

Log R-631C



# National Transportation Safety Board

Washington, D. C. 20594

## Safety Recommendation

Date: October 9, 1991

In Reply Refer To: R-91-59 through -62

Mr. Robert L. Kirk  
President and Chief Executive Officer  
CSX Transportation, Inc.  
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About 11:20 a.m. central daylight time on July 22, 1989, CSX Transportation, Inc., freight train R-331-22 derailed near Freeland, Michigan. The train consisted of 2 locomotive units, 17 loaded freight cars, 15 empty freight cars, and an unoccupied caboose. Of the 14 freight cars that derailed, 6 were tank cars that sustained damage resulting in either partial or total loss of load. A flatcar (ATSF 90005) carrying a heat recovery steam generator, which was being transported as an excess dimensional load, overturned, and the module was destroyed. One nearby residence was destroyed by the fire that ignited following the release of hazardous materials. About 1,000 residents were evacuated for 7 days after the accident. No one was killed; 11 people were treated for injuries. Estimated damage exceeded \$4 million.<sup>1</sup>

The Safety Board believes that as ATSF 90005 passed through the main track turnout and approached the point of derailment (POD), irregularities in track geometry, such as the track warp at the heel of the frog, combined with the jointed rail, initiated lateral and vertical forces that caused excessive harmonic roll movement on the car.<sup>2</sup> Harmonic roll transferred the weight of the load from one side of the car to the other, unloading vertical forces on diagonally opposite wheels of the same truck and at diagonally opposite corners of the car. While the vertical forces were unloaded, the lateral dynamic forces caused ATSF 90005's lead wheel set to move from the normal wheel interface position and to lose flange contact with the gauge side of the rail head.

<sup>1</sup>For more detailed information, read Railroad Accident Report--"Derailment of CSX Transportation Inc. Freight Train and Hazardous Materials Release Near Freeland, Michigan on July 22, 1989" (NTSB/RAR-91/04).

<sup>2</sup>Excessive lateral rocking of cars, usually at low speeds and associated with jointed rail. The speed range over which this cyclic phenomenon occurs is determined by factors such as the wheel base, height of each car's cg, and the spring dampening associated with each vehicle's suspension system.

The Board also believes, based on several factors, that harmonic roll did not have to be sustained or severe to cause an accident with this type of car carrying this type of load. One such factor is the short distance between the track warp at the heel of the frog and the initial POD at Freeland; another is the statements by the traincrew who observed a similarly loaded car (PC 766071) derail and overturn in Lansing. Although the irregular track conditions near the derailment were within allowable tolerances for FRA class 3 track and did not greatly affect standard cars with typical ride characteristics, the combination of conditions may have been sufficient to induce rocking that lifted and moved the wheels on ATSF 90005 at this location.

When track geometry is irregular, the lead axle of a truck is most severely affected; it absorbs the initial impact caused by track warp and depresses the track structure for the axles that follow. Where track irregularities exist, heavy loads may produce excessive bearing, which must be absorbed by a car's wheels, axles, and suspension systems; by its ability to torque around its longitudinal and rotational axes; and by the track structure. In this accident, ATSF 90005's ability to twist was probably diminished by the truss work that had been fabricated to the car to accommodate the excess dimensional load.

The Safety Board concludes that atypical freight cars, such as ATSF 90005 and similarly loaded and maintained cars, are more susceptible to harmonic roll and wheel lift because of their high combined cg, which amplifies lateral motion. This susceptibility is exacerbated by improper side bearing clearance, inadequate suspension, and inability to absorb torque. Insufficient side bearing clearance impaired ATSF 90005's ability to dampen lateral motion. In addition, ATSF 90005 was vertically rigid; free travel in its truck spring system was restricted because of a load weight approaching the car's limit and less than optimum spring capacity, as evidenced by the full compression of the truck springs.

During the Board's investigation of this accident, four heavy-capacity flatcars associated with a series of derailments involving HRSG modules were inspected and major safety deficiencies were found. The deficiencies included improper side bearing clearance on heavily loaded cars, improper coupler heights, improper bolster gib clearances, loose and missing safety appliances, train lines dragging below top of rail, and numerous minor safety deficiencies. Given the condition of the cars, the Safety Board concludes that they were allowed to continue in service despite repeated, albeit inadequate, inspections by ATSF and CSX and that they were interchanged for some time in spite of the safety deficiencies.

In addition to inspections of ATSF 90005 at Chanute, Kansas, and Chicago, Illinois, train R-331-22's brakeman had inspected the car before it departed Flint on the day of the accident. Nonetheless, the Safety Board's postaccident inspection of ATSF 90005 indicated insufficient side bearing clearance at 11 of 12 locations on the car. The condition of the components used to establish side bearing clearance suggests that inadequate clearance had been a pre-accident and ongoing condition of ATSF 90005. Neither ATSF's nor CSX's inspections had resulted in the identification and correction of the defective condition before the accident, and the Safety Board is, therefore, concerned about the adequacy of the inspections being performed.

In fact, the inadequacy of car inspection at almost every point of car movement during the shipment of HRSG modules concerns the Safety Board. Heightening that concern are the reservations recently expressed about the adequacy of freight car

inspections following the investigation of a CSX freight train derailment at Akron, Ohio, on February 26, 1989. In its report on that accident,<sup>3</sup> which resulted in the release of hazardous materials and subsequent fire, the Safety Board recommended that the AAR emphasize the need for car inspectors to check side bearing and gib clearance during inspections.

ATSF 90005 had derailed three times on the CSX (twice while loaded with an HRS module and once while empty) in less than a year before the Freeland accident. CSX officials should have been concerned about the repeated derailment of a car, especially one that was loaded with a high dollar value shipment. The Safety Board believes that CSX should have considered the derailment record of this car before placing it in a train consist in which hazardous materials were to be carried.

The Safety Board also believes that all carriers should have access to the complete derailment history of special-use, heavy-capacity flatcars. The Board therefore urges the FRA to require that carriers report all derailments involving such flatcars to the AAR and recommends that the AAR implement and maintain a reporting system that makes that information available.

The General Code of Operating Rules, which has been adopted by some 38 railroads, requires that, subject to available seating, crewmembers ride in the control compartment of the locomotive and that the conductor ride in the control compartment when he is on the head end of a train. CSX operating rules do not require that conductors ride in any particular location on a train. Nonetheless, the conductor is in charge of the train under CSX rules and is generally responsible for train operations and for other train crewmembers.

In the Freeland accident, the conductor was riding on the head end because switching performed en route had resulted in placement of a hazardous materials car next to the caboose. FRA regulations preclude anyone from riding in the caboose in that situation. When the conductor moved to the head end, he positioned himself in the second locomotive unit. While the conductor was in that unit, the engineer repeatedly blocked the deadman pedal and abandoned the locomotive controls in the lead unit. Had the conductor been riding in the control compartment of the lead locomotive unit, he would have been better positioned to determine whether the engineer was adhering to the operating rules to and to advise the engineer if he was not.

In the Freeland accident, the traincrew arrived at the hospital to have toxicological samples collected about 3 hours after the derailment despite the crew's participation in emergency response activities and a delay by the conductor and engineer, who prepared accident reports while the assistant trainmaster inquired about routine duties. Nonetheless, the samples actually analyzed were not obtained until about 7 1/2 hours after the accident. The Safety Board believes the assistant trainmaster inadvertently provided "agreement" rather than "FRA" test kits for sample collection because he did not understand FRA and CSX requirements for postaccident toxicological testing. In the Board's opinion, documentation of this and other delays would help individuals involved in the toxicological sample collection process understand and comply with FRA requirements.

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<sup>3</sup>Hazardous Materials Accident Report--"Derailment of a CSX Transportation Freight Train and Fire Involving Butane, Akron, Ohio, February 26, 1989" (NTSB/HZM-90/02).

The Safety Board believes that CSX decided to collect a second set of toxicological samples and have the first set destroyed in an effort to comply with the strictest possible interpretation of FRA requirements. However, CSX officials did not first seek advice from the FRA about what that interpretation should be. As was apparent from testimony by the FRA's special counsel for the alcohol and drug program, the FRA considers toxicological testing a sensitive area that requires everyone involved in sample collection to act responsibly in order to avoid violating the Fourth Amendment rights of individuals being tested. The FRA conducted a comprehensive education program for carriers before the alcohol and drug rules went into effect. It held regional seminars throughout the country, distributed instruction manuals, and responded to extensive questioning. As in the case of other regulatory requirements, the FRA wants the carriers to administer this program based on the published regulations. Nonetheless, in a situation such as the one following the Freeland accident, in which officials were confused about collection requirements, the FRA stated that it would have welcomed a request for guidance and would have provided timely advice.

The first set of samples had not been compromised for purposes of toxicological analysis. CSX could either have forwarded the sealed samples in an appropriate shipping container to the FRA-approved laboratory or sent them to a laboratory to be "portioned out" (split) and then forwarded a sample portion to the FRA-approved laboratory for analysis. If CSX had sought advice from the FRA, the two parties may have been able to identify other options. The Safety Board agrees with the FRA that destruction of the first set of toxicological samples was "unnecessary and unfortunate." The Board does not support CSX's position that destruction of that set of samples was appropriate or its position that future toxicological samples should be destroyed if collected under similar circumstances. The Safety Board urges CSX to reconsider these positions and to seek advice from the FRA before any toxicological samples are destroyed in the future.

The brakeman admitted that he had consumed several gin and tonics and had used about 1 gram of cocaine the night before the accident; he also stated that he felt "kind of hung over" the next day. Blood and urine specimens taken 7 1/2 hours after the accident contained cocaine and cocaine metabolite levels sufficient to support the brakeman's admission. Since the stimulant action of cocaine can lead to insomnia and since alcohol adversely affects sleep, it is unlikely that the brakeman slept much the night before the accident and may have been fatigued the following morning.

The Safety Board believes the brakeman was not fit for duty on the day of the accident as a result of cocaine and alcohol usage the night before. Although the brakeman's performance was not a factor in the accident, his apparent use of cocaine is troubling, since someone in his position must be alert, have good judgment, and be prepared to respond quickly to various situations in order to carry out his duties. Moreover, studies have shown that drug users have an increased accident rate and thus may not only be susceptible to accidents but may also represent a threat to their fellow workers.

The Safety Board expressed concern about timely collection of toxicological samples in its 1988 study of the impact of alcohol-drug use on railroad safety.<sup>4</sup> Collection times in a sample from 46 railroad accidents in 1987 ranged from 1 1/2 to 14 hours; the average was 5 1/2 hours. As a result of its study, the Safety Board recommended on August 9, 1988, that the FRA:

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Amend 49 CFR Part 219 to require railroads to collect all appropriate toxicological samples as soon as practicable and not more than 4 hours after the triggering event. Written explanation of the reason(s) for failure to collect samples within 4 hours or not at all must be submitted to the Federal Railroad Administration.

Delays in sample collection seriously limit the ability to identify and quantify drugs that are rapidly metabolized. These drugs include, depending on the extent of the delay, cocaine, the psychoactive component of marijuana, and alcohol. Delays in sample collection also increase the difficulty and uncertainty in determining whether an individual was impaired at the time of the accident. Thus, blood and urine samples should be obtained from surviving crewmembers as quickly as possible. If collection cannot be carried out within 4 hours, samples should still be obtained, but the analytical measurements and interpretation of positive results become more difficult.

The Independent Safety Board Act Amendments of 1990 (Public Law 101-641) recognize the importance of timely collection of samples for toxicological testing. Section 5 of the law states in part:

When the Department of Transportation, including any of its agencies, conducts postaccident or postincident testing of an employee of the Department, specimen collection shall be accomplished as soon as practicable after the accident or incident, and the Department shall endeavor when feasible to complete such collection within four hours after the accident or incident.

Public Law 101-641 also requires that agency heads in DOT report to the Office of the Secretary the amount of time required to complete specimen collection related to a toxicological test.

Therefore, the National Transportation Safety Board recommends that CSX Transportation, Inc.:

Perform a complete inspection of heavy-capacity and special flatcars accepted in interchange. This inspection should include documentation that the subject car complies with all existing requirements in the Field Manual of the AAR Interchange Rules. (Class II, Priority Action) (R-91-59)

Until the Federal Railroad Administration establishes a reporting system, immediately notify the shipper and car owner about a derailment involving a special-use, heavy-capacity flatcar. (Class II, Priority Action) (R-91-60)

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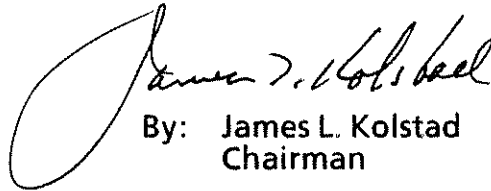
<sup>4</sup>Safety Study--"Alcohol/Drug Use and Its Impact on Railroad Safety" (NTSB/SS-88/04).

Issue operating rules that require freight train conductors to ride in the controlling compartment of the locomotive. (Class II, Priority Action) (R-91-61)

Provide annual training on proper procedures for collecting toxicological samples for CSX officers who may be involved in collecting such samples. (Class II, Priority Action) (R-91-62)

Also, the Safety Board issued Safety Recommendations R-91-51 through -54 to the Federal Railroad Administration; R-91-55 and -56 to the Association of American Railroads; I-91-1 to the Silicon Health Council; R-91-57 and -58 to Dow Corning Corporation; and R-91-63 and -64 to the Atchison, Topeka and Santa Fe Railway Corporation. Also, the Safety Board reiterates R-89-50 to the Federal Railroad Administration.

KOLSTAD, Chairman, COUGHLIN, Vice Chairman, and LAUBER, HART and HAMMERSCHMIDT, Members, concurred in these recommendations.



By: James L. Kolstad  
Chairman