National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Date: August 16, 1988
In reply refer to: R-88-49

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On October 12, 1987, National Railroad Passenger Corporation (Amtrak) passenger train 6, the California Zephyr, derailed in Russell, Iowa, injuring 15 crewmembers and 107 of the 230 passengers. The train was operating eastbound on the westward track, since the maintenance-of-way department had taken the eastward main track out of service. The train was traveling about 60 mph when it entered into a stub track and struck maintenance-of-way work equipment. Two locomotive units and 11 of the 14 passenger cars derailed, as well as the maintenance-of-way crane and three flat cars. 1/

As they approached Russell, the crewmembers of train 6 were operating the train in accordance with the BN operating rules and instructions. BN Timetable No. 6, which provides speed restrictions for the First Subdivision main track of the Galesburg Division, authorizes a maximum allowable speed of 79 mph for passenger trains, except for those moving against the current of traffic, for which the maximum allowable speed is 59 mph.

To protect the maintenance-of-way employees and equipment that would be working on the at-grade crossing replacement and switch relocation at Russell on October 12, 1987, the roadmaster in charge of the Russell area requested a Form B track bulletin on October 9, 1988, according to Rule 455 of the BN maintenance-of-way rules. That rule provided three options for train and engine speed through the limits of the work area the Form B was to protect. Since the preparatory work for the grade crossing rehabilitation project would not, and ultimately did not, disturb the track structure or geometry, the roadmaster chose not to restrict train speeds.

The Form B allows passenger trains to be authorized through a work area at 59 mph on nonsignalled track and at 79 mph on signalled track. Freight trains, which may require a longer distance to stop, even though the maximum speeds are lower, are restricted to 49 mph and 60 mph (for the same conditions, except when special instructions require lower speed limits). Freight trains can also be authorized through a work area at maximum speed.

1/ For further information, read Railroad Accident Report--*Collision and Derailment of Amtrak Train 6 on the Burlington Northern Railroad, Russell, Iowa, October 12, 1987* (NTSB/RAR-88/04).

On the day of the accident, Form B track bulletin No. 1116 gave the track foreman the authority for the track and mandated the procedures the traincrew and the track foreman were to follow to move a train through the work area. The pilot of train 6 contacted the track foreman listed on the Form B for the first work area east of Chariton, Iowa, in accordance with the rule. When the track foreman authorized train 6 to proceed through the work area at normal speed without stopping at the red board, the traincrew had no reason to expect that a switch would not be properly lined for the main track.

A track laborer acknowledged that he failed to return the west stub track switch to its normal position when a crane was moved into the stub track to clear the westward main track for train 6. As a result, train 6 was diverted into the stub track where it collided and derailed with the crane. The track foreman authorized train 6 into the work area without personally ensuring that the track was safe for the movement he authorized.

Train 6 approached the west stub track switch at a speed of about 60 mph, a speed that did not permit the locomotive crew sufficient time to identify, react, and stop the train before it reached the improperly lined switch. Amtrak calculated the stopping distance at an emergency braking level that compared with the calculations based on accepted engineering standards using data from the event recorder. The emergency braking level for train 6, computed to be 1,237 feet, is greater than the sight distance to either the switch banner (859 feet) or the switch points (639 feet).

At the speed train 6 was authorized to operate through the work area, unforeseen circumstances, such as in this case an improperly lined switch or men and/or equipment that have not cleared the track, can arise too quickly for a traincrew to have time to take proper action.

The Safety Board believes that the provisions of the Form B authorizing trains through a work area, whether the track is signalled or nonsignalled, at the maximum authorized speed is an unsafe operating practice. This practice effectively reduced the ability of the locomotive crew to see the equipment and switch banner ahead in time to stop the train before it reached the improperly lined switch, thereby eliminating the last chance to avoid the accident. The Safety Board concludes that the rusted red switch banner failed to provide visual contrast to its background, preventing the crew from identifying the position of the switch at a distance that would have permitted them to stop or significantly slow the train.

The BN maintenance-of-way rules also provide for the display of a red flag at prescribed locations to define the limits of a work area. Trains must stop short of the red flag and not proceed unless authorized by the track foreman. The Safety Board considers the display of a red flag at a prescribed location to be a fixed signal that indicates conditions that would affect the movement of a train. Both the engineer and BN pilot of train 6 interpreted the red flag the same way; however, the BN division manager of safety rules disagreed with this interpretation. The Form B provides for authorizing trains to proceed past a red flag without stopping when so authorized by the track foreman, and at a speed determined by the track foreman. The track foreman makes this determination based on his experience for track conditions and the type of work being performed. He can authorize a speed ranging from a speed less than restricted speed to the maximum authorized speed for that track. Under certain circumstances, a train dispatcher may authorize a train to proceed through a red signal after stopping; however, in these instances, the

dispatcher can only authorize the train to proceed through the signal at restricted speed. The Safety Board concludes that had train 6 been authorized to operate through the Form B work area at restricted speed, the engineer would have had time to stop his train when he saw that the switch was improperly lined for the main track.

The Form B in effect at the time of the accident referenced the name of the track foreman as the person a train crewmember would have to contact to obtain permission to proceed through the limits of the Form B order. According to BN rules, no other person was authorized to grant such permission. The Safety Board is concerned that the track foreman, who was not experienced in train operations, authorized a train to pass a red flag without stopping and to proceed at speeds greater than restricted speed. The Safety Board is especially concerned because this commonly used practice was established by BN management, and the track foreman was simply complying with this accepted practice. The Safety Board believes such a practice degrades the safety of train operations and the safety of maintenance-of-way employees.

The authorization for the passage of trains through a work area must provide for the protection of not only the men and equipment in the work area, but for the safe operation of trains. The Safety Board recognizes that other railroads require that a train approaching a work area reduce its speed and be prepared to stop at the limits of the work area, with the speed of a train through the area being prescribed by train order, not the track foreman. One railroad using the Form B track bulletin stated that the use of normal track speed is the exception and that restricted speed is generally used when men and equipment are in the work area. The Safety Board believes that the Form B needs to be changed to limit the speed of a train through a work area to restricted speed.

Although the Form B order establishes time limits and specifies the placement of red, yellow, and green flags, those flags had not been placed by the established time on the day of the accident. Rather, the track foreman placed the flags as the track crane traveled along the track. This laxity indicated a casual attitude on the part of BN supervision, and consequently on the part of rank and file employees in the maintenance-of-way department. This attitude was further demonstrated when the track foreman authorized Extra 7200 East through the work limits of his Form B order while he was still in Chariton, about 7 miles from the work area. The Safety Board recognizes that circumstances may develop that require track foremen to be at locations other than those specified on the Form B within the specified time limits; however, the Safety Board believes that in this case the track foreman should have had that portion of Form B annulled and reissued later. The BN maintenance-of-way supervision should not accept the practice of authorizing trains through a work area unless the track foreman is present at the work area.

A further indication of a lack of adequate safety precautions was the BN failure to place the eastward main track east of Russell out of service even though workers were replacing rail at that location. The eastward main track had been taken out of service west of Russell to MP 333.2; the BN was unable to provide any reason for taking that track out of service. This may indicate that the BN maintenance-of-way management was not properly overseeing its own operations.

The BN roadmaster testified that the track switch to the west stub track was spiked out-of-service because occupied maintenance-of-way camp cars were on the stub track at Russell. However, he also stated earlier that the switch had not been

spiked out-of-service. BN rules require that any track wherein occupied camp cars are placed be taken out of service for the protection of camp car occupants. Given the conflicting testimony concerning whether the track switch was spiked, and the absence of written orders protecting the equipment on the stub track, it may be concluded that the west stub track was not taken out of service.

Because the switch banner was partially rusted, it was difficult to see against the background, including the track crane. As a result, the crew of train 6 had little opportunity to take advantage of this warning of the track switch position. The traincrew testimony indicated that the switch point position was the first visible sign they had that the switch was open to the stub track. The use of reflective material on the switch banner would have enhanced the visibility of the banner.

In anticipation of the arrival of train 6 at the work site in Russell, the track foreman instructed the crane operator and the laborer to place the crane in the clear at the west stub track. They had earlier placed two flat cars, which they had used to transport material to the work site, into the stub track. The safe placement of the crane and the flat cars was the crane operator's responsibility, in conjunction with the laborer. However, neither of them checked the position of the track switch leading from the main track to the west stub track. In fact, the laborer acknowledged that he failed to position the switch properly in compliance with applicable rules. The crane operator also should have been diligent when placing his equipment in the stub track to check that the switch was properly positioned to protect his equipment and ensure the safe passage of trains on the westward track. Further, the track foreman, when picking up the crane operator and the laborer at the grade crossing at the stub track, also neglected his responsibilities in checking the track switch for the safe operation of trains through the limits of his work area as he admitted in his statement to the roadmaster following the accident. The Safety Board believes that the track foreman had the ultimate responsibility for the correct operation of the switch by an employee under his supervision. Such laxity on the part of the three employees further reflects an attitude by BN maintenance-of-way management that rules enforcement and compliance was not of the first order of importance.

Before adopting the General Code of Operating Rules, the BN conducted rules classes for its employees. These classes were to cover not only the introduction of Form B track bulletin orders, but other rules changes, according to BN officials. However, the BN did not provide the Safety Board with any documentation for special rules classes, except for a class on how to use Rule 40 and a 4-hour review of rules before the rules qualification examination.

BN officers testified that after employees took the written qualification rules examination, they were permitted to review it and correct their mistakes before the grade was recorded. This was confirmed by personnel records, which showed a score of 100 percent for each employee taking the test. The Safety Board questions the validity of such a procedure to ensure that maintenance-of-way employees so qualified understand the practical applications and requirements of the rules.

The Safety Board also believes that classroom testing and rules examinations should be conducted in conjunction with other teaching methods such as simulated exercises. Accident investigation history has revealed that even though employees are able to memorize operating rules and pass examinations, they may be unable to apply these rules in practice. As a result of its investigation of an accident in New

York City on July 23, 1984, 2/ the Safety Board recommended that the Association of American Railroads (AAR):

> R-85-84
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> Review member railroads' current methods of conducting operating rules classes and administering tests for deficiencies and develop model instruction and testing procedures that will require employees to demonstrate that they not only know the wording of the operating rules but that they understand how the rules are to be applied both in normal and emergency operating conditions. Disseminate the model program to member railroads and encourage them to adopt the program.

The AAR responded to this safety recommendation a number of times. The most current letter was of May 18, 1988, which transmitted the results of a questionnaire sent to eight U. S. railroads representing 60 percent of the U.S. rail mileage. The Safety Board reviewed the May 18 letter and replied:

> . . . the Board finds it difficult to reach the conclusion that the railroads are providing quality rules instruction for their employees based on the questions posed to and the answers received from the representatives of eight United States railroads at the May 4, 1988, meeting of the AAR's Operating Rules Committee. Our accident investigations continue to indicate otherwise. Furthermore, the Board sees no meaningful information gained from the questionnaire that was presented to the railroad representatives.
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> The Board does not agree that this questionnaire can be termed "...an in-depth followup . . . to determine . . . if the minimal guidelines are being met . . . ," as was suggested in our September 27, 1987, letter. We would suggest that further and closer observation of actual rules classes and testing procedures would be more indicative of an "in-depth followup." While the AAR considers the Board's comments, Safety Recommendation R-85-84 will continue to be held in an "Open--Acceptable Alternate Action" status.

As a further note to highlight the Safety Board's concern for the need for railroad employees to fully understand operating rules and the impact these rules can have on railroad safety, the Board's reply to the AAR contained the following:

> After reviewing the questions posed to the railroad representatives, the Safety Board notes a broader and more general concern. Accident investigation experience has shown us that an effective training program must reach beyond classroom instruction. Your questionnaire seemingly evaluates a rules instruction program solely from the standpoint of classroom coverage and we see little benefit in that kind of a review. There are a number of other factors that, if not emphasized, can undermine or negate the effectiveness of a rules

2/ Railroad Accident Report--*Head-On Collision of National Railroad Passenger Corporation (Amtrak) Passenger Trains Nos. 151 and 168, Astoria, Queens, New York, New York, July 23, 1984* (NTSB/RAR-85/09.)

> instruction program, including, but not limited to: 1. lack of followup on-the-job supervision; 2. supervision which ignores or takes no action with respect to rules violations; and 3. lack of meaningful disciplinary action for rules violations.
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> . . . if a train crew understands that they will routinely encounter supervisory personnel and that supervisory personnel are consistent in citing rules violations with appropriate meaningful disciplinary action, there is an incentive for employees to understand and follow those operating rules. Put another way, the testing procedures of an effective rules program should extend beyond the classroom to the operating environment so that employees are consistently monitored and checked on their knowlege and adherence to operating rules. The Board found in its investigation of the accident at Pine Bluff, Arkansas, on June 9, 1985, [3/] that management provided only part-time rules enforcement efforts by an inadequate supervisory staff, an inconsistent policy of rules enforcement and discipline, and a tendency toward leniency which mitigated the effect of discipline.
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> In short, the Board believes there are a number of factors, in addition to the minimal standards previously developed, that the AAR should look at and take into consideration in determining the overall effectiveness of the rules instruction programs in the railroad industry.

In this instance, employees were not even required to memorize the rules in order to pass the exam. Thus, BN management acquired no true measurement of employees' knowledge of the rules. The track foreman selected the laborer to accompany the crane operator and assist in the movement of the crane because, in the words of the track foreman, he was qualified because ". . . He's had the Book of Rules and he's got switch keys. . . ."

This casual attitude was further demonstrated by the BN method of performing efficiency testing of the track foremen. When efficiency testing is properly administered, the track foreman is evaluated by his supervisor without prior notice for implementation of the applicable rules under actual operating conditions. This provides an evaluation of the track foreman's understanding of the rules as well as a measure of whether the intent of the rules is being met.

The two roadmasters conducted 20 efficiency tests of track foremen that included Rule 455 (Form B). Only three of the 20 tests were performed under the conditions of a train operating through the work area. However, since none of the tests included testing for radio rules, it can be concluded that no evaluation was made of the track foremen for authorizing trains to enter the work area correctly and if the appropriate speed was prescribed, or if trains had actually been authorized into the work area.

During the 8-month period before the accident, the efficiency tests performed by the roadmaster for the Russell area showed no failures to comply with the rules by maintenance-of-way foremen. The track foreman involved in this accident had been

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3/ Railroad Accident Report--*Derailment of St Louis Southwestern Railway Company (Cotton Belt) Freight Train Extra 4835 North and Release of Hazardous Material Near Pine Bluff, Arkansas, June 9, 1985* (NTSB/RAR-86/04).

evaluated only once on the application of Rule 455 while operating a hy-rail vehicle through a Form B work area assigned to another track foreman.

The Safety Board believes that the failure to perform efficiency testing that fully encompassed the proper use of the recently introduced Form B indicated that BN maintenance-of-way management may have been lax in its oversight and enforcement of the rules.

BN policies in implementing the Form B order according to Rule 455 of the maintenance-of-way rule book further indicates laxity on the part of management. The passage of trains, especially passenger trains, through work areas at unrestricted speeds even in conjunction with Form B orders cannot be considered safe practice.

The placement of flags at the limits of a work area covered by a Form B is prescribed as part of the requirement to provide information to traincrews of conditions affecting the movement of a train. When flags cannot be placed or the location of flags overlaps, the dispatcher, when advised, is to obtain instructions from the maintenance-of-way foreman to relay instructions to traincrews. On the morning of the accident, the track foreman had not placed his flags at the time designated on his Form B. He was also unaware that his Form B work area overlapped the Form B work area of the rail-laying gang east of Russell. Since the roadmaster had not properly evaluated the track foreman for Rule 10, Rule 10A (Temporary Restrictions and Red Flags), and Rule 455, he had no way of knowing that this track foreman may not have understood the rules or that he had to notify the dispatcher.

The Safety Board believes that efficiency testing can be effective only when it is done under the circumstances for which the rules were designed. The Safety Board concludes that BN maintenance-of-way management failed to properly administer effective efficiency testing that would ensure that employees were properly tested on the correct application of the rules and that the rules were adequately tested.

The chief dispatcher was informed by the roadmaster that the crossover at MP 333.2 had been repaired and returned to service before the accident. Both the dispatcher and the Chariton operator recognized that the instructions issued to cross over trains to the westward track at Chariton on the morning of the accident were incorrect. The instructions disagreed with the morning line-up, which showed that the crossover at MP 333.2 was to be used. They discussed what had been shown on the morning line-up and determined that they would back eastward trains through the crossover at Chariton and that the dispatcher would issue correct instructions for the afternoon line-up to cross over trains at the double crossover at MP 333.2. The line-up information explains why the roadmaster said that he believed that train 6 had been crossed over at the crossover at MP 333.2.

Track warrant 812, issued at 0452 on the day of the accident to Extra 7200 East, authorized it to ". . . proceed from MP 391 to Chariton on the eastward track with track bulletins in effect 1112, 1116, 1118. . . ." This track warrant did not authorize the train to occupy the eastward track east of the Chariton crossover. Track warrant 821 issued to Extra 7200 East at 0821 on the day of the accident authorized the train to ". . . proceed from the crossover Chariton to CTC Halpin on westward track . . . protection as prescribed by rule 99 not required. . . ." This track warrant did not authorize the train to occupy the westward track west of the Chariton crossover.

Extra 7200 East, a cabooseless coal train about 1 mile long, went beyond the authorized limits specified in its track warrant and entered into the next automatic block signal (ABS) track block east of Chariton before its rear cleared the crossover and before beginning its reverse move. Because of its length, the reverse move resulted in the rear of the train traveling across an at-grade crossing that was protected with gates and flashing lights, and then entering the ABS track block west of Chariton. Even if the dispatcher had authorized the train to occupy the westward track west of the crossover, which he did not do, there was no one at the rear of the train to notify the engineer of conditions that could affect the movement of the train, such as the signal aspect displayed for the ABS track block west of Chariton and the inability to warn vehicles approaching the at-grade crossing. This is an unsafe and dangerous practice. The Safety Board is concerned that this procedure jeopardizes the safe movement of trains on the Chicago Region and this crossover procedure demonstrates that BN management should revise its operating practices for reverse moves of cabooseless trains to ensure that this procedure is accomplished safely.

Track warrants 822 and 829 issued to train 6 also did not provide for train 6 to occupy the eastward track east of the Chariton crossover or to occupy the westward track west of the Chariton crossover. The division superintendent assumed that track warrants protected the trains by permitting them to make the crossover move and operate between specified mileposts. This assumption was not supported by the track warrants issued for the movements of train 6 or Extra 7200 East at Chariton. The Safety Board believes that this crossover move was made without either train having the proper authority.

The track work for relaying curve worn rail on the eastward main track east of Russell was listed on track bulletin Form B No. 1116 on line 3 for both tracks. Since the track work involved the removal and replacement of rail on the eastward track, that track should have been taken out of service and a Form B issued for train movements on the westward track. The Form B, however, did not show what work was being performed, or on which track. In addition, the dispatcher stated that he was not made aware of the reasons for a Form B order. Since the dispatcher was not aware of the type of work or which track was actually affected, he would have no way of knowing which track to use if he were required to route a train around another train on the westward track. The Safety Board believes that BN management should have a policy of informing dispatchers of work that affects the movement of trains.

Therefore , the National Transportation Safety Board recommends that the American Short Line Railroad Association and the Association of American Railroads:

> Inform your membership of the circumstances of the train accident at Russell, Iowa, on October 12, 1987. (Class II, Priority Action) (R-88-49)

Also as a result of its investigation, the Safety Board issued Safety Recommendations R-88-40 through -45 to the Burlington Northern Railroad Company, R-88-46 through -48 to the National Railroad Passenger Corporation (Amtrak), and R-88-50 to the Union Pacific System; Missouri-Kansas-Texas Railroad System; St. Louis Southwestern Railway Company; Southern Pacific Transportation Company; Atchison, Topeka, and Santa Fe Railway Company; Chicago and North Western Transportation Company; Davenport, Rock Island and

North Western Railway Company; Lake Superior and Ishpeming Railroad Company; Minnesota Transfer Railway Company; and Soo Line Railroad Company.

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" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation R-88-49 in your reply.

BURNETT, Chairman, KOLSTAD, Vice Chairman, and LAUBER, NALL, and DICKINSON, Members, concurred in this recommendation.

By: James L. Kolstad
Acting Chairman