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National Transportation Safety Board
Washington, D.C. 20594

Safety Recommendation

Date: FEB 7 1995

In Reply Refer To: **P-95-8 and -9**

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About 11:55 p.m. on March 23, 1994, a 36-inch diameter pipeline owned and operated by Texas Eastern Transmission Corporation (TETCO) ruptured catastrophically in Edison Township, New Jersey, within an asphalt plant compound. The force of the rupture and of natural gas escaping at a pressure of about 970 psig (pounds per square inch gauge) excavated the soil around the pipe and blew gas hundreds of feet into the air, propelling pipe fragments, rocks, and debris more than 800 feet. Within 1 to 2 minutes of the rupture, one of several possible sources ignited the escaping gas, sending flames upward 400 to 500 feet in the air. Heat radiating from the massive fire ignited the roofs of several building roofs in a nearby apartment complex. Occupants, alerted to the emergency by noises from escaping gas and rocks hitting the roofs, fled from the burning buildings. Approximately 1,500 apartment residents were evacuated. Miraculously, no deaths directly resulted from the rupture and resulting fire. Most injuries were minor foot burns and cuts that the apartment residents sustained from the hot pavement and glass shards as they fled the complex. Damage from the accident exceeded $25 million.[1]

In the early 1960s, when TETCO was planning to add a new pipeline, which it designated Line 20, across New Jersey, the accident site was in a Class 2 location, i.e., an area that was on the fringe of a township, that was used for farming or for industrial purposes, and that had fewer than 20 buildings intended for human occupancy within 1 square mile. In anticipation of residential growth, the pipeline company designed the line using, as a minimum, the more restrictive Class 3 location standards. When TETCO built Line 20, the company complied fully with New Jersey statutes that new high-pressure pipelines be constructed away from buildings. However, the State

[1] For more detailed information, read Pipeline Accident Report–*Texas Eastern Transmission Corporation Natural Gas Pipeline Explosion and Fire, Edison, New Jersey, March 23, 1994* (NTSB/PAR-95/01).

statutes had no provisions limiting the construction of buildings adjacent to pipelines. Over the years, as local governments granted permits for building construction near Line 20, the original separation distance between the pipeline and structures was substantially reduced.

The Safety Board has previously identified the need for local and State government agencies, which generally have the authority to control land use and building construction, to consider the public safety risks presented by pipelines in urban settings.

Following its investigation of a March 15, 1983, pipeline accident in West Odessa, Texas,[2] in which six people died, the Safety Board expressed concern about the responsibilities of planning officials and about government land-use policies. In that accident, an owner/resident in a new housing development and his relative were drilling holes with an auger to plant trees when they struck and ruptured a liquid petroleum gas (LPG) pipeline. The escaping gas initially pooled and vaporized, forming an explosive gas-in-air mixture that was ignited. The LPG being blown into the air by the pressure in the line then ignited, forming a fireball that engulfed the relative operating the auger and the resident's home. The auger operator and the four residents of the mobile home were burned fatally; the owner sustained serious burns and died 5 days later. The fire also threatened the residents of the home on the adjoining lot. They escaped with minor burns only by breaking and fleeing through a back window in their home.

As a result of the West Odessa accident investigation, the Safety Board concluded that new public policy should be developed to improve public safety as it relates to the proximity of pipelines to populated areas, including:

> Defining the role of Federal, State, and local governments concerning land planning for land adjacent to pipelines;
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> Placing restrictions on the use of land adjacent to pipelines;
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> Determining what information should be communicated to prospective users about adjacent pipelines; and
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> Informing prospective users about the existence of and potential hazards of nearby pipelines.

The Board further concluded that crafting public policy for land development adjacent to pipelines would require extensive research and would involve incorporating the views from many interests, including the general public, pipeline operators, land developers, local, State, and Federal government agencies, and many others. Noting the ability of the Transportation Research Board (TRB) of the National Academy of Sciences to bring diverse interests groups together to formulate practical public safety policy, the Safety Board recommended that the TRB:

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[2] For further information, read Pipeline Accident Report–*Mid-America Pipeline System Liquefied Petroleum Gas Pipeline Rupture, West Odessa, Texas, March 15, 1983* (NTSB/PAR-84/01).

Assess the adequacy of existing public policy for surface and subsurface use of land adjacent to pipelines that transport hazardous commodities to provide reasonable public safety. Based on the findings of the assessment, develop a recommended policy to correct identified deficiencies in current policy (P-84-30).

In 1988, the TRB published *Pipelines and Public Safety (Special Report 219)*,[3] which synthesized policies and practices for enhancing public safety near pipelines through damage prevention programs, land-use measures, and emergency preparedness programs. The report identified many policies and practices used to enhance public safety near pipelines, but concluded that government and industry applies these measures unevenly. The report recommended that State and local governments:

- Enact damage prevention statutes that clarify enforcement responsibility, increase contractor liability, and stipulate that permitting agencies must require, as a condition of permit approval, proof that applicants for building or excavation permits have notified the pipeline company/one-call system.

- Prohibit construction of structures on pipeline rights-of-way and ensure access to pipelines is unobstructed.

- Institute a referral and approval procedure that requires pipeline operator review of subdivision plans, site plans, and variances for all properties that have a pipeline easement.

- Modernize land records systems to ensure that information about the types of easements, easement boundaries, and holders of easements by parcel is readily accessible to local planners.

- Prepare, in consultation with pipeline operators and developers, planning guidelines for safely integrating pipelines easements into development projects and protecting the lines during construction; incorporate these guidelines in comprehensive plans, zoning ordinances, and building codes.

- Consider building setbacks and low-density development near transmission pipeline rights-of-way in densely populated areas with high concentrations of pipeline mileage where the risks of damaging a pipeline may be sufficiently great, and the consequences sufficiently severe to warrant special measures; provide development bonuses to compensate the developer for loss of developable property.

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[3] National Academy of Sciences, Transportation Research Board, *Pipelines and Public Safety (Special Report 219)*, Washington, D.C.

The report also included model/sample documents for damage prevention legislation, right-of-way agreements, State legislation for subdivision plan review, guidelines for subdivision developments near pipeline rights-of-way, and local setback ordinances.

After reviewing the TRB report, the Department of Transportation's Research and Special Programs Administration (RSPA) "wholeheartedly" supported the report's recommendation that local governments should determine the appropriate use of land near pipelines and enact laws to prevent development on pipeline rights-of-way. Following the Edison accident, RSPA contracted the New Jersey Institute of Technology (NJIT) in August 1994 to perform a study on methods to reduce the risks and enhance pipeline safety and environmental protection with respect to the siting and proximity of pipelines to the public and sensitive environments. RSPA noted that the existing population-based requirements, which were considered adequate for assessing risk in the past, proved to be inadequate in the Edison, New Jersey accident. RSPA acknowledged the need to reevaluate pipeline safety regulations in 49 CFR Parts 192 and 195 as they related to the proximity of pipelines to populated and environmentally sensitive areas. RSPA noted that land use, including population concentration and surrounding environment, should be considered in the evaluation. The contract requires that the institute:

- Develop a framework for effective environmental and public safety requirements in the areas of land use, siting, and rehabilitation and retrofitting practices; compare this framework with existing regulatory requirements and industry practices and recommend needed improvements.

- Assemble two groups consisting of no more than seven members to provide technical assistance on factual matters and to give the institute feedback needed in completing the analytical requirements of the contract. One group shall be composed of individuals having pipeline engineering and technical expertise and the other of representatives from the environmental community and representatives having expertise in New Jersey land use and zoning matters.

- Study the probability of failures that can occur on gas transmission and hazardous liquid pipelines and identify the factors that cause pipeline failures. The institute shall consider failures that might occur anywhere along the pipeline corridor, but shall concentrate on failures that occur at high risk areas and environmentally sensitive areas, such as urban areas and water bodies used for human consumption.

The Safety Board believes that the NJIT contract offers significant potential for rationally quantifying the risks posed to public safety by high-pressure pipelines in urban areas, for assessing the effectiveness of government requirements in reducing identified risks to acceptable levels, and for identifying what additional actions may be needed and by whom.

The Safety Board has asked RSPA to make the NJIT study widely available to local and State governments when it is completed. However, completion of and dissemination of the study will not ensure that recommended actions are enacted. The Safety Board therefore reviewed the objectives and capabilities of several associations to determine which would be best able to translate the study results into guidance suitable for implementation by local and State governments and to work with and encourage them on implementation.

The members of the American Public Works Association (APWA) comprise many engineers and/or municipal planners. The Safety Board recognizes that through its reports and other efforts, the APWA can be instrumental in helping develop policies and practices on surface and subsurface use of land adjacent to pipelines to provide reasonable public safety.

Therefore, the National Transportation Safety Board recommends that the American Public Works Association:

> Develop, in coordination with the American Society of Civil Engineers, the International City/County Management Association, and the American Planning Association, model programs and statutes and/or guidelines for local and State governments to implement the recommendations from the New Jersey Institute of Technology's study on enhancing public safety near high-pressure pipelines. (Class II, Priority Action)(P-95-8)
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> Advise your Members of the public safety concerns addressed in this accident report and urge them to implement the improvement recommendations in the Transportation Research Board's Report 219. (Class II, Priority Action)(P-95-9)

Also, the Safety Board issued Safety Recommendations P-95-1 through -4 to the Research and Special Programs Administration, P-95-5 through -7 to the Texas Eastern Transmission Corporation, P-95-10 and -11 to the Interstate Natural Gas Association of America, P-95-12 and -13 to the Association of Oil Pipe Lines, P-95-14 and -15 to the American Petroleum Institute, P-95-16 and -17 to the American Gas Association, P-95-18 and -19 to the American Society of Civil Engineers, P-95-20 and -21 to the International City/County Management Association, and P-95-22 and -23 to the American Planning Association. The Safety Board is also reiterating P-87-4 and P-90-21 to the Research and Special Programs Administration. If you need additional information, you may call (202) 382-0672.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations P-95-8 and -9 in your reply.

Chairman HALL and Members HAMMERSCHMIDT and FRANCIS concurred in these recommendations.

By: Jim Hall
Chairman