

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: September 15, 1981

Forwarded to:

Mr. J. C. Kenefick  
President  
Union Pacific Railroad Company  
1416 Dodge Street  
Omaha, Nebraska 68179

SAFETY RECOMMENDATION(S)

R-81-88 through -93

About 2:29 p.m., P.s.t., on November 17, 1980, Union Pacific Railroad Company (UP) work train Extra 3119 West ran out of control while descending a long 2.20-percent grade, overtook, and struck the rear of UP freight train Extra 8044 West (2 VAN-16) on the UP's single main track about 4 1/2 miles west of Kelso, California. Three train crewmembers were killed and one crewmember was seriously injured. Damage was estimated at \$1,200,000. 1/

The investigation disclosed that Extra 3119 West followed Extra 8044 West from Cima, at the summit of a 17-mile sustained downgrade with maximum gradient of about -2.22 percent. Prior to beginning the descent, the engineer had discovered and reported to the dispatcher that the train's single SD40 unit had an inoperative dynamic brake feature and the train would have to stop at Cima where the crew was required by the timetable to set up retainers. The engineer and conductor were also aware that timetable rule 1042 (RC) restricted their train's speed to 15 mph between Cima and Kelso and required a 10-minute stop at Dawes to cool wheels.

Extra 3119 West left the north passing track at Cima on an "approach" signal aspect from a starting point about 0.3 mile east of the turnout to the main track. By the time the head end reached the turnout, the train was moving about 14 mph and the engineer had already made an initial application of the train brakes. When the caboose reached the turnout, the speed had increased to about 17 mph and the engineer made another application of the train brakes. This began to slow the train and speed was reduced to about 13 1/2 mph when the head end was about 0.9 mile from the starting point and the entire train was in a 2-degree curve. Before the train exited the curve, however, it began to reaccelerate reaching a speed of 16 mph before another brakepipe reduction achieved deceleration to 15 mph in a second 2-degree curve when the head end was at a point about 1.6 miles from the starting point. Thereafter, additional brakepipe reductions resulted in slight deceleration which always occurred in curves and which were quickly followed by reacceleration.

1/ For more detailed information, read: Railroad Accident Report—"Rear-end Collision of Union Pacific Railroad Company Trains Extra 3119 West and Extra 8044 West (2-VAN-16), near Kelso, California, November 17, 1980" (NTSB-RAR-81-7).

The engineer was never able to reduce speed sufficiently or to stabilize speed long enough to risk releasing the brakes against the retainers in order to recharge the brakepipe. It is probable that the engineer had the brakes at or near full service and had applied the independent brake as well by the time the train had reached Chase, about 3.3 miles west of the starting point. The speed of Extra 3119 West began to increase again from the desired 15 mph, and the engineer notified the dispatcher that he was in trouble and could not slow down. There were two brief interruptions of acceleration: the first, at 18 mph, was probably achieved by increased application of the independent brake and/or an overreduction of the automatic brake; the second, at 20 mph, was slightly longer and probably resulted from the application of the brakes in emergency by the conductor from the caboose when the head end had reached a point about 4.4 miles from the starting point. This was followed by a dramatic burst in acceleration which increased progressively at a phenomenal rate. By the time Extra 3119 West had reached a point 12.6 miles west of the starting point, it was traveling 80 mph, the limit of the locomotive unit's speed recorder tape.

Shortly after Extra 3119 West started accelerating rapidly, the engineer notified the dispatcher that he would not be able to stop the train at Dawes. After hearing this, the engineer of the VAN train began to speed up his train in an effort to stay ahead of Extra 3119 West. However, when the VAN train reached the east end of Kelso traveling about 75 mph, the locomotive overspeed feature functioned causing a loss of power and speed. As a result, the still-accelerating Extra 3119 West had closed the gap between the two trains to the point where they passed through Kelso about 1 minute apart. The collision ultimately occurred with the VAN train moving at 80 to 85 mph and Extra 3119 West moving at a speed of about 118 mph.

Extra 3119 West consisted of a caboose and 20 UP Class F-70-1 bulkhead flatcars modified for hauling crossties in company service. These cars were loaded with 10,789 treated crossties en route from UP's timber treating plant at The Dalles, Oregon, to a tie renewal project near Yermo, California. Waybills for the tie cars were issued at The Dalles facility and showed an estimated lading of 60,000 pounds per car. The investigation developed that the actual lading was more than twice the estimated figure and that trailing tonnage of Extra 3119 West was approximately 2,049 tons compared with the figure of 1,495 tons which was given to the crew at Las Vegas, where Extra 3119 West originated.

The investigation developed that the tie cars were urgently needed at the work site and that it was anticipated the ties could be distributed there during the daylight hours of November 17. The cars which ultimately made up Extra 3119 West arrived at Las Vegas shortly after midnight on the 17th. However, the train could not be run until daylight because the electrical system of the available caboose was inoperative. Shortly before the crew reported for duty at 8:05 a.m., it was discovered that the train had to be reswitched since it included cars of 8-foot ties that could not be used in the main track. The switching was done hastily under the direct supervision of the terminal superintendent. The haste in reswitching resulted in Extra 3119 West leaving Las Vegas with one car of 8-foot ties. According to the car inspector, the inspection and testing of Extra 3119 West were done improperly and not as required by the UP's air brake rules. No determination was made as to whether the dynamic brake was functional.

The postaccident investigation indicated that 3 of the cars in Extra 3119 West had brakes cut out and a total of at least 13 of the 20 tie cars did not have fully-effective brakes. It was also established that in order to balance the grade between Cima and

Chase at 15 mph, Extra 3119 West needed fully-effective brakes on 14 to 15 cars with the brakes applied in full service. On this basis, there was no way that the engineer could have stopped the train once it had attained the maximum allowable speed where the gradient was -2.00 percent or steeper.

Analysis of the speed tape, radio reports attributed to the engineer, and statements of the surviving crewmembers indicates that the emergency application was initiated from the caboose after the engineer had made an overreduction of brakepipe pressure. Static tests made with a train similar in makeup to Extra 3119 West and with the Westinghouse Air Brake Company's test rack revealed that in every instance where brakepipe pressure was reduced below 64 pounds, an emergency application initiated from the caboose failed to transmit to the locomotive. Since the conductor was not required to inform the engineer of the action he had taken and since the locomotive unit was not equipped with a brakepipe flow indicator, the engineer probably did not realize what had occurred. In addition, if the engineer failed to place the locomotive brake valve in emergency in less than a minute, the pressure-maintaining feature would begin restoring brakepipe pressure and cause a release of the brakes. The conductor was required to leave the caboose valve open, and as long as it was open, brakepipe pressure and braking capability could not be restored. This is the only logical explanation for the sudden and continuous acceleration of the train and its uncontrolled movement down the grade.

The only UP air brake rules that the engineer had to rely on in his handling of Extra 3119 West instructed him to make repeated light brakepipe reductions until speed could be controlled at the desired level. There were no rules or instructions informing the engineer of the maximum brakepipe reduction that could be made to balance the grade and how much pressure had to be retained for stopping ability. Further, UP rules do not require an engineer to stop his train if there is doubt that speed can be controlled with a given amount of braking. The Air Brake Association recommends that no more than one-third of full service reduction be employed when dynamic braking is not available, and the rules of the other railroads with mountain grades comparable to Cima Hill contain specific and straightforward limits of allowable brakepipe reduction as well as other required safeguards.

Even if the engineer of Extra 3119 West had noticed the brief drop in brakepipe pressure that resulted from the emergency application, there was no way that he could know without advice from the conductor or a brakepipe flow indicator whether this was the result of an emergency or a service application. In addition, UP Rule 1053 required the engineer to place the brake valve in "running" or "release" position when a service application was made from a location other than the locomotive brake valve.

The Safety Board's investigation revealed that UP made significant changes in the methods of operating westbound freight trains down the Cima-Kelso grade many years after the use of steam locomotives was discontinued and diesel-electric locomotives with dynamic braking were put into service on the First Subdivision. In the past, the crews of all westbound trains had to make a running test of the dynamic brake on Erie Hill and were required to stop at Cima to make a brakepipe air test and inspect their trains before starting down the grade. Westbound trains with inoperative dynamic braking had to be stopped 10 minutes at both Chase and Dawes, and the crews had to make walking inspections of their trains at both places. No train was allowed to descend Cima Hill with more than 70 tons per operative brake, and empty cars were kept at Cima so that they could be added to trains which exceeded the per brake tonnage limit. At the time of the accident, there was no limit to the allowable tonnage per operative brake; the running

dynamic brake test had to be made only by trains with locomotives lacking the pressure-maintaining feature; and the brakepipe test and inspection at Cima were no longer required. Trains with inoperative dynamic braking had to stop only at Dawes, and the crews were no longer required to make a walking inspection of their trains.

The First Subdivision dispatcher was the immediate supervisor of the traincrews involved in this accident; however, neither he nor the assistant chief dispatcher took any action from the time that the engineer of Extra 3119 West reported his locomotive's dynamic brake inoperative to the time the engineer of Extra 8044 West reported the accident. This same apparent detachment and lack of concern was cited by the Safety Board in its report on the rear-end collision of two UP trains near Hermosa, Wyoming, on October 16, 1980. <sup>2/</sup> Although there was no plan to be followed in the event of an emergency on Cima Hill, the dispatcher was experienced and knew that there had been speed control problems on the grade in the past. He should have known that the engineer of Extra 3119 West was inexperienced, and there was adequate time to consult with other supervisors to work out a safe solution once he learned the dynamic brake was inoperative.

On the basis of the investigation of this accident, as well as the investigation of other relatively recent accidents on the Union Pacific, the Safety Board believes that present UP policy does not foster compliance with the rules relating to air brake inspection and testing of trains where they are originated. In its report on the runaway derailment of a UP freight train on Sherman Hill at Granite, Wyoming, on July 31, 1979, <sup>3/</sup> the Board recommended that UP instruct those employees who make train brake tests in the requirements of the rules and the Federal regulations with which the rules conform, and to establish monitoring procedures to insure that the tests are performed properly.

Therefore, as a result of its investigation of this accident, the National Transportation Safety Board reiterates the following recommendations made to the Union Pacific Railroad Company in 1980 and 1981:

Instruct employees who make train brake tests in the test requirements of the Federal Power Brake regulations, CFR 49 Part 323, and establish monitoring procedures to insure that the tests are conducted properly. (Class II, Priority Action) (R-79-78)

Equip locomotives with brakepipe flow indicators to enable engineers to measure trainline air flow. (Class II, Priority Action) (R-79-81)

Amend and clarify rules to require dispatchers and train crewmembers to communicate with each other about conditions affecting the movement of their train. (Class II, Priority Action) (R-81-42)

In addition, the Safety Board recommends that the Union Pacific Railroad Company:

Provide traincrews with accurate tonnage figures for their trains at Las Vegas and other locations where operating methods are predicated on tonnage per operative brake. (Class II, Priority Action) (R-81-88)

<sup>2/</sup> Railroad Accident Report—"Rear-End Collision of Union Pacific Railroad Company Freight Trains, near Hermosa, Wyoming, October 16, 1980" (NTSB-RAR-81-3).

<sup>3/</sup> Railroad Accident Report—"Derailment of Union Pacific Railroad Freight Train, Granite, Wyoming, July 31, 1979" (NTSB-RAR-79-12).

Require that The Dalles, Oregon, timber treating plant and other UP facilities where material is loaded on cars provide actual weights on waybills where track scales are available. Where scales are not available, require that weights be accurately estimated. (Class II, Priority Action) (R-81-89)

Amend its timetable instruction pertaining to the operation of westbound trains without functioning dynamic braking to provide for:

- (1) A maximum tonnage per operative brake that is consistent with the braking force required to balance grade force;
- (2) The requirement that a running air brake test be performed in advance of Cima;
- (3) Establish the maximum brakepipe reduction that may be made in the effort to balance the grade; and
- (4) Caution traincrews that in case there is any doubt of ability to control speed, the train must be stopped immediately, sufficient hand brakes set to hold the grade, and brakepipe pressure fully restored before the train is allowed to proceed. (Class II, Priority Action) (R-81-90)

Issue instructions to the California Division chief train dispatcher that require First Subdivision dispatchers to:

- (1) Ascertain that crews of westbound trains without functioning dynamic brakes understand the special timetable provisions applying to their trains between Cima and Kelso;
- (2) Determine that engineers of westbound trains at Cima fully understand the proper method of braking on the grade;
- (3) Hold westbound trains without functioning dynamic brakes at Cima until the main track is clear to Kelso and not permit the occupancy of the main track east of Kelso by other trains while a train without functioning dynamic brakes is descending the grade. (Class II, Priority Action) (R-81-91)

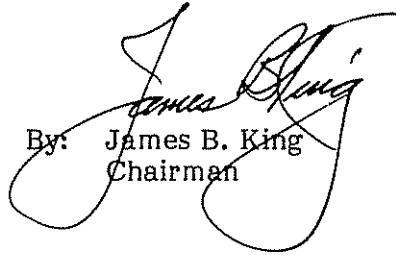
Require that the dynamic braking feature of the lead locomotive unit on all westbound trains originating at Las Vegas and which are to be operated west of Cima be tested and determined to be functional. (Class II, Priority Action) (R-81-92)

Amend its air brake and train handling rules to:

- (1) Require crewmembers to notify the engineer whenever the caboose brake valve is used;
- (2) Expand Rule 1043 to include reference to the necessity of retaining sufficient brakepipe pressure to stop anywhere on the grade; and

- (3) Modify Rules 1053 and 1053(A) to eliminate the possibility of an inadvertent release of the brakes after an open brakepipe occurs and fails to result in an emergency brake application on the locomotive. (Class II, Priority Action) (R-81-93)

DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations. KING, Chairman, did not participate.



By: James B. King  
Chairman