100-P-155

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: April 28, 1980

Forwarded to:

Honorable Carlos Romero Barcelo
Governor
Commonwealth of Puerto Rico
Box 82, La Fortaleza
San Juan, Puerto Rico 00902

SAFETY RECOMMENDATION(S)

P-80-23 through -25

At 11:20 a.m., on January 30, 1980, several explosions and a subsequent fire killed one person and extensively damaged approximately 25 houses and other property adjacent to a small canal in the Sector Cana of Bayamon, Puerto Rico. The Safety Board's continuing investigation has revealed that the explosions and fire were caused by the ignition of gasoline that had leaked from a break in an 8-inch, refined petroleum products pipeline, which had been struck and ruptured by excavation equipment.

Earlier that morning, the Water Authority of Puerto Rico had been using a paving breaker 1/ to remove a cement anchor that supported a 6-inch water line in order to replace a damaged water valve that had been leaking for several days. Unable to remove the anchor with its own equipment, the water authority personnel at the site requested help from highway department personnel who were also at the site. The verbal request was granted, and the highway department contractor moved a ripper 2/ to the site. During the second attempt to remove the concrete anchor, the ripper struck and punctured the pipeline which was located 3 inches below the water line.

Blueprints from the water authority and the pipeline company showed that the steel, coated and cathodically protected, high-pressure pipeline ran parallel to the water line; however, at the point of the accident, investigators found that those lines crossed each other perpendicularly. Neither the ripper operator nor the water authority personnel at the site knew the pipeline was at this location.

1/ A paving breaker is a hydraulic or air-operated piece of equipment used to break or fracture pavement.
2/ A ripper is the name given to a bulldozer which has as a part of its excavation equipment a heavy, metal, extendable tooth resembling a plow.

PAR-80-6

Gasoline under approximately 300-psig pressure gushed from the 10-inch by 8-inch hole in the pipeline and sprayed down a 45-degree hill into a creek and flowed downstream to a residential area. The fire, which originated somewhere downstream, burned back upstream until it reached the pipeline break. On its approximately 2.5-mile path, the fire traversed 1 mile of the open canal, approximately 1/2 mile of underground canal, and 1 mile of the creek's curved natural course up to the rupture. The flames destroyed the tropical vegetation, gardens, and domestic animals that were located approximately 20 feet on each side of the canal and creek. The body of a fatally injured youth was found approximately 150 feet down the hill, between the pipeline break and the creek where he and other persons had been collecting the leaking gasoline for their personal use.

The pipeline, which is operated by Shell Oil Company (Puerto Rico) Limited under the name of the Pipelines of Puerto Rico, Incorporated, is owned by Shell, Texaco, and the Commonwealth Oil Refinery of Puerto Rico (CORCO). It is the longest pipeline system on the island of Puerto Rico and extends 78.2 miles from Guayanilla Pump Station in the CORCO Refinery to Catano dock and terminal in San Juan. An additional 9.3 miles of 6-inch pipeline extends from Catano terminal to the Fuel Storage at the San Juan International Airport. The pipeline was installed from 1965 to 1967. Approximately 99 percent of the pipeline lies within the rights-of-way of main public roads and main city and town streets from the Guayanilla Pump Station to the San Juan International Airport.

The investigation disclosed that the pipeline had not been marked by wood stakes or paint marks on the ground at the accident site where heavy highway construction was underway. The location of the utilities is requested verbally and usually marked by the personnel on site, without reference to blueprints or use of a pipeline locator. 3/ The Safety Board is concerned that this casual method of locating utilities poses an unnecessarily high risk to public safety. The Safety Board is also concerned that the accident occurred at the beginning of the construction of a new highway, sections of which will use the existing road right-of-way where the pipeline is buried. The first 1.275 miles (2.04 kilometers) of this new highway will cross the pipeline at four other locations in the next 18 months. The remainder of the new highway also will cross the pipeline at several points. The investigation disclosed that formal preconstruction meetings, which could have included the telephone company, the highway department, the water authorities, the pipeline company, and other concerned parties, were not held. A "one-call" system (Centro de Excavaciones) does exist; however, few, if any, participants utilize it properly; they do not notify utilities in advance of proposed excavations.

The most effective method of preventing excavation-caused damage to underground facilities is to notify the operators of utility companies in advance of the proposed excavation work to allow the operators to properly mark the location of their facilities before excavation begins. The most convenient method to make this notification is through a "one-call" system. A "one-call" notification system establishes a center to which an excavator can make one telephone call to notify the center of the date and location of a proposed project. The center then alerts each participating operator of underground facilities near the work area so the operator can locate and properly mark its

3/ A pipeline locator is an electronic device consisting of transmitting and receiving units and earphones. The locator is used to find the exact centerline of an underground pipeline.

facilities. There are now 107 "one-call" systems operating in 42 States and U.S. territories. In a 1978 special study, 4/ the Safety Board reported that a 1977 survey of "one-call" systems found a markedly downward trend in damage to underground facilities after the "one-call" system was established in an area. The greatest number of accidents to underground facilities after the "one-call" system was established was attributed to excavators who did not notify the operators of underground facilities before undertaking excavation. Throughout the United States, the "one-call" notification system has been effective in reducing accidents and damages similar to this accident at Bayamon.

The Safety Board believes that, to protect the public and the utility companies in the construction area, the high-pressure petroleum pipeline should be well-marked, inspected, and relocated as necessary to allow the highway department to operate its heavy equipment safely. The Safety Board also believes that similar accidents can be prevented if the parties involved in a construction project communicate effectively before excavating. Therefore, the National Transportation Safety Board recommends that the Governor of the Commonwealth of Puerto Rico:

> Direct contractors, utilities, and other excavators on highway or other construction projects to utilize properly the established "one-call" notification system (Centro de Excavaciones) so that the public can be protected against similar accidents. (Class I, Urgent Action) (P-80-23)
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> Direct the utilities of Puerto Rico to update all their maps and records to facilitate the accurate marking of their underground facilities. (Class II, Priority Action) (P-80-24).
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> Require that preconstruction meetings be held before the initiation of highway or other construction projects. All affected parties should be in attendance at the meetings and all facilities should be marked before construction. (Class II, Priority Action) (P-80-25)

Because almost all of the 3 million inhabitants of Puerto Rico conduct their business and keep their records in Spanish, and in order to communicate effectively and acquire from all sources the necessary information, the Safety Board's investigation on the Bayamon accident is being conducted in the Spanish language.

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

By: James B. King
Chairman

4/ "Safe Service Life for Liquid Petroleum Pipelines" (NTSB-PSS-78-1).