

SP-20  
Log R-417

**NATIONAL TRANSPORTATION SAFETY BOARD**  
WASHINGTON, D.C.

ISSUED: March 8, 1983

-----  
Forwarded to:

Mr. W. H. Dempsey  
President and Chief Executive Officer  
Association of American Railroads  
1920 L Street, N.W.  
Washington, D.C. 20036

SAFETY RECOMMENDATION(S)

R-83-27

-----

About 3:15 a.m. on June 15, 1982, National Railroad Passenger Corporation (Amtrak) Train No. 5 (the San Francisco Zephyr), with 315 persons onboard, derailed near Emerson, Iowa, while traveling about 74 miles per hour on the Burlington Northern Railroad (BN). The train was traveling westbound on the No. 2 main track when it encountered floodwater over the top of washed-out rails. The accident resulted in 1 passenger fatality and 27 injuries. Damage was estimated to be about \$3,381,940. 1/

Shortly after 10 p.m. on June 14, 1982, police began to evacuate parts of the towns of Malvern, Hastings, and Emerson, in southwest Iowa, because of flooding caused by heavy rainfall earlier in the evening. All of the towns, which are located about 5 miles apart, were BN stations. The BN train dispatchers controlling train movements on the BN's main tracks of its Galesburg Division, in which the towns were located, were stationed at Cicero, Illinois. Cicero is located about 450 miles east of Emerson. The assistant chief dispatcher in Cicero stated that about 10:10 p.m. he became aware of a power-out indication 2/ on the dispatcher's console for a signal in Malvern. The indication also had occurred earlier about 6:30 p.m. The assistant chief dispatcher stated that, in response to both of the power-out indications, the dispatcher in Cicero contacted the operator at Pacific Junction, Iowa, and asked him to call out the local signal maintainer to correct the problem.

According to BN's tape recordings of the Cicero dispatcher's telephone communications, the operator at Pacific Junction called the Cicero dispatcher at 11:31 p.m. to report that he had contacted the signal maintainer. The operator said that the signal maintainer would go to the signal location at Malvern as soon as heavy rains subsided. The signal maintainer contacted the Cicero dispatcher at 11:51 p.m. to report that he had corrected the signal problem and to confirm that the power-out light on the dispatcher's console was no longer illuminated.

1/ For more detailed information, read National Transportation Safety Board's Railroad Accident Report--"Derailment of Amtrak Train No. 5 (The San Francisco Zephyr) On the Burlington Northern Railroad, Emerson, Iowa, June 15, 1982" (NTSB-RAR-83-2).

2/ The power-out indication is a light on the console that, when illuminated, indicates that the commercial electric power supply to a given signal location has been interrupted, and the signal is functioning on backup battery power.

3579A

The signal maintainer and the Cicero dispatcher discussed the weather in general in the Malvern area. The signal maintainer reported that he had driven through water on a highway and that water was standing in some fields. The dispatcher mentioned the possibility of ordering track patrols to ride on the track to determine if water had affected the tracks. The signal maintainer said that the tracks were on a "high fill." The dispatcher then said, "All right . . . it could be a little later in the morning before we need [to check] out east where the river, or where the tracks are low." The signal maintainer later stated to Safety Board investigators that, while driving through Emerson about 12:15 a.m. on June 15 on his way home, he did not notice any flooding, evacuation, or other unusual conditions.

The track inspector for the Emerson area, who resides in Hastings, stated that he heard a tornado warning siren sound about 10:30 p.m. He said that when the rain stopped 15 or 20 minutes later, "I got in the car and I drove to [U.S.] Highway [No.] 34 and about a half-a-mile out of Hastings to see how much damage or water there was." He stated that he observed the BN tracks at an at-grade crossing in Hastings, "and there was nothing that appeared to me of any damage any place, so I went back home." He did not report his findings to anyone.

The operator at Pacific Junction stated that at the end of his tour of duty at midnight, he advised his relief of the extra track patrols on the Lincoln Division. About 12:40 a.m., while en route home eastbound on U.S. Highway No. 34, the operator had to stop at the Indian Creek Bridge near Emerson because water was covering the bridge. An Iowa Department of Transportation pickup truck and a sheriff's car were being used to block the west approach to the bridge. The operator stated that he sat in his car during a light rain until about 1:30 a.m., and then joined the highway department employee in the pickup truck, where he sat until 3:30 a.m. waiting for the water to recede. He said that he talked with the highway department employee about the water, and that the highway employee was discussing the situation around Emerson with other persons via a two-way radio in the truck. The operator stated that he did not make any effort to contact the BN concerning the flooding situation at Emerson because "the [railroad] roadbed is several feet higher than the main street." Traffic was allowed to proceed over the Indian Creek Bridge when the water receded about 4:05 a.m.

Shortly before 3:15 a.m., while the evacuation of Emerson was still in progress, Amtrak Train No. 5 passed through the town westbound about 78 miles per hour on the No. 2 main track. The train had originated at Chicago, Illinois, about 1 hour behind schedule, and was en route to San Francisco, California. The train was being operated at that time by the fireman, who was qualified as an engineer. Both the engineer and the fireman stated that, as they neared Emerson, they observed the emergency lights on a sheriff's patrol car parked on the U.S. Highway No. 59 overhead bridge at the east end of Emerson. Neither the engineer nor the fireman observed anyone near the vehicle. The fireman began sounding the warning whistle for the two highway at-grade crossings in Emerson just before the train passed under the bridge. Just east of the highway bridge, the BN tracks traverse a railroad bridge which spans Indian Creek. The engineer and the fireman both stated that they did not observe any flooding of Indian Creek as they crossed the bridge.

The engineer told Safety Board investigators that after the fireman, who was in the engineer's seat on the north side of the locomotive, finished sounding the warning whistle, the fireman said, "that water is kind of high for what rain we did have. We didn't have any heavy rains." The engineer said that he had informed the fireman of some flooding he had seen to the south side of the tracks in Emerson. The fireman later stated to Safety

Board investigators that he had not seen any water in the town of Emerson. Both the engineer and the fireman stated after the accident that they had never observed unusual flooding or water conditions at or near Emerson before.

After passing through Emerson, the train negotiated a curve to the right, and the fireman sounded the warning whistle for another highway at-grade crossing. The fireman stated that they had just passed the crossing and entered the tangent track when both the engineer and fireman saw water over the track ahead. Neither of them could recall the aspect of the last signal they had passed, which was located beyond the end of the curve and about 1,740 feet east of where the water covered the track. The fireman stated that he immediately placed the automatic airbrake in emergency, and that the throttle was in the third position at the time. The engineer and the fireman then lay on the floor of the locomotive cab, awaiting the derailment.

A series of weather forecasts was issued by the National Weather Service Forecast Office concerning flood and storm watches and warnings in southeast Nebraska and southwest Iowa during the evening of June 14 and early morning of June 15. A weather "watch" indicates that a potential threat exists and that persons in the affected area should make necessary preparations and keep informed of pending conditions. A weather "warning" indicates that the threat has materialized and is imminent or has been reported, and that persons in the affected area should take immediate precautions. Severe thunderstorm warnings were first issued for Mills County at 9:50 p.m. on June 14. A flash flood watch was issued at 10:30 p.m., and six subsequent weather bulletins indicated severe weather in that area.

The BN collects meteorological data from designated stations along its railroad four times daily. The weather data conveyed to the dispatchers are furnished by observations made by the station operators. The operators must rely on their personal evaluations because the stations are not equipped with any weather monitoring devices and because the operators do not have access to commercial weather data. Further, since all of the stations are located directly along the railroad, the scope of the observations is limited to a small area. In this instance, the weather reporting stations encompassing the accident site were located about 82 miles apart. The BN's method of collecting meteorological data proved to be inadequate in this instance to prevent the derailment. The Safety Board believes that the BN, and all railroad common carriers which gather meteorological data through similar methods, should implement professionally gathered and evaluated meteorological data collection methods, such as subscribing to data services offered by the National Oceanic and Atmospheric Administration, to better assure the safe operation of trains.

As Amtrak Train No. 5 neared the town of Emerson, it passed over the railroad bridge spanning Indian Creek. At this time, the floodwaters were near crest stage, had flowed over Indian Creek's banks, and had covered the piers supporting the bridge. The engineer and fireman should have been able to see the flood condition at this location, according to the postaccident sight distance test. The statements of the engineer and fireman indicate, however, that their attention was diverted from the track structure ahead of their train to the flashing emergency lights on the patrol car situated on the overhead highway bridge located west of the Indian Creek railroad bridge. Since the flashing emergency lights were situated near the upper limit of the crew's cone of vision from the locomotive, while the floodwater was located near the lower limit, this distraction of the crew's attention from the track structure at a critical moment delayed the crew's awareness of the imminent danger.

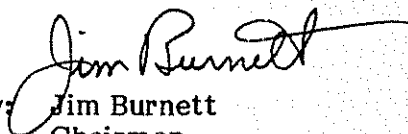
After the accident, the event recorder cassette was removed from the locomotive and taken by Safety Board investigators to the event recorder's manufacturer for expanded format playback and verification. Results of the playback indicate that the speed of the train was reduced from about 78 miles per hour to about 74 miles per hour in the last 2 miles of operation prior to the point at which intense deceleration began. Since the train was about 1 hour behind schedule, the Safety Board believes that the locomotive crew would have been operating the train at its maximum allowable speed of 79 miles per hour so as to not further delay the schedule. The decrease in speed and the idle throttle position indicate that the locomotive crew doubted the safety of operating at the maximum allowable speed. The Safety Board believes that the event recorder playback indicates a manner of train operation that substantiates the engineer's testimony that both he and the fireman observed at least some of the flood at Emerson. Since the engineer and fireman stated that they had never experienced flooding or unusual water conditions at this location in the past, the Safety Board believes that they did not recognize the severity of this flood condition and its effect on the track structure. The Safety Board also notes that neither the engineer nor the fireman could recall the aspect of the last signal they passed, about 1,740 feet east of the washed-out track structure. This signal should have been in the range of vision of an alert and responsive locomotive crew, and its aspect should have been evident to such a crew before the water ahead came into view. The Safety Board believes that the locomotive crew's lack of awareness of the signal further indicates that they may have been preoccupied with looking at the flooding along the sides of the track structure east of the accident site.

The foregoing circumstances indicate that although BN has several operating and safety rules in effect regarding protection of train movements during severe weather, the involved employees did not act as provided by the rules to take the necessary actions that would have prevented the accident. The Safety Board believes that this may have been due to the lack of training afforded the involved employees to assess adequately the particular weather conditions at their locations and the effects that these conditions might have on the safe operation of train movements.

As a result of its investigation of this accident, the National Transportation Safety Board recommends that the Association of American Railroads:

Inform its membership of the facts and circumstances of the derailment at Emerson, Iowa, on June 15, 1982, and recommend to its member railroads that they adopt a system of professionally gathered and evaluated meteorological information to better assure timely knowledge of climatic conditions that may affect the safe operation of train movements. (Class II, Priority Action) (R-83-27)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and McADAMS, BURSLEY, and ENGEN, Members, concurred in this recommendation.

  
By: Jim Burnett  
Chairman