National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: June 13, 2003

In reply refer to: R-03-3

Mr. Rod McCorkle
Chairman, General Code of Operating Rules Committee
% Canadian Pacific Railway
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St. Paul, Minnesota 55106

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendation in this letter. The Safety Board is vitally interested in this recommendation because it is designed to prevent accidents and save lives.

This recommendation addresses the issuance to moving trains of track warrant authority that contains an "after-arrival" stipulation. The recommendation is derived from the Safety Board's investigation of the May 28, 2002, head-on collision of two Burlington Northern Santa Fe (BNSF) freight trains near Clarendon, Texas, and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued three safety recommendations, one of which is addressed to the General Code of Operating Rules Committee. Information supporting this recommendation is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

At 8:57 a.m., central daylight time, on May 28, 2002, an eastbound BNSF coal train collided head on with a westbound BNSF intermodal train near Clarendon, Texas. Both trains had a crew of two, and all crewmembers jumped from their trains before the impact. The conductor and engineer of the coal train received critical injuries. The conductor of the intermodal train received minor injuries; the engineer of the intermodal train was fatally injured. The collision resulted in a subsequent fire that damaged or destroyed several of the locomotives and other railroad equipment. Damages exceeded $8 million.[1]

The National Transportation Safety Board determined that the probable cause of the May 28, 2002, collision at Clarendon, Texas, was (1) the coal train engineer's use of a cell phone during the time he should have been attending to the requirements of the track warrant his train

[1] For more information, see National Transportation Safety Board, *Collision of Two Burlington Northern Santa Fe Freight Trains Near Clarendon, Texas, May 28, 2002*, Railroad Accident Report NTSB/RAR-03/01 (Washington, D.C.: NTSB, 2003).

was operating under and (2) the unexplained failure of the conductor to ensure that the engineer complied with the track warrant restrictions. Contributing to the accident was the absence of a positive train control system that would have automatically stopped the coal train before it exceeded its authorized limits.

The coal train, with 116 cars of coal and headed by lead locomotive BNSF 8876,[2] departed Amarillo at 7:40 a.m. The train operated eastward, entering track warrant control (TWC) territory several miles east of the yard area. Track warrant records indicate that the coal train received a track warrant to enter TWC territory at 7:47 a.m. The crew's first track warrant was quickly followed by a second track warrant, which was issued to the coal train at 7:49 a.m. The second track warrant was an "after-arrival" warrant, which stipulated that the coal train was to wait at Malden Siding for the arrival of a specified train before proceeding beyond that point. The coal train met an opposing westbound train at Malden Siding, as required. The meet took place from about 8:30 until 8:35, after which, in accordance with its track warrant, the coal train proceeded toward the east end of Ashtola Siding.

As the coal train neared Ashtola, at 8:43 a.m., the final track warrant, Track Warrant 22, was issued. This was also an after-arrival track warrant that covered the coal train's movement between Ashtola Siding and Hedley Siding, about 25 miles away. This track warrant specified that the coal train was to hold short of the east end of Ashtola Siding until the arrival in the siding of a westbound intermodal train (Engine BNSF 4385 West). The track warrant would become effective at that point. At the time this warrant was issued, the coal train was approximately 3.2 miles from the point at which it was to stop and wait and was traveling, according to event recorder data, about 48 mph.

Investigators reviewed audiotapes and confirmed that communications between the dispatcher and the coal train crew were similar for both of the last two track warrants given to the coal train. The conductor accurately repeated the instructions for the last track warrant, including the stipulation that the track warrant was not in effect until after the arrival of BNSF 4385 West at the east siding switch at Ashtola.

Records indicated that about the time that the final track warrant was radioed to and read back by the conductor, the engineer placed a call on his cell phone. The engineer was still on this call about 4 minutes later as his train passed the east end of Ashtola Siding. The train should have stopped at this point to await the arrival of the intermodal train, in accordance with the train's track warrant. Event recorder data indicated that the train was traveling about 48 mph at that time.

Some minutes after the coal train passed the east end of the siding, the train's conductor saw and alerted the engineer to the oncoming train as the intermodal train rounded the curve ahead. At the point of the collision, the coal train had traveled for about 9 1/2 minutes and about 7.7 miles from the point where it should have waited for the arrival of the intermodal train.

[2] The *General Code of Operating Rules* uses the identification of the lead locomotive to formally identify a train for the purpose of issuing authority to occupy main tracks. The train identification also includes the train's direction. Thus, the official identification of the coal train on track warrants (see note below) was "Engine BNSF 8876 East."

Both the engineer and conductor said they could not remember anything about the track warrant. They could not, therefore, confirm that the engineer had a copy of the track warrant or, if the conductor did give a copy to the engineer, that it reflected the after-arrival instructions. (The track warrant could not be found after the operating cab was destroyed by the impact and fire.)

Over a period of time, some railroads, including the Union Pacific (as noted below), have discontinued issuing after-arrival track warrants to moving trains. Rules promulgated by the Northeast Operating Rules Advisory Committee (NORAC), under which some railroads operate, have not allowed the use of after-arrival track warrants for at least 15 years.

After the Safety Board investigated a head-on collision of two Union Pacific trains at Devine, Texas, in June 1997,[3] the Safety Board recommended that the Union Pacific Railroad:

> R-98-25
> Discontinue permanently the use of after-arrival orders in dark (nonsignalized) territory.

This recommendation was classified "Closed—Acceptable Action" on July 23, 2001, after the Union Pacific indicated that it would stop using after-arrivals in nonsignaled TWC territory. In May 2002, the railroad issued instructions to operating employees that would allow the use of after-arrival track warrants after the train that was issued these instructions had stopped at the point at which it was to wait for the arrival of the opposing train. The Union Pacific's instructions read:

> Track Warrant Box 7: A track warrant authority containing a Box 7 (not in effect until after the arrival of…) is permitted in non-signaled TWC territory only after the train to receive the track warrant containing the Box 7 is stopped at the location where the opposing train will be met.

The portions of 49 *Code of Federal Regulations* (CFR) that address train movement mention "mandatory directives" and "train orders" but do not address the information that is contained in these authorities or other similar methods of train control.

Also as a result of the Devine collision, the Safety Board made the following safety recommendations to the Federal Railroad Administration (FRA):

> R-98-26
> Revise 49 Code of Federal Regulations Part 220 to address track warrants and other current railroad operating practices.

> R-98-27
> Require railroads to discontinue permanently the use of after-arrival orders in dark (nonsignalized) territory.

[3] For more information, see National Transportation Safety Board, *Collision and Derailment of Union Pacific Railroad Freight Trains 5981 North and 9186 South in Devine, Texas, June 22, 1997*. Railroad Accident Report NTSB/RAR-98/02 (Washington, D.C.: NTSB, 1998).

In a February 4, 1999, letter in response to Safety Recommendation R-98-26, the FRA told the Safety Board that it had issued a final rule, effective January 4, 1999, modifying 49 CFR Part 220 as requested. Accordingly, the Safety Board classified Safety Recommendation R-98-26 "Closed—Acceptable Action" on June 29, 1999.

In the same February 1999 letter, the FRA stated that it had issued a safety directive addressing safety practices in direct train control territory. The directive recommended that in those instances in which a train movement instruction includes a train meet, the dispatcher specifically state in the movement authority that "this track warrant includes a requirement to meet another train." The second recommendation in the directive required that railroads review their operating rules and practices pertaining to operations in nonsignaled territory to determine what further enhancements were warranted to improve safety, including the elimination of the use of after-arrival orders. The letter further stated that FRA audits had determined that "the overwhelming majority" of railroads had eliminated the use of these orders in nonsignaled direct train control territory. While the letter stated that the FRA would continue to review these safety-critical procedures during future dispatcher audits, the agency stopped short of prohibiting the use of after-arrival orders. Based on this response, the Safety Board classified Safety Recommendation R-98-27 "Closed—Unacceptable Action" on June 29, 1999.

After this accident, the BNSF changed its operating rules to require that dispatchers not issue after-arrival track warrants until after the affected train is stopped at the location where it is to meet the opposing train. This restriction eliminates instances in which a train has a track warrant that instructs the crew to proceed or to keep proceeding, but to remember to stop the train before passing a specific point within the territory. A disoriented or distracted crew may not stop at the designated location.

In this accident, had the crew not received their final track warrant, they might have stopped at the limit of their previous warrant; that is, at the east end of Ashtola. The engineer may have heard the radio transmission of at least the beginning of the final track warrant and mistakenly determined that, since he had a track warrant, he did not have to be concerned about stopping in the next several miles. The timing of the engineer's initiation of the final phone call clearly suggests that he did not believe he had to stop at Ashtola. The Safety Board concluded that the issuance, to moving trains, of track warrants containing after-arrival provisions creates an unacceptable and unnecessary risk of a head-on train collision. The Safety Board believes that the FRA should restrict the issuance of track warrant authority that contains an after-arrival requirement to trains that have stopped at the location at which they will meet the opposing train.

Technology does exist to automatically enforce the operating parameters of trains and thus prevent train collisions. Over the past 3 decades, the Safety Board has investigated a long list of train collisions that could have been prevented through the use of a positive train control system[4] that incorporated collision avoidance. The Safety Board has addressed this issue through the issuance of a series of safety recommendations. In fact, positive train control has been on the Safety Board's list of "Most Wanted" transportation safety improvements since 1990. The most

[4] Various names have been given to these types of systems, but one component of all true positive train control systems is a system designed to prevent train collisions.

recent safety recommendation relating to positive train control was issued as a result of the Board's investigation of a 1999 fatal train collision in Bryan, Ohio:

> R-01-6
> Facilitate actions necessary for development and implementation of positive train control systems including collision-avoidance components, and require implementation of positive train control systems on main line tracks, establishing priority requirements for high-risk corridors such as those where commuter and intercity passenger railroads operate.

Based on a March 27, 2002, letter in which the FRA outlined steps it had taken toward "achieving the proper atmosphere in the rail industry to allow for the development and implementation of [positive train control]," the Safety Board classified Safety Recommendation R-01-6 "Open—Acceptable Response."

In answer to an April 17, 2003, letter from the Safety Board asking for an update on actions regarding this safety recommendation, the FRA responded, in a May 5, 2003, letter, that it was "doing everything within its power to prepare the way for [positive train control] and encourage its rapid deployment." In the meantime, the majority of railroad operations occur in territory without any automatic means of preventing train collisions.

The BNSF is developing a system of train separation that would prevent trains from operating beyond the limits of track warrant authority. BNSF's train collision avoidance system is designed as an "overlay system" that enforces the track warrant limits or signal indications and the operating rules that are in place. The system is designed to inform the engineer of conditions that require him to act. If the engineer does not take the proper actions, the system will automatically stop the train. The BNSF plans to begin a pilot collision avoidance program for trains in the summer of 2003 on about 100 miles of track in western Illinois.

The BNSF system will use such information as train position (provided by the global positioning system), switch position (provided by switch sensors), signal indication, locomotive speed and control inputs, and track authority as given by the train dispatcher. This information will be combined with a train and track database to enforce operating parameters. The system will be designed to prevent the overrun of track authority in both signaled and track warrant territory. In addition to the absolute limits of track authority, the system will be able to enforce track speed and permanent and temporary speed restrictions. The Safety Board concluded that had a positive train control system with collision avoidance capabilities been in place and operational on the Red River Valley Subdivision at the time of the accident, the collision probably would not have occurred.

Based on its investigation of this accident, the National Transportation Safety Board makes the following safety recommendation to the General Code of Operating Rules Committee:

> Add language to the track warrant rules to ensure that in territory not equipped with a positive train control system, track warrant authority that contains an after-arrival requirement is issued only to trains that have stopped at the location at which they will meet the opposing train. (R-03-3)

The Safety Board also issued safety recommendations to the Federal Railroad Administration. In your response to the recommendation in this letter, please refer to R-03-3. If you need additional information, you may call (202) 314-6177.

Chairman ENGLEMAN, Vice Chairman ROSENKER, and Members GOGLIA, CARMODY, and HEALING concurred in this recommendation.

Original Signed

By: Ellen G. Engleman
Chairman