National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: April 16, 2002

In reply refer to: R-02-13

Honorable Allan Rutter
Administrator
Federal Railroad Administration
1120 Vermont Avenue, N.W.
Washington, D.C. 20590

On Saturday, May 27, 2000, about 11:48 a.m., 33 of the 113 cars making up eastbound Union Pacific Railroad (UP) train QFPLI-26 derailed near Eunice, Louisiana. Of the derailed cars, 15 contained hazardous materials and 2 contained hazardous materials residue. The derailment resulted in a release of hazardous materials with explosions and fire. About 3,500 people were evacuated from the surrounding area, which included some of the business area of Eunice. No one was injured during the derailment of the train or the subsequent release of hazardous materials. Total damages exceeded $35 million.[1]

The National Transportation Safety Board determined that the probable cause of the May 27, 2000, derailment of UP train QFPLI-26 was the failure of a set of joint bars that had remained in service with undetected and uncorrected defects because of the UP's ineffective track inspection procedures and inadequate management oversight.

During wreck-clearing operations, a rail with pieces of two broken joint bars attached to its east end was found. The following day, investigators located a similar rail with broken pieces of joint bars attached. Metallurgists at the site indicated that the two pairs of broken joint bars matched, which was later reaffirmed by a closer examination at the Safety Board's Materials Laboratory.

Investigators were more confident that the broken pair of joint bars had played a role in the derailment after observing that the top corner of the end face of the rail exhibited visible evidence of having been deformed by the impact of wheels moving over the top corner of the rail end. This is significant in that it demonstrates that the separated rail and joint bars had, for a time, remained in place while the wheels of a moving train passed over them. Such damage would not have been present if the joint bars had broken as a result of forces generated during the derailment.

[1] For more information, see National Transportation Safety Board, *Derailment of Union Pacific Railroad Train QFPLI-26 at Eunice, Louisiana, May 27, 2000*, Railroad Accident Report NTSB/RAR-02/03 (Washington, D.C.: NTSB, 2002).

Based on the engineer's statements, on the physical evidence exhibited by the broken joint bars and the damage to the end face of the rail that is consistent with wheel impact, and on the laboratory examination of the joint bars, the Safety Board concluded that the joint bars found at the point of the derailment had broken before the arrival of the accident train, which allowed the rail to become misaligned.

Investigators found that in the 5 months before the derailment, UP track inspectors had detected and replaced 128 defective joint bars. However, after the derailment, various walking inspections of the entire 44-mile section of jointed rail revealed 403 defective joint bars, indicating that regular track inspections had resulted in a significant number of defective joint bars remaining undetected.

As evidenced by the numerous joint bars that were found with fatigue cracks of varying lengths, a joint bar with a fatigue crack can remain in service for some time before failing completely. And although fatigue crack growth rates will vary depending on the type and frequency of forces exerted upon the joint bars, a fatigue crack, once initiated, can be expected to grow until it causes complete failure of the bar. Laboratory examination of the pair of broken joint bars found at the derailment site revealed that the fractures in those bars resulted from fatigue cracks, and while it cannot be determined when the cracks were initiated, they were certainly evident in the bars for some time before the bars failed in this accident. The Safety Board concluded that the UP track inspection procedures in use before the derailment were inadequate in that inspectors identified only a small proportion of the cracked or broken joint bars on the subdivision, with the result that defective joint bars that should have been replaced were allowed to remain in service.

In addition to the defective joint bars, investigators became aware of defective switch ties that were itemized on track inspection reports 6 weeks before the derailment, on March 11, April 7, and April 15. These switch ties remained in service, notwithstanding the six inspections per week for the 6-week period between April 15 and the derailment on May 27. The Federal Railroad Administration (FRA) chief inspector also located areas of defective crossties and joint bolt defects.

After the derailment, a thorough inspection of the jointed rail territory revealed track conditions that did not meet the requirements of class 3 track, and these conditions had likely existed for some time. As noted earlier, the inspection method used by UP track inspectors was inadequate to detect the significant number of cracked or broken joint bars in the inspection area, and Federal rules require that such defective bars be replaced if the track is to maintain its class 3 classification and be approved for 40 mph operations. Therefore, the Safety Board concluded that had the track of the Beaumont Subdivision been properly assessed, trains would not have been permitted to operate at a speed of 40 mph until appropriate repairs were made.

The FRA's records for the 5 years preceding the accident document a history of weak tie conditions and cracked joint bars in the jointed rail section of the Beaumont Subdivision. During a walking inspection in 1996, the FRA discovered 36 broken joint bars and identified areas with weak crossties. FRA inspectors inspected the track in January 1999 and discovered areas with insufficient crossties and defective joint bars. An inspector returned for a follow-up inspection in

March 1999 and found that the situation had been corrected; however, he found defective tie conditions at 11 locations and 2 cracked joint bars.

Although the FRA did not conduct a regular track inspection on the Beaumont Subdivision in the 13 months before the derailment, it did do a track geometry car inspection 47 days before the derailment. The track geometry car did not detect an unusual amount of poor track surface or alignment. The car did not, and was not designed to, detect track component defects—such as fatigue cracks in joint bars or defective crossties—that did not affect track geometry.

The Safety Board notes that hazardous materials can be expected to traverse most mainline rail routes; however, certain lines, such as the Beaumont Subdivision, are known to support a high volume of hazardous materials. In fact, train QFPLI-26 was designated a "key train" because of the amount and types of hazardous materials it was transporting. Further, according to the UP, the route from Freeport, Texas, to Livonia, Louisiana, is a "key route." The Association of American Railroads (AAR) defines "key route" as follows:

> Any track with a combination of 10,000 car loads or intermodal portable tank loads of hazardous materials, or a combination of 4,000 car loadings of PIH (Hazard zone A or B), flammable gas, Class 1.1 or 1.2 explosives (Class A), and environmentally sensitive chemicals, over a period of one year.

In its Circular OT-55, *Recommended Railroad Operating Practices for Transportation of Hazardous Materials*, the AAR states:

> Main Track on 'Key Routes' must be inspected by rail defect detection and track geometry inspection cars or any equivalent level of inspection no less that two times each year; and sidings must be similarly inspected no less than one time each year.

Because the inspections conducted by UP and FRA inspectors using special cars designed to detect internal rail defects or variances in track geometry did not and could not identify cracks or breaks in joint bars that did not affect track geometry, the Safety Board concluded that inspections of jointed rail using rail defect detection or track geometry cars are inadequate to identify the types of joint bar defects that led to this accident. As a result, the Safety Board has made the following safety recommendation to the AAR:

> R-02-15
> Revise the guidance in your Circular No. OT-55, *Recommended Railroad Operating Practices for Transportation of Hazardous Materials*, to recommend that all key routes be subjected to periodic track inspections that will identify cracks or breaks in joint bars.

The FRA had inspected Beaumont Subdivision track in 1999 because the military was planning a shipment of napalm. But as a key route, this track routinely carries other, possibly equally hazardous, materials that can constitute a serious risk to the public if the track does not comply with the Federal track safety standards. The Safety Board concluded that the frequency and type of track inspections routinely performed by the FRA on the Beaumont Subdivision were

inappropriate given the fact that this was a key route that carried large volumes of hazardous materials.

Therefore, the National Transportation Safety Board makes the following safety recommendation to the Federal Railroad Administration:

> Modify your track inspection program to incorporate the volume of hazardous materials shipments made over the tracks in determining the frequency and type of track inspections. (R-02-13)

The Safety Board also issued safety recommendations to the Union Pacific Railroad and the Association of American Railroads.

Please refer to Safety Recommendation R-02-13 in your reply. If you need additional information, you may call (202) 314-6607.

Chairman BLAKEY, Vice Chairman CARMODY, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

Original Signed

By: Marion C. Blakey
Chairman