



National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Date: October 9, 1991

In Reply Refer To: R-91-51 through -54

Honorable Gilbert C. Carmichael
Administrator
Federal Railroad Administration
400 7th Street, S.W., Room 8206
Washington D.C. 20590

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.¹

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.² 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.

¹For 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).

²Excessive 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 HRSO 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,³ 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 HRSO 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.

Train R-331-22 was not equipped with a functioning multi-event recorder. Consequently, train handling information was largely derived from what the traincrew related. Recorded train speed was of limited usefulness since the manner in which the train was controlled in this accident was more important than speed. Vital information, such as quantified braking, throttle manipulation, and the chronological relationship between power-to-braking and braking-to-power, was not available. The Safety Board concludes that the absence of event recorder data hindered this investigation.

Section 10 of the Rail Safety Improvement Act of 1988⁴ directs the Secretary of Transportation to:

Issue such rules, regulations, standards, and orders as may be necessary to enhance safety by requiring trains to be equipped with event recorders.

The Safety Board's position regarding mandatory use of event recorders in the railroad industry has been well documented.⁵ In 1989, following its investigation of

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

⁴Public law 100-342, June 22, 1988.

⁵See, for example, Railroad Accident Report--"Head-on Collision between Iowa Interstate Railroad Extra 470 West and Extra 406 East With the Release of Hazardous Materials, near Altoona, Iowa, July 30, 1988" (NTSB/RAR-89/04); Railroad Accident Report--"Derailment of Southern Pacific Transportation Company Freight Train on May 12, 1989 and Subsequent Rupture of Calnev Pipeline on May 25, 1989 San Bernardino, California" (NTSB/RAR-90/02); and Railroad Accident Report--"Derailment of a CSX Transportation Freight Train and Fire Involving Butane, Akron, Ohio, February 26, 1989" (NTSB/HZM-90/02).

a head-on collision between two freight trains in Altoona, Iowa, the Board issued the following safety recommendation to the FRA:

R-89-50

Expedite the rulemaking requiring the use of event recorders in the railroad industry.

The Safety Board subsequently reiterated this safety recommendation to the FRA, which has indicated that it expects to publish by mid-1991 a notice of proposed rulemaking that would require the use of event recorders by the railroad industry. Safety Recommendation R-89-50 has been classified "Open--Acceptable Action" pending publication of a final rule.

Therefore, the National Transportation Safety Board recommends that the Federal Railroad Administration:

Require that carriers inspect special-use rail equipment, such as heavy-capacity flatcars, before those cars are offered for service and thereafter at a frequency to be determined by the Federal Railroad Administration. (Class II, Priority Action) (R-91-51)

Require that carriers immediately notify the shipper and car owner about a derailment involving a special-use, heavy-capacity flatcar. (Class II, Priority Action) (R-91-52)

Require that carriers report derailments involving special-use, heavy-capacity flatcars to the Association of American Railroads, which will maintain a record of the derailment history of all such cars. (Class II, Priority Action) (R-91-53)

Determine, using owners' records of derailments for special-use, heavy-capacity flatcars under load, whether handling of such equipment should be restricted in trains that include tank cars or hopper cars transporting hazardous materials and cars carrying shipments of class A and B explosives. (Class II, Priority Action) (R-91-54)

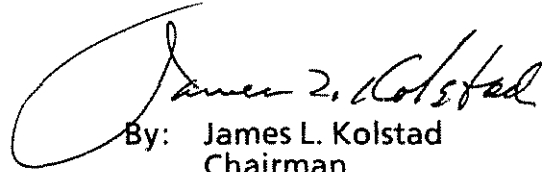
The Safety Board is also reiterating its recommendation that the Federal Railroad Administration:

R-89-50

Expedite the rulemaking requiring the use of event recorders in the railroad industry.

Also, the Safety Board issued Safety Recommendations 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 the Dow Corning Corporation; R-91-59 through -61 to the CSX Transportation, Inc.; and R-91-63 and -64 to the Atchison, Topeka and Santa Fe Railway Corporation.

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


By: James L. Kolstad
Chairman