

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: July 13, 1979

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Forwarded to:

Mr. F. G. Turpin  
President  
Alyeska Pipeline Service Company  
1835 South Bragaw  
Anchorage, Alaska 99504

SAFETY RECOMMENDATION(S)

P-79-16 through -19

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At 8:45 a.m., Alaska daylight time, on June 10, 1979, the pilot of a helicopter reported sighting oil on the surface of the Atigun River near the route of the Alyeska Pipeline Service Company's 48-inch crude oil pipeline. The oil was seen on the north side of Atigun Pass, 166 miles south of the pipeline terminal at Prudhoe Bay, Alaska. Alyeska was notified and began shutdown procedures at 9 a.m. By 9:28 a.m. the north section of the line between pump stations Nos. 1 and 4 was shut down. By 10:46 a.m. the entire line had been shut down. The pipe between pump stations Nos. 4 and 5 was drained.

The leak was uncovered at 2:00 p.m. on June 11. The pipeline at this location was buried in bedrock with 12 feet of cover on a slope of approximately 15 to 18 degrees. The leak was approximately 1,300 feet north of the summit of Atigun Pass about 200 feet uphill from an insulated box. The leak was through a 7-inch-long, 1/64-inch-wide crack, which passed through a longitudinal weld. The crack was one of several small cracks on and near a wrinkle in the pipe. Only one crack went all the way through the 0.462-inch-thick wall of the pipe. The pipe at this location had wrinkled in two sections. Looking south, the wrinkles were between 9 and 11 o'clock and between 1 and 3 o'clock. The wrinkles were approximately 7 inches from peak to valley.

Company work crews completed a temporary repair weld at 2 p.m. on June 12, so that the transportation of the crude oil could be resumed. The wrinkle in the pipeline was of such a configuration that temporary repair clamps could not be used. Line start-up was initiated immediately. The repair was confirmed as holding at 3:30 p.m. Flow was increased gradually until normal flow, 1.2 million barrels per day, was reached at 8:00 a.m. on June 14. The pipeline had been shut down for about 62 hours.

Alyeska fabricated a permanent split-sleeve repair clamp and moved it to the leak site. This clamp was welded over the wrinkled area on June 15 and 16. Alyeska does keep leak repair clamps in stock for emergency use but not of a configuration to fit over wrinkled pipe. If the temporary weld could not have been made strong enough to hold, the line could have been shut down for a period longer than 62 hours.

Five days after the first leak, at 3:15 p.m. on June 15, the pilot of an Alyeska helicopter on a routine surveillance flight reported a leak north of pump station No. 12 near the Little Tonsina River, but no oil had entered the river. Because of the apparent small size of the leak and because no oil had entered the river, Alyeska decided that the system would not have to be shut down.

Alyeska began excavating during the evening of June 15 and uncovered the leak at 4:00 a.m. on June 16. Oil was leaking through a 3-inch crack along the heat-affected zone of a longitudinal weld, not in the weld metal proper. This crack was also near a wrinkle in the pipe. The leak was approximately 2,000 feet north of pump station No. 12, and the pipeline in this area is on a relatively flat slope. The pipe is buried in what was considered to be thaw-stable <sup>1/</sup> silts and gravel with 4 feet of cover. The ground had apparently settled on each side of the leak. The wrinkle at this location was at 9 o'clock looking north. The size of the wrinkle and the width of the crack was difficult to determine because of oil spraying from the crack.

By 4:23 p.m., Alyeska completed a temporary repair by placing two Smith clamps across the crack. Another split-sleeve repair clamp designed to fit over the temporary repair clamps had to be fabricated in Anchorage. The repair work was completed on June 18.

The June 10 spill resulted in a release of approximately 1,500 barrels (63,000 gallons) of crude oil; the June 15 spill resulted in a release of approximately 300 barrels (12,600 gallons) of crude oil; these losses were estimated by Alyeska personnel at the leak site. The spills were too small to be verified by the Alyeska metering system. Metallurgical tests will be made on samples of pipe from both leaks.

During construction of the pipeline, buried sections of the system were required to be insulated, except when buried in bedrock or thaw-stable ground. The first leak was in a buried section considered to be

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<sup>1/</sup> Thaw-stable ground is frozen bedrock or soils containing little or no ice. Thaw settlement is not a problem in thaw-stable earth.

in bedrock, and the second leak was considered to be in thaw-stable ground. Therefore, neither section was insulated. Both leaks were at wrinkles in the pipe. The pipeline at the second leak appeared to have settled.

Before beginning construction of this facility, Alyeska entered into a formal agreement with the U.S. Department of the Interior, which outlined construction and operating practices that Alyeska was to follow to insure the safe operation of the facility. One of the operating requirements called for the development and use of a curvature monitoring program to detect, record, and analyze aberrations in the vertical and horizontal curvature of the pipe at critical locations along the pipeline. Alyeska developed a "super-pig" to run through the pipe to perform this measurement requirement.

Curvature monitoring runs were to be completed periodically according to the agreement. The pipeline has been carrying oil since June 1977. Baseline data definition was completed for the super-pig in May 1978. A confirmation run to authenticate the baseline was completed in December 1978, but no monitoring runs have yet been undertaken. The confirmation run showed no significant curvature differences when compared to the baseline. In order to maintain proper surveillance, the Safety Board believes that Alyeska should be performing these monitoring activities regularly, at least quarterly, before and after each freeze/thaw cycle. The wrinkles in the pipe near each of the leaks probably could have been detected by the monitoring system if it had been operational. The next run of the super-pig is scheduled for July 1979. Based on the past performance of Alyeska in following through on curvature monitoring runs, the Safety Board is concerned about possible delay in completing the scheduled run.

Therefore, the National Transportation Safety Board recommends that Alyeska Pipeline Service Company:

Complete the scheduled run of the curvature monitoring device expeditiously to determine other locations with abnormal buckles or bends. (Class I, Urgent Action)  
(P-79-16)

Develop and implement an inspection program adequate to detect curvature aberration. Inspections should be completed at least quarterly. (Class I, Urgent Action) (P-79-17)

Reevaluate the ground stabilization in all areas where the pipeline is buried without insulation in bedrock

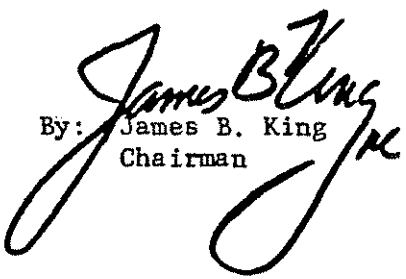
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or ground considered to be thaw stabilized. Take corrective action where ground movement has occurred due to thawing. (Class I, Urgent Action) (P-79-18)

Fabricate a variety of special split-sleeve repair clamps large enough to encompass pipe wrinkles similar to those encountered in the latest failures. These repair sleeves should be stored to provide for rapid disposition to leak sites. (Class I, Urgent Action) (P-79-19)

KING, Chairman, DRIVER, Vice Chairman, and McADAMS, Member, concurred in these recommendations. GOLDMAN, Member, did not participate.

By:  James B. King  
Chairman