



LOG - R-650D

# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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Date: March 2, 1995

In reply refer to: R-95-15 through -17

Mr. David R. Goode  
Chairman, President, and  
Chief Executive Officer  
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Norfolk, Virginia 23510-2191

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On June 6, 1994, a conductor for the Norfolk Southern Railway Company detected product leaking from the bottom of tank car UTLX 79211 in the Norfolk Southern Harry deButts yard in Chattanooga, Tennessee. The tank car contained 12,184 gallons of a 75-percent concentration of arsenic acid, which is classified as a poisonous material and also designated as a marine pollutant under the Department of Transportation (DOT) Hazardous Materials Regulations.

A total of 3,079 gallons of arsenic acid was released from UTLX 79211. An undetermined amount of the arsenic acid entered the storm drain system for the yard. Although the sluice gate for the storm drain system was closed, arsenic-contaminated water from the storm drain system was discharged into Citico Creek about 1 1/2 miles upstream of the mouth of the creek into the Tennessee River. The intake pipes for the city's municipal water supply cross the mouth of the creek and extend about 175 feet into the Tennessee River. Cleanup, containment, and disposal costs were estimated at \$8.77 million as of January 31, 1995. There was no evacuation, and no injuries were attributed to the release.<sup>1</sup>

The tank car involved in the release of arsenic acid was tank car UTLX 79211, a DOT specification 111A100W1 tank car, built by the Union Tank Car Company (Union) in March 1966. Because of the jacket and insulation covering the tank shell of UTLX 79211, Norfolk Southern personnel at the deButts yard were unable to determine the precise location of the leak from UTLX 79211 and assumed the leak was coming from multiple locations. Although the leak was not from multiple

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<sup>1</sup> National Transportation Safety Board 1995. Tank car failure and release of arsenic acid in Chattanooga, Tennessee, on June 6, 1994. Hazardous Materials Accident Report NTSB/HZM-95/01. Washington, DC.

locations, the trainmaster correctly concluded by 0330 that the leak could not be stopped without offloading the tank car. The trainmaster also correctly recognized that the tank car, if left in its current location, would not be accessible to emergency responders and the equipment and vehicles that were needed to contain the spill and offload the tank car. Therefore, the trainmaster directed the yardcrew to move the tank car to a location that would be more accessible to emergency responders.

The trainmaster was aware that storm drains were located throughout the yard; however, many of these drains were covered with ballast and were not visible. The movement of UTLX 79211 was also made in darkness. Under these circumstances, the placement of the tank car near the storm drain was unfortunate but was not due to carelessness. However, the placement of UTLX 79211 near a storm drain could have been avoided if there had been designated containment tracks or areas within the yard for leaking tank cars. A 1988 tank car spill in the deButts yard that resulted in a discharge into Citico Creek and revealed that the sealing capabilities of the sluice gate system were inadequate should have sensitized the railroad to the need for a containment area within the yard. Consequently, the Safety Board concludes that Norfolk Southern failed to adequately anticipate and plan for the best location within the deButts yard to place a leaking tank car. Yard facilities should include designated areas where cars that develop leaks that cannot be readily stopped may be placed to contain the leaking cargo and to provide access for offloading operations. The need for containment areas is especially important when leaking cargoes are environmentally harmful and nearby water supplies can be threatened. The Safety Board, therefore, believes that Norfolk Southern should identify and designate within the deButts yard, and its other rail yards that handle tank cars carrying hazardous materials, areas where leaking tank cars can be placed to contain the leaking cargo and to provide access for offloading operations.

Although the trainmaster was aware of the hazards of the arsenic acid as a poison and as a designated marine pollutant by 0330 on June 6, he did not view the incident as a major leak (for poison liquids, corrosives, and non-flammable gases). However, the leak was beyond the capabilities of yard personnel to manage, and the leaking arsenic acid posed an environmental threat. Norfolk Southern's definition of a major leak from a tank car is based solely on the subjective description of the leak as a steady continuous stream or heavy gas and does not take into account equally important considerations such as the location of the leak on the tank car, its accessibility, whether the leak can be readily stopped, and the potential threats to the environment or long-term public health, including contamination of water supplies. For jacketed and insulated tank cars such as UTLX 79211, the bottom shell and sump areas are not readily visible and accessible. Because the trainmaster did not perceive the leak of arsenic acid from UTLX 79211 to constitute a major leak as defined in the emergency plans, the trainmaster did not have a sense of urgency to directly notify the Chattanooga fire department that he would have had if he believed the leak from UTLX 79211 was a major leak. Because the notification procedures are prompted by the definition of a major leak that fails to consider any

of the factors previously described, the existing definition for a major leak is not adequate to provide meaningful guidance to Norfolk Southern employees to assess the need to directly notify local emergency responders. Therefore, the Safety Board believes that Norfolk Southern should revise its definition of a major leak to include these other equally important considerations.

Although the maximum concentration of arsenic in the finished water never exceeded the Environmental Protection Agency standard of 0.05 ppm, the actions of the State's Water Pollution Control division in Chattanooga to have the Tennessee Valley Authority maintain an increased flow of water in the Tennessee River likely minimized the potential contamination of the municipal water supply. However, events during the emergency response suggest that neither the fire department nor Norfolk Southern recognized the potential seriousness or severity of the hazardous materials release in terms of the environmental consequences and cleanup efforts. Yard personnel did not begin to close the sluice gate until nearly 1 hour after the leak was detected and at least 45 minutes after the trainmaster knew that the arsenic acid was a marine pollutant. The storm drain system for the yard was not completely isolated until the electric pumps were disconnected, about 7 hours after the leak was detected, although there is no evidence that the pumps ever operated. Because of the design and configuration of the storm drain system, the arsenic acid, once it entered the storm drain system, eventually would be discharged into Citico Creek through either the main drain pipe or the backup drain pipe. To prevent the contamination of the creek, the storm drain system should have been, but was not, isolated as soon as the environmentally harmful characteristics of the arsenic acid were known.

Although Norfolk Southern knew at 0340 (when the trainmaster made his report to the dispatcher) that the arsenic acid posed an environmental threat and that the leak could not be stopped or contained by yard personnel, Norfolk Southern did not attempt to contact an environmental contractor until 0630. The delay in contacting an environmental contractor, particularly one not in the Chattanooga area and therefore unable to respond to the scene for several hours, indicates that Norfolk Southern did not recognize the seriousness of the environmental threat or appreciate the measures that would have to be taken to clean up the released arsenic acid. Further, although a local contractor was subsequently contacted by Norfolk Southern and obtained the lime, rolls of plastic, absorbent materials, and a child's swimming pool for a catch basin, these actions were taken nearly 5 hours after the leak was first detected. Once these materials were obtained, there was virtually no effort by the fire department or Norfolk Southern to use these materials until the arrival of shipper and environmental contractor personnel between 1100 and 1300.

The incident commander recognized that the fire department had no way to contain the leaking acid and that offloading of the tank car was the only solution to stop the release. Further, he did not believe that the benefit from limited containment actions—such as placing a drum beneath the tank car—were worth the risk to the personnel performing the work. He also did not believe that there was a

safe means readily available to handle the drums once they became filled with leaking cargo. More importantly, the incident commander, knowing that the acid had already entered the storm drain system, believed that the storm drain system was isolated, and that additional acid spilling into the storm drain system would not adversely affect the situation.

These actions collectively demonstrate that the Norfolk Southern and the Chattanooga fire department failed to adequately recognize the potential environmental consequences of not responding more expeditiously to the release. Had Norfolk Southern or the fire department recognized the environmental consequences, they may have been prompted to take more aggressive action to contain the leaking cargo rather than waiting until the arrival of shipper and environmental contractor personnel. Therefore, the Safety Board believes that the actions of Norfolk Southern and the fire department would have been more timely and efficient had Norfolk Southern's definition of a major leak included leaks that had the potential to damage the environment and had Norfolk Southern identified containment areas in the deButts yard.

The circumstances of this accident also raise concerns about the lack of joint training and coordination between the city of Chattanooga and Norfolk Southern. Exercises or drills have not been regularly conducted between the fire department and the deButts yard to assess the effectiveness of their respective emergency action plans. The in-service calls made annually by the fire department to the yard only familiarize firefighters with the physical layout of the yard. Prior to the accident, there had not been any type of regular exchange between the fire department and the deButts yard to discuss the types of hazardous materials releases that could occur at the yard, the consequences of such a release, and the actions each could be expected to take in such an accident. If effective emergency response exercises between the city and Norfolk Southern had been conducted and the other improvements addressed above been in place, a more timely response with sufficient resources to contain the leaking cargo would likely have been initiated.

The Safety Board most recently addressed these issues in a 1991 safety study on the transport of hazardous materials by rail.<sup>2</sup> The Board concluded in this study that many railroads and community emergency response organizations have not jointly developed written emergency response plans and procedures and have not regularly participated with community emergency response organizations in joint disaster drills of simulated emergencies.

Consequently, the Safety Board recommended on July 1, 1991, that all class I railroads and railroad systems, including Norfolk Southern:

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<sup>2</sup> National Transportation Safety Board. 1991. Transport of hazardous materials by rail. Safety Study NTSB/SS-91/01. Washington, DC.

Develop, implement, and keep current, in coordination with communities adjacent to your railroad yards and along your hazardous materials routes, written emergency response plans and procedures for handling releases of hazardous materials. The procedures should address, at a minimum, key railroad personnel and means of contact, procedures to identify the hazardous materials being transported, identification of resources for technical assistance that may be needed during the response effort, procedures for coordination of activities between railroad emergency response personnel, and the conduct of disaster drills or other appropriate methods to test emergency response plans. (R-91-15)

In its initial response to the recommendation, dated July 30, 1991, Norfolk Southern indicated that it had developed an emergency action plan for hazardous materials incidents that was available at all yard facilities and on file with certain company officials. Norfolk Southern also advised the Safety Board that it maintained separate yard plans that included information about hazardous materials passing through the yard, emergency response telephone numbers for local hospitals, the police department, and the fire department. On November 1, 1991, Norfolk Southern provided additional information about its efforts to coordinate with communities along its rail lines. The company indicated that it intended to share copies of the individual yard plans and the emergency action plan with local communities. Norfolk Southern also described training provided to local emergency response personnel, and the participation of Norfolk Southern officials on local emergency planning committees. Based on these responses, the Safety Board classified Safety Recommendation R-91-15 to Norfolk Southern "Closed--Acceptable Action" on December 17, 1991.

The circumstances of this accident suggest that additional efforts are needed to improve Norfolk Southern's response when environmentally harmful materials are involved in accidents. The Safety Board believes, therefore, that Norfolk Southern should initiate and participate in emergency response drills and exercises with local emergency response agencies at all rail yards within its operating system. The Safety Board is also urging Hamilton County and the city of Chattanooga to coordinate with and involve regional and local transporters of hazardous materials, such as railroads and trucking companies, in planned emergency response drills and exercises.

Although such actions may improve the regional and local emergency response efforts in Chattanooga, the Safety Board is concerned about actions to improve emergency responses to environmentally harmful materials on a national level. The Safety Board believes the circumstances of this accident provide an example of the importance of effective emergency response preparedness. The Safety Board is recommending, therefore, that the Association of American Railroads advise its members of the circumstances of this accident and encourage its members to evaluate their emergency response plans to ensure that the plans adequately address the release of environmentally harmful materials within a yard facility, including the

containment of leaking cargo and the procurement of necessary response equipment and personnel.

Therefore, as a result of its investigation of this accident, the National Transportation Safety Board recommends that the Norfolk Southern Corporation:

Identify and designate within the deButts yard, and the company's other rail yards that handle tank cars carrying hazardous materials, areas where leaking tank cars can be placed to contain the leaking cargo and to provide access for offloading operations. (Class III, Longer Term Action) (R-95-15)

Revise Norfolk Southern's definition of a major leak to incorporate guidance about factors such as the location of the leak on the tank car, its accessibility, whether the leak can be readily stopped, and the potential threats to the environment or to long-term public health, including contamination of water supplies. (Class II, Priority Action) (R-95-16)


Initiate and participate in emergency response drills and exercises with local emergency response agencies at all rail yards within the Norfolk Southern operating system. (Class II, Priority Action) (R-95-17)

Also as a result of this accident investigation, the Safety Board issued safety recommendations to the Federal Railroad Administration, the Research and Special Programs Administration, the Union Tank Car Company, the Association of American Railroads, the Hickson Corporation, Hamilton County Emergency Services, the city of Chattanooga, and the Railway Progress Institute.

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 vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations R-95-15 through -17 in your reply.

Chairman HALL, Vice Chairman FRANCIS, and Member HAMMERSCHMIDT concurred in these recommendations.

By:

  
Jim Hall  
Chairman