



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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**Date:** July 16, 1999

**In reply refer to:** R-99-4 through -6

Mr. Pete Carpenter  
President and Chief Executive Officer J-120  
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About 12:37 p.m. eastern daylight time on Saturday, June 20, 1998, 30 of the 148 cars making up eastbound CSX train Q316 derailed at Cox Landing, West Virginia. Of the derailed cars, three were loaded with hazardous material, and eight others contained hazardous material residue. Two of the loaded cars were damaged in the pileup and leaked a combined volume of about 21,500 gallons of formaldehyde solution. No one was injured during the derailment of the train; however, 15 persons reported minor injuries as a result of the release of formaldehyde. Total damages in the accident exceeded \$2.6 million.<sup>1</sup>

The National Transportation Safety Board determined that the probable cause of this derailment was an unstable roadbed that resulted from the inadequate or ineffective measures taken by CSX Transportation, Inc., to permanently correct known drainage problems in the accident area.

The investigation determined that the first wheel of train Q316 to derail was on the leading axle of the trailing truck of the 74th car on the train, car CCX 752. This determination was based on the fact that all wheels of the first 73 cars were on the track when the front portion of the train came to rest. Additionally, wheel marks visible on the crossties and on the center sill of CCX 752 indicated that this car had derailed first, as did the break in the top weld of the coupler carrier, which indicated that the car had dropped off the rails and continued, at least momentarily, while the following car remained on the rails.

The first wheel to derail climbed the east rail, which was the outside rail of the beginning of a 3° left-hand curve at MP 207.9. Following cars then derailed, and the train separated between the 77th and 78th cars. As the 78th car left the roadbed and plowed into a ditch, the cars following it, many of them containing hazardous materials, left the tracks and became involved in the general pileup.

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<sup>1</sup> For more information, read Railroad Accident Report—*Derailed of a CSX Freight Train and Subsequent Hazardous Material Release at Cox Landing, West Virginia, June 20, 1998* (NTSB/RAR-99/01).

Car CCX 752 was carefully examined after the accident to determine if a mechanical defect in the car had caused the derailment. CSX inspectors partially disassembled the car and performed a detailed examination of car components in the presence of Safety Board and FRA representatives. The detailed inspection revealed no mechanical defect in the car.

On February 26, 1999, CCX 752 was involved in a second derailment about 33 miles from the first. Although the same car derailing twice in less than a year in the same relative area raises questions about the mechanical condition of the car, several important attributes of the car were different in the two derailments. Of major significance is that at the time of the second derailment, the car was loaded, as opposed to being empty at Cox Landing. Also, in the second derailment, the side bearing clearances were outside the recommended range, while investigators determined that the clearances at the time of the Cox Landing accident were within tolerance. Further, the second derailment occurred at a site of track surface deviations where special trackwork—a turnout and guardrail—complicated the track geometry. The Cox Landing derailment occurred at the beginning of a slight curve with no special trackwork. Finally, the second accident occurred after substantial work had been performed on the car, including replacing the wheel sets on the B-end and replacing a truck bolster and one side frame.

No inspections of car CCX 752 performed after the Cox Landing derailment and in the presence of Safety Board investigators and FRA representatives pinpointed any defect in the car that would have caused it to derail. Although this car is a covered hopper which, as a class of car, has a higher center of gravity when loaded and is more susceptible to being “rocked” off the rails than some other car types, no evidence was found after the Cox Landing accident to indicate that car CCX 752 was more likely to derail than other cars of its type. The Safety Board therefore concluded that the Cox Landing derailment was not caused by a mechanical defect in the empty covered hopper that was the first car to derail.

In addition to the mechanical condition of the rolling stock, the Safety Board investigation also addressed the condition of the roadbed in and near the accident area.

Railroad track structure supports the weight of trains by distributing the load over a relatively wide area. The weight of the train is transferred from the rails to the crossties and from the crossties to the track ballast. The track ballast and subballast rest on the roadbed. Although different types of roadbed soil will react differently to an excessive amount of water, complete water saturation will generally destabilize a roadbed. To avoid such saturation, the track system, including ballast and subballast, must be able to guide both rain and drainage water away from the track structure. The track ballast allows water to drain through it, while the subballast should be impermeable, guiding water away from the subgrade and into the drainage ditches that parallel all railroad right-of-ways. These ditches are designed to flow water away from the track and toward culverts or terrain features that will channel the water away from the roadbed.

Before the accident, no culverts or other effective means of channeling water away from the track bed were located in the derailment area. According to statements from local residents, water stood in the ditches alongside the track until it either evaporated or soaked into the roadbed. At least partly because of the lack of effective drainage, the area in and around MP 207.9 had experienced instances of subgrade and surface problems, which had resulted in speed

restrictions being placed on trackage in the derailment area. Track inspection records indicated that several locations near the derailment site had had track surface defects. In February 1998 and again in May 1998 (about 1 month before the accident), surface defects resulted in slow orders being issued for the accident area.

CSX was aware of and had attempted to address the roadbed instability in the vicinity of the derailment by adding ballast or other fill material. These measures, however, while temporarily effective, did not permanently solve the problem of roadbed instability, as indicated by the fact that in the area of the derailment, track inspectors noted numerous defects in cross level and curve elevation during the 12 months preceding the accident. In June 1998, the effects of inadequate drainage were exacerbated by above-average rainfall, which further contributed to roadbed saturation and made the roadbed even less able to maintain the integrity of the track geometry under load. With the roadbed thus weakened, the weight of trains passing through the area contributed to an irregular track surface. At some point, perhaps during the passage of train Q316 itself, the weakened subgrade allowed the cross level to degrade to the point that the cars passing through the area incurred a high degree of longitudinal roll. This rolling action would have decreased vertical force on the wheels on the outside rail of the curve and thus would have allowed, as happened in this accident, the flange of one or more wheels to “lift” and ride on top of the rail. The Safety Board therefore concluded that drainage in the accident area was inadequate and that, as a result, the roadbed in the derailment area likely became water-saturated, rendering the track structure unable to maintain track integrity under the load of train Q316.

While CSX added culverts and fill material to correct drainage problems, these measures may not address all the existing or potential drainage problems along the subdivision. Moreover, portions of the Ohio River Subdivision consist of lighter, older rail with observable, if relatively minor, defects in the form of head-checks. At least one of the several accidents that occurred on the subdivision before the Cox Landing derailment was caused by a broken rail. Also, some of the ties in the general area of the accident appeared to Safety Board investigators to be in poor condition. The Safety Board is concerned about these conditions, because the subdivision closely parallels the Ohio River, and the daily passage of two large trains carrying a variety of hazardous materials represents a significant risk to the river and the residents along it, should a derailment occur.

The Safety Board investigation also addressed emergency response after the accident. A derailed car struck the vertical riser on a residential gas meter located within 40 feet of the centerline of the tracks. Damage to the riser resulted in a gas leak that lasted for several hours. Gas service personnel were called, but they were not allowed to approach the damaged riser because of concern that the chlorine tank cars might also be leaking. However, because of concern about the gas leak itself, the incident commander directed gas company employees to shut off gas service in the immediate area at the site.

Without access to shut-off valves at the site, gas company employees were unable to repair the damaged riser or isolate the 2-inch line. As an alternative, pipeline personnel considered isolating the 6-inch gas main by closing shutoff valves, but they were concerned about the large number of residential and industrial customers that would be affected. In any event, because of the

location of the valves and the pressure and volume of gas in the line, blocking the 6-inch line would not have immediately stopped the leak.

The incident commander eventually allowed the gas service crew to access the damaged riser and determine if the 2-inch service line could be shut down. Following their inspection, the service crew capped the 2-inch service line, but the line remained charged with pressurized gas, since the line had not been isolated from the 6-inch main supply line.

Because railroad and gas company personnel did not coordinate their activities before railroad contractors began working in the area of the gas line, railroad contractors did not know that the gas line was still charged. They stated that, had they known, they would not have carried out the wreckage-clearing operations the next day that severed the gas line and created a second gas leak in the area. This released gas, if ignited, could have injured nearby recovery workers and destroyed or damaged property. Although the gas did not ignite, its release posed a safety hazard to those in the area. The Safety Board concluded that railroad wreckage-clearing operations and pipeline operations were not effectively coordinated and unified under an effective command structure,<sup>2</sup> which placed excavation personnel at risk while they worked in the vicinity of a natural gas line. A unified incident command structure would have ensured better commitment from and participation by railroad, pipeline, and public safety officials in decision-making throughout the emergency response, wreckage-clearing, and environmental remediation activities.

The need for increased communication and coordination between railroads and pipeline operators has been demonstrated in other Safety Board accident investigations.<sup>3</sup> In its investigation of an Amtrak passenger train derailment on CSX tracks near Intercession City, Florida, on November 30, 1993, the Safety Board concluded that the lack of a cooperative action plan between CSX and the pipeline operator contributed to a breakdown in communication during wreckage-clearing operations. After its investigation of the Intercession City accident, the Safety Board asked CSX, in Safety Recommendation R-95-32, to develop procedures for coordinating emergency response and wreckage-clearing operations with public safety officials to ensure that the actions of its employees and its contractors do not endanger personnel safety or the facilities of others on or adjacent to the railroad right-of-way. In its June 6, 1997, response, CSX stated that it had revised emergency response coordination policy to require that operations center personnel determine whether pipelines are likely to be in the area of any emergency. If they are, on-scene personnel must be notified of the possible existence of pipelines and must coordinate with the pipeline operators and public safety officials. On the basis of this response, Safety

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<sup>2</sup> See National Response Team Incident Command Technical Assistance Document: *Managing Response to Oil Discharge and Hazardous Substances Under the National Contingency Plan*, published by the National Response Team, May 1996. (Available at <http://www.nrt.org>)

<sup>3</sup> For example, see Railroad Accident Report—*Derailement of Southern Pacific Transportation Company Freight Train on May 12, 1989, and Subsequent Rupture of Calnev Petroleum Pipeline on May 25, 1989, at San Bernardino, California* (NTSB/RAR-90/02); Railroad Accident Report—*Atchison, Topeka and Santa Fe Railway Company (ATSF) Freight Trains ATSF 818 and ATSF 891 on the ATSF Railway, Corona, California, November 8, 1990* (NTSB/RAR-91/03); Highway Accident Report—*Collision of Amtrak Train No. 88 with Rountree Transport and Riggings, Inc., Vehicle on CSX Transportation, Inc., Railroad Near Intercession City, Florida, November 30, 1993* (NTSB/HAR-95/01); and Railroad Accident Report—*Derailement of Freight Train H-BALTI-31 Atchison, Topeka and Santa Fe Railway Company Near Cajon Junction, California, on February 1, 1996* (NTSB/RAR-96/05).

Recommendation R-95-32 was classified “Closed—Acceptable Alternative Action” on September 11, 1997.

Despite the CSX response to Safety Recommendation R-95-32, however, at least in the area of this accident, CSX did not have adequate procedures in place to facilitate the level of on-scene coordination necessary to have prevented putting railroad workers at risk during wreckage-clearing operations.

CSX records indicated that the company had a program of community outreach and emergency response training assistance for rail transportation accidents involving hazardous materials. According to CSX officials, on at least two occasions, in 1997 and 1998, the company offered to provide hazardous materials training to local emergency responders in the Cabell and Wayne County areas; however, these offers apparently received no response, with the result that no such CSX-sponsored training was conducted. The company gave no indication that CSX representatives made any follow-up effort when no response to its offer of training was made. CSX has, since the accident, developed an 8-hour advanced course for emergency responders, but this training is provided on an “as requested” basis.

In the view of the Safety Board, CSX should much more actively promote its company-sponsored hazardous materials training. More active promotion and better follow-up on offers of training would help ensure that local emergency responders are prepared for a railroad emergency. CSX benefits from the transportation of cargo, including hazardous materials, along the Ohio River Subdivision, and the company is acutely aware of the potential hazards to persons and the environment in the event of an accident involving its trains. The Safety Board therefore believes that CSX should examine its hazardous materials outreach program with the objective of ensuring that emergency response agencies are fully prepared for an emergency involving CSX trains.

Based on its investigation of this accident, the National Transportation Safety Board makes the following safety recommendations to CSX Transportation, Inc.:

Perform a comprehensive engineering analysis and evaluation of track and roadbed conditions on the Ohio River Subdivision and develop a plan and a timetable for correcting existing or potential deficiencies, including inadequate drainage, that may affect the safe passage of trains and the safe shipment of hazardous materials through the area. Provide to the National Transportation Safety Board a schedule to correct the deficiencies found during the evaluation. (R-99-4)

Develop and implement incident coordination procedures that will ensure that safety-critical operations during wreckage-clearing activities are coordinated with all parties involved in those activities. (R-99-5)

Review and revise, as necessary, in light of this accident, your community outreach and training assistance programs to ensure that all emergency response groups that may be called upon to respond to an incident or accident involving your railroad receive the necessary training on a timely and recurring basis. (R-99-6)

Also, the Safety Board issued Safety Recommendations R-99-3 to the Federal Railroad Administration, R-99-7 through -10 to Cabell and Wayne Counties' Local Emergency Planning Committee, and R-99-11 to Mountaineer Gas Company.

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 action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you within 90 days regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations R-99-4 through -6 in your reply. If you need additional information, you may call 202-314-6435.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

By: Jim Hall  
Chairman