National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation R-89-82C

Date: February 12, 1990

In reply refer to: R-89-81 and R-89-82

Honorable Gilbert Carmichael
Administrator
Federal Railroad Administration
400 7th Street, S.W.
Washington, D. C. 20590

About 4:30 a.m. mountain standard time on February 2, 1989, freight cars from Montana Rail Link Inc. (MRL) westbound train 1-121-28 (train 121) rolled eastward down a mountain grade and struck a stopped helper locomotive consist, Helper 1, in Helena, Montana. The locomotive consist of train 121 included three helper units (Helper 2) and three road units positioned at the head end of a 49-car train. The crewmembers of train 121 had uncoupled the locomotive units from the train to rearrange the locomotive consist while stopped on a mountain grade. In the collision and derailment, 15 cars from train 121 derailed, including 3 tank cars containing hydrogen peroxide, isopropyl alcohol, and acetone. Hazardous material released in the accident later resulted in a fire and explosions. About 3,500 residents of Helena were evacuated. Two crewmembers of Helper 1 were only slightly injured. The estimated damage (including clean-up and lading) as a result of this accident exceeded $6 million.[1]

The National Transportation Safety Board determined that the probable cause of this accident was the failure of the crew of train 1-121-28 to properly secure their train by placing the train brakes in emergency and applying hand brakes when it was left standing unattended on a mountain grade. Contributing to the accident was the decision of the engineer of Helper 2 to rearrange the locomotive consist and leave the train unattended on the mountain grade, and the effects of the extreme cold weather on the airbrake system of the train and the crewmembers. Also contributing was the failure of the operating management of the Montana Rail Link to adequately

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[1] For more detailed information, read Railroad Accident Report--"Collision and Derailment of Montana Rail Link Freight Train with Locomotive Units, and Hazardous Materials Release at Helena, Montana, February 2, 1989." (NTSB/RAR-89/05)

assess the qualifications and training of employees placed in train service. Contributing to the severity of the accident was the release and ignition of hazardous materials.

Train 1-121-28 had the required initial terminal road train airbrake test before departing Laurel to determine train line leakage. The MRL Train Activity/Delay Report dated February 1, 1989, showed that the failure of the 64-car train to pass the air test was "due to cold." To pass the required airbrake test, a block of 16 cars was removed from the train as interchanged from the BN. The engineer stated that the train line leakage after a second air test (following the removal of the 16 cars) was 4 psi/min (49 CFR 232.12 requires 5 psi/min or less train line leakage). However, the relief engineer stated that he had taken exception to the train line pressure between Townsend and Helena, and told the Helper 2 engineer and Helena yard office "...the fact that the air flow indicator was at 14...." Although the helper engineer was made aware of the train line pressure concerns of the relief crew engineer, he did not take any action nor were there any instructions that required him to do so.

In accordance with MRL operating practices for mountain grade territory, the Helper 2 engineer increased the feed valve setting increasing train line pressure from 80 psi to 90 psi prior to departing Helena. This had the effect of increasing the air flow and thus the leakage rate. However, leakage tests were not required and none were performed. At intermediate terminals such as Helena, when the train consist is not changed, Federal regulations[2] only require that the train line be charged to within 15 psi of the feed valve setting on the locomotive. After making a 20-psi automatic brake reduction and release, it must be determined that the brakes on the rear car apply and release. Crews of trains with an EOT telemetry device must make the same 20-psi automatic brake reduction and release, but they only need to determine that the train line pressure reduces and then is being restored; they do not need to check the rear car to determine that its brakes have applied and released. Neither the Federal regulations nor the MRL operating practices require additional airbrake testing or provide specific procedures such as more stringent leakage requirements, increased frequency of airbrake testing, or diagnostic devices for airflow, when extreme cold weather conditions exist, even in mountain grade territory or when the feed valve setting has been increased. The Safety Board believes that had there been requirements to perform leakage tests in extreme cold weather, the outbound crew would have done so while train 1-121-28 was at Helena and the high air flow reported by the inbound engineer might have been verified providing an opportunity for a decision to either correct the cause of the high air flow or not operate train 1-121-28.

The EOT telemetry device on train 121 did not have the capability to transmit a signal to confirm the status of operation of the rear unit or to initiate an emergency application of the train brakes from the rear of the train. When the road engineer saw that the automatic airbrake application made by the helper engineer was not reflected by a reduction in train line pressure from the 75 psi originally shown on the EOT receiver, he assumed

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[2] Road Train and Intermediate Terminal Train Air Brake Tests, 49 CFR 232.13.

that the device had either "quit transmitting" or "froze up." The road engineer did not consider whether or not the train brakes had applied or if the EOT transmission signal was being obstructed. When the road locomotive UOE uncoupled the train from the road locomotive, the EOT receiver still displayed 75 psi and again the road engineer did not question whether or not the expected emergency brake application had occurred. In both instances, the road engineer had no way to verify the status of EOT telemetry. A two-way EOT telemetry device would have allowed the road engineer to verify the status of the EOT transmitter. Furthermore, in the first instance, when the train line pressure did not change after the automatic airbrake application by the helper engineer, the road engineer could have initiated an emergency application of the train brakes from the rear of the train with a two-way EOT telemetry device before proceeding to uncouple from the train. In the second instance, when the UOE uncoupled the train from the road locomotive without initiating an emergency application of the train brakes and the train line pressure still did not show the reduction in train line pressure, the road engineer could have attempted to initiate an emergency application of the train brakes from the rear of the train with a two-way EOT telemetry device. The two-way EOT telemetry device would have continued to transmit a signal until acknowledged by a drop in train line pressure and would have afforded at least two opportunities for the road engineer to attempt to initiate an emergency application of the train brakes although it probably may not have stopped the train once it began moving down the mountain. Two-way transmitting EOT telemetry devices are not in use on railroads in the United States nor are they required. The president of Pulse Electronics Inc. stated at the Safety Board's public hearing that a two-way transmitting EOT telemetry device, which has the capability to allow the engineer to issue an emergency brake application from the locomotive cab as well as operate the rear marker lights, is available and is being marketed for use on Canadian railroads.[3]

The Safety Board found in its investigation of a derailment of a Union Pacific freight train in Granite, Wyoming,[4] on July 31, 1979, that the train line was blocked by a closed angle cock behind the sixth car and the engineer could not slow the train because he could not apply the brakes behind the sixth car. Although the train had a caboose and the capability to initiate an emergency application of the train brakes, this was not done. The Safety Board determined in that accident that,

> Had the crewmembers in the caboose put the train brakes in emergency when the train speed became excessive, the train would have stopped and the derailment would have been avoided.

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[3]The Safety Board was informed that Canada has enacted legislation, effective November 1, 1989, to require that cabooseless trains are to be equipped with two-way transmitting EOT devices.

[4]Railroad Accident Report--"Derailment of Union Pacific Railroad Freight Train, Granite, Wyoming, July 31, 1979" (NTSB-RAR-79-12).

The Safety Board believes that the Federal Railroad Administration should amend 49 CFR 232.19 to require the use of two-way EOT telemetry devices on all cabooseless trains for the safety of railroad operations.

Therefore, the National Transportation Safety Board recommends that the Federal Railroad Administration:

> Amend the Road Train and Intermediate Terminal Train Air Brake Tests, 49 CFR 232.13, to require additional testing of a train airbrake system when operating in extreme cold weather, especially when the feed valve setting is changed and the train will be operated in mountain grade territory. (Class II, Priority Action) (R-89-81)
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> Require the use of two-way end-of-train telemetry devices on all cabooseless trains for the safety of railroad operations. (Class II, Priority Action) (R-89-82)

Also as a result of its investigation of this accident, the Safety Board issued Safety Recommendations R-89-68 through R-89-77 to Montana Rail Link, Inc., R-89-78 and R-89-79 to the Burlington Northern Railroad Company, R-89-80 to the Secretary of the U.S. Department of Transportation, R-89-83 to the Research and Special Programs Administration, R-89-84 through R-89-87 to the City of Helena, R-89-88 to the State of Montana, R-89-89 to the Lewis and Clark County Disaster and Emergency Services, and R-89-90 through R-89-92 to the Association of American Railroads.

As a result of its investigation of this accident, the Safety Board also reiterated the following Safety Recommendations to the Research and Special Programs Administration, the Association of American Railroads, and the Federal Railroad Administration, respectively:

> In consultation with the Federal Railroad Administration and the Association of American Railroads, conduct a full testing and evaluation program to develop a head shield to protect DOT specification aluminum tank car ends from puncture and mandate installation of the head shield at an early date. (Class II, Priority Action) (R-85-61)
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> In consultation with the Federal Railroad Administration and the Research and Special Programs Administration, conduct a full testing and evaluation program to develop a head shield to protect DOT specification aluminum tank car ends from puncture and mandate installation of the head shield at an early date. (Class II, Priority Action)(R-85-63)
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> In consultation with the Research and Special Programs Administration and the Association of American Railroads, conduct a full testing and evaluation program to develop a head shield to protect DOT specification aluminum tank car ends from puncture and mandate installation of the head shield at an early date. (Class II, Priority Action) (R-85-64)

KOLSTAD, Acting Chairman, and BURNETT, LAUBER, NALL, and DICKINSON, Members, concurred in these recommendations.

By: James L. Kolstad
Acting Chairman