R-431C

PORTATION SAFETY BOARD
/ASHINGTON, D.C.

ISSUED: January 28, 1983

Forwarded to:

Mr. P. H. Croft
President
The American Short Line Railroad Association
2000 Massachusetts Avenue, N. W.
Washington, D.C. 20036

SAFETY RECOMMENDATION(S)

R-83-10 and -11

About 9:50 p.m., P.s.t., on Thursday, January 7, 1982, Southern Pacific Transportation Company (SP) freight train No. 01-BSMFF-05, derailed 14 cars at Thermal, California, while traveling about 57 miles per hour on the tangent single main track. Four transients riding on the train were seriously injured, a fifth transient died as a result of injuries. No crewmembers were injured as a result of the accident. The presence of radioactive material in the derailed Trailer-On-Flat-Car train was discovered about 1 hour after the accident occurred, resulting in the handling of the emergency response effort as a serious radiological emergency. Contributing to misdirected emergency response efforts was erroneous and conflicting information concerning hazardous material on the train. Accurate information regarding the precise nature of the radioactive material shipment was not available at the accident site until about 5 hours after the derailment occurred; at that time, radiological emergency procedures were terminated. Damage was estimated to be about $1,015,350. 1/

Metallurgical analysis of the broken rail indicated that two of the fractures were detail fractures which originated from shelling. Shelling is a condition which occurs when contact stresses between wheels and the railhead exceed the elastic limit of the steel, and can result in deformation and subsurface shear in the railhead. The subsurface shear normally originates in a longitudinal plane, but then turns downward to a transverse plane. Detail fractures are unique in contrast to other transverse defects because they are not the result of metallurgical factors such as inherent inclusions 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 a detail fracture from shelling occurs rapidly in contrast to other transverse fissures. The remaining rail fractures were caused by instantaneous overstress, which probably occurred during the derailment. The fact that the rail fracture surfaces displaying detail fractures were battered also indicated that the detail fractures preceded the instantaneous overstress fractures. Although the precise moment of the rail failure could not be established, the signal's momentary flash from green (clear) to red (stop) to green (clear), as train No. 01-BSMFF-05 approached, indicated a momentary disruption of the signal circuit, which was conveyed through the rails. The dynamics imposed on the rails by the approaching train could have caused a slight longitudinal motion of the rails inducing the momentary disruption of the signal circuit. The Safety Board believes that the initial rail failure most likely occurred before the passage of train No. 01-BSMFF-05.

1/ For more detailed information, see Railroad Accident Report--"Derailment of Southern Pacific Transportation Company Train No. 01-BSMFF-05, Carrying Radioactive Material, at Thermal, California, January 7, 1982" (NTSB-RAR-83-1).

detail fr... ...and
sh... ...of a potential rail failure. At the time of the accident, Section 213.113(b) of the Federal Railroad Administration's (FRA) Track Safety Standards prescribed the remedial action to be taken when shelly spots became evident in rails. The prescribed remedial action depended on the track inspector's subjective determination of whether or not the condition required that the rail be replaced. If the inspector decided that the shelling condition required that the rail be replaced, a 20-mph speed restriction was to be imposed and the rail was to be scheduled for replacement. If the inspector decided that the condition did not require that the rail be replaced, the rail then had to be inspected for internal defects at intervals of not more than every 12 months. Since the carrier determined that the rail did not require replacement and had inspected the rails for internal defect conditions on April 27, 1981, it considered itself to be in compliance with the Federal regulations. The degree or limits of surface defects listed in Section 213.113(b) are not defined by the FRA. The condition becomes a deviation from the FRA track standards only if the track owner's designated inspector decides that the rail condition is serious enough to require replacement of the rail. In this regard, the FRA track standards can have the effect of tacitly condoning excessive delay by a railroad in the replacement of defective rail.

On April 27, 1981, the SP inspected the rails for internal defects to comply with Section 213.237 of the FRA's Track Safety Standards, which require that once a year a search for internal defects be made on Classes 4 through 6 track. The report of that inspection contained a footnote stating, ". . .cut off work. . .acct. too many defects. . . ." The discovery of 10 separate internal rail defects within the 15 miles of track internally inspected on April 27, 1981, should have served as a warning that the rails were approaching their service life limits for main track use and would require more frequent internal inspection for defects in order to assure continued safe use of that rail. Although there is no standard method to determine the point at which the rate of rail fatigue failures indicates an approaching limit on safe operation, the Safety Board believes that owners of track need to recognize the risks associated with train operations on rails containing internal defects, especially rails which have been subjected to gross tonnage of the magnitude carried on the SP's main track at Thermal.

The SP's Rules M971 and M972, Rules and Regulations For The Maintenance Of Way And Structures, address inspection and removal of defective rails. Had these rules been effectively implemented through more frequent internal defect inspections in order to locate and remove defective rails, the Safety Board believes this accident would have been avoided. The results of the April 27, 1981, inspection, the shelling condition of the rail, and the continued high volume of traffic should have indicated to SP personnel the need for more frequent inspections.

The train identification symbol "BSMFF" contributed to the traincrew's initial belief that their train was not carrying hazardous materials. Since the SP normally identifies trains carrying certain hazardous materials, such as radioactive material (RAM), with a "K" designation, the crew assumed that train No. 01-BSMFF-05 did not contain hazardous materials. In addition, the profile for train No. 01-BSMFF-05 did not indicate the presence of hazardous materials on the train. Since train No. 01-BSMFF-05 was a through train with no scheduled stops, pickups, or setouts, the conductor did not review the individual waybills, and consequently did not discover the presence of the hazardous materials until after the accident when he did look at the waybills to apprise the SP dispatcher of the damages. Because the engineer did not have any waybills on the locomotive, he and the head-end crew relied on the erroneous profile on the train consist to operate the train.

When the traincrew relayed the train profile information to the first arriving emergency personnel, the emergency personnel believed that a serious hazardous material emergency did not exist. However, about 1 hour later, contradictory information from an erroneous waybill resulted in an over-reaction to the situation that actually existed. The response personnel were thus led to believe that a serious radiological emergency was at hand, with the presence of a large amount of fissionable material to which the emergency personnel might have been exposed. The Safety Board believes the emergency response forces were prompt, efficient, and well organized in their efforts. These efforts were, however, needlessly complicated by erroneous and contradictory information being conveyed to them about the hazardous material.

The shipping forms presented to SP and consequently the waybills carried on the train did not reflect accurate information regarding the RAM shipment as contained in the originating shipping order. To determine the exact nature of the RAM shipment, SP personnel were required to backtrack through a series of shipping papers before they were able to contact the originating shipper who had the technical information that was necessary to properly assess the emergency and necessary response action. The Safety Board believes that although the RAM shipment in this accident posed no significant hazard to the involved personnel, improvements are needed in the methods of disseminating vital information concerning hazardous materials shipments which is contained on the originating shipping orders. The Safety Board is concerned that derailments may occur in which erroneous waybill information could fail to disclose the presence of extremely hazardous material and that as a result, proper emergency procedures might not be implemented. This is especially true for Trailer-On-Flat-Car/Container-On-Flat-Car (TOFC/COFC) shipments, for which a series of shipping documents may be issued. Emergency personnel need to know the precise nature of hazardous materials shipments in order to properly respond to the situation. Had the originating shipper's documentation of the hazardous material accompanied all successive documents, the nature of the shipment and the appropriate emergency procedures to follow would have been known to responding personnel more promptly. This could be accomplished by requiring that the originating shipper's documentation accompany all successive documents for a hazardous material which may be shipped via a TOFC/COFC shipment.

As a result of its investigation of this accident, the National Transportation Safety Board recommends that the American Short Line Railroad Association:

> Inform its membership of the facts, conditions, and circumstances of the accident which occurred at Thermal, California, on January 7, 1982, and recommend to its member railroads that they:
>
> Review, and modify if necessary, their evaluation process concerning track inspection deflect data for tracks carrying passenger trains or trains with hazardous materials to better assure that rails having defects which might result in catastrophic failure be replaced. (Class II, Priority Action) (R-83-10)
>
> Assess their procedures to make certain that traincrews of trains carrying hazardous materials have in their possession accurate documentation of, and emergency response information for, all hazardous materials being carried. (Class II, Priority Action) (R-83-11)

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." (P.L. 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations. Therefore, we would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and McADAMS, BURSLEY, and ENGEN, Members, concurred in these recommendations.

By: Jim Burnett
Chairman

Patricia A. Goldman for