

Log R-446

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: August 9, 1983

Forwarded to:

Honorable Thomas A. Till  
Deputy Administrator  
Federal Railroad Administration  
400 Seventh Street, S.W.  
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

R-83-79 through -82

About 4:42 a.m. on March 22, 1983, 13 cars (including 3 tank cars and 10 boxcars) of Illinois Central Gulf Railroad Company (ICG) train SML-4-21, 1st No. 64, engine 702, derailed in a 2° left curve at Fort Knox, Kentucky, while moving about 28 mph. During the derailment, two tank cars containing chloroprene overturned, and chloroprene began leaking from a dome valve of one of the cars. At 9:00 a.m., three E.I. DuPont hazardous material experts from Louisville, Kentucky, arrived at the derailment site. About 9:45 a.m., the leak was stopped. Evacuation of the area was not necessary. There were no injuries as a result of the accident. Damage was estimated at \$199,831. 1/

The postaccident investigation revealed that the outside curve rail was excessively worn and was shelling. Experience indicates that shelling leads to detail fractures in the railhead and weakens the rail. Detail fractures are the result of the excessive contact stresses of heavy wheel loads for a long time and, as such, are fatigue-related defects. The growth of a detail fracture from shelling occurs rapidly in contrast to other transverse fissures. The continued use of the worn rail subjected it to shelling and the subsequent development of detail fractures.

On July 25, 1980, train No. 64 (the "chemical dispatch"), consisting of 4 locomotive units and 17 cars, including 7 placarded tank cars containing hazardous materials, derailed in a 6° curve at Muldraugh, Kentucky. 2/ The train derailed about milepost 26.6, located about 5 miles north of Fort Knox. Two tank cars transporting vinyl chloride were punctured, and the contents were ignited and burned. Four crewmembers received minor injuries in the derailment, and about 6,500 persons were evacuated from the surrounding area. The Safety Board determined that the probable cause of the accident was "the tipping of the outside rail and widening of track gage in the 6° curve because of the combined effects of defective crossties, excessively worn rail, irregular alignment and gage, and the lateral forces produced by the train's speed. Inadequate maintenance and inspection practices of the ICG allowed these conditions to remain uncorrected. Contributing to the accident was the inadequate Federal Track Safety Standards which failed to provide for a track structure commensurate with the permitted train speeds."

1/ For more detailed information, read Railroad Accident Report — "Derailment of Illinois Central Gulf Railroad Company Freight Train, Fort Knox, Kentucky," March 22, 1983 (NTSB-RAR-83-7).

2/ For more detailed information, read Railroad Accident Report—"Illinois Central Gulf Railroad Company Freight Train Derailment, Hazardous Material Release, and Evacuation, Muldraugh, Kentucky, July 26, 1980" (NTSB-RAR-81-1).

As a result of the Muldraugh accident, the Safety Board recommended that the Federal Railroad Administration (FRA):

Promulgate regulations which designate the limit of acceptable rail wear and which require railroads to remove from active tracks rails that are worn beyond the acceptable limits. (R-81-35)

On December 22, 1981, the FRA responded that since the gage measurement is specifically addressed in the existing track safety standards, defective gage conditions as defined should limit the rail usage relative to wear. The Safety Board, however, interpreted the FRA's responses to mean that a rail in the outside of a curve could wear as much as 1 1/4 inches if there is no wear on the other rail. Because the Safety Board did not agree with the FRA's response, Safety Recommendation R-81-35 was classified as "Closed--Unacceptable Action." Adjusting the rail position to compensate for excessive wear on the gage side to maintain track gage within Federal requirements for the class of track involved, or turning the rail, does not fully cover the intent of recommendation R-81-35. The 7/8-inch wear on the rail in the curve at Fort Knox was probably not considered detrimental by the ICG from an operating standpoint. However, the Safety Board believes it was detrimental from a load bearing standpoint. Increased wear, which causes a narrowing of the railhead and running surface, decreases the structural integrity of the rail and leads to other defects, such as shelling, which then makes the rail vulnerable to detail fractures. The Safety Board urges the FRA to reconsider the establishment of rail wear limit standards.

On February 6, 1983, 4 locomotive units and 27 cars in the "chemical dispatch" derailed in a 5° curve at Vine Grove, Kentucky, about 5 miles south of Fort Knox. No one was injured in the derailment. Five tank cars containing vinyl chloride and one tank car containing caustic soda were among the derailed cars. A small amount of caustic soda leaked from a dome area fitting of the car. Because of the involvement of the vinyl chloride, about 50 persons were evacuated from nearby residences as a precautionary measure. The Safety Board is investigating the accident and although the probable cause of the derailment has not yet been confirmed, wide track gage is suspected. A broken rail believed to have been broken during the accident was found at the point of derailment.

The track condition and volume of hazardous materials on the route between Fulton and Louisville, Kentucky, warrants immediate attention to protect the public from the possibility of a catastrophic hazardous materials derailment. The ICG's actions in response to the Safety Board's recommendations in the Muldraugh accident report were not sufficient to prevent this derailment and the condition of the track raises concern about the possibility of future derailments. The potential for disaster is too great to continue moving hazardous materials over this route at speeds of up to 40 mph. The FRA should immediately impose speed restrictions on trains carrying hazardous materials on this route. It should make immediate on-site track inspections of the route and other routes of the ICG system which carry hazardous materials to determine the condition of the tracks and impose such restrictions as may be indicated.

The Safety Board investigated an accident on the Southern Pacific Transportation Company (SP) at Thermal, California, which occurred January 7, 1982. <sup>3/</sup> The investigation disclosed several fractures near a rail joint. The railheads exhibited battering at the fractures, and it was noted that the railhead displayed shelly spots.

<sup>3/</sup> For more detailed information read, Railroad Accident Report—"Derailment of Southern Pacific Transportation Company Train No. 01-BSNFF05 Carrying Radioactive Material at Thermal, California, January 7, 1982" (NTSB-RAR-83-1).

Metallurgical analysis performed by the SP's testing facility determined that two of the fractures were detail fractures which originated from shelling. Detail fractures differ from other transverse defects because they are not the result of metallurgical factors, such as inherent inclusions<sup>4/</sup> in the rail steel. Rather, they are the result of the excessive contact stresses of heavy wheel loads over an extended time frame, and as such, are fatigue-related defects. The growth of detail fracture from shelling occurs rapidly in contrast to other transverse fissures. Such phenomena should have been considered by the ICG management when it left the curve worn rail in service in the face of indications it had reached its service life limit. The continued in-service use of the worn rail subjected it to shelling and the subsequent development of detail fractures. Safety Recommendation R-83-14 was issued to the FRA on January 28, 1983, with the accident report.

In a letter dated July 29, 1983, the FRA responded to this safety recommendation and asserted that the Federal Track Safety Standards contained in 49 CFR 213 provided a detailed schedule of frequency and manner of inspecting track. The FRA further stated that 104 instructional classes had been conducted for FRA inspectors regarding track inspections as a part of FRA's regional inspection and enforcement activities. The Safety Board has historically been at odds with the FRA as to the adequacy of the guidance provided by the track safety standards. As stated by the Board on page 21 and 22 of its report on the Thermal, California, accident,

The prescribed remedial action depended on the track inspector's subjective determination of whether or not the condition required that the rail be replaced.

Safety Recommendation R-83-14 was issued with the intent of removing that subjective determination of rail condition. The track safety standards, as amended in September 1982, did not do this, and the FRA response of July 29, 1983, is not considered acceptable as a response to R-83-14. Therefore, based on the circumstances of the Fort Knox accident, the Safety Board reiterates to the FRA Safety Recommendation R-83-14:

Develop, validate, and implement a model plan of recommended inspection practices containing clearly defined limits of allowable track structure conditions for the use of industry employed railroad track inspectors to facilitate uniform and knowledgeable appraisals of defective track structure conditions.

Train 1st No. 64 was being operated according to ICG operating procedures and in compliance with authorized speed requirements. However, despite the work the ICG has done on the Louisville District, the track condition still appears to have been marginal for a Class 3 classification. Given the volume of hazardous material that is moved over the line, the Safety Board believes that the FRA should impose speed restrictions over the line until the track is made safe for the movement of hazardous materials. The potential for disaster is too great to continue allowing the movement of hazardous materials over inadequately maintained track at speeds up to 40 mph.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Federal Railroad Administration:

<sup>4/</sup> A small quantity of gas or slag trapped in molten steel during the process of manufacturing rail which remains in the rail after it cools.

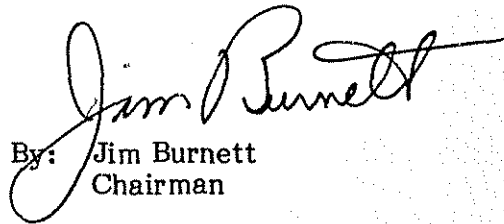
Immediately issue an emergency order to reduce the speed of all trains carrying hazardous materials in the Louisville District of the Illinois Central Gulf Railroad Company until a safe speed can be determined by the Federal Railroad Administration. (Class I, Urgent Action) (R-83-79)

Immediately conduct a one-time emergency on-site inspection of the track in the Louisville District of the Illinois Central Gulf Railroad Company to assign the appropriate classes of track for that District. (Class I, Urgent Action) (R-83-80)

Evaluate the adequacy of the Illinois Central Gulf track inspection program and take remedial action as necessary. (Class II, Priority Action) (R-83-81)

Conduct on-site spot checks of other routes of the Illinois Central Gulf Railroad Company which carry hazardous materials for defective track conditions and where warranted conduct a comprehensive on-site emergency track inspection and assign the appropriate class of track. (Class II, Priority Action) (R-83-82)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY and ENGEN, Members, concurred in these recommendations. McADAMS, Member, did not participate.

  
By: Jim Burnett  
Chairman