

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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 Forwarded to:

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SAFETY RECOMMENDATION(S)

R-85-130 and -131

About 6:50 a.m., on July 7, 1984, northbound Amtrak passenger train No. 60, the Montrealer, derailed while passing over a washed-out section of gravel embankment under the main track of the Central Vermont Railway (CV) near Essex Junction, Vermont. Two locomotive units and the forward seven cars of the train derailed and were destroyed or heavily damaged. Three passengers and an Amtrak sleeping car attendant were killed; one CV crewmember died about 3 hours after the accident as a result of injuries sustained in the accident. One CV crewmember, two Amtrak attendants, and 26 passengers were seriously injured. Damage was estimated to be \$6,812,838. ^{1/}

The general weather forecasts issued by Burlington National Weather Service Office (NWSO) on the morning and afternoon of July 6 proved to be very accurate. There was nothing particularly unique or ominous in the forecasts; afternoon and evening thunderstorms are frequently forecast and occur commonly in midsummer in Vermont. By the time the meteorologist-in-charge reported on duty at 4:30 p.m., the weather system in advance of a cold front was well-developed and was beginning to produce severe convective storms all along the Appalachian mountain chain. There was a very strong likelihood that such storms would eventually strike western Vermont and that they could be highly localized and severe.

More than 4 hours passed between the 4:10 p.m. general weather forecast and the first of several special weather statements issued by Burlington NWSO. Although the meteorologist stated that he was concerned about potential flooding since an inch of rain had fallen the previous day, he did not update the local weather information to reflect the rapid development of adverse weather conditions until 8:27 p.m., well after he had become aware of them. At 4:30 p.m., the Albany, New York, weather station had issued a flood watch for the Adirondack Mountains, to the west and southwest of Burlington. Shortly afterward, the Burlington meteorologist observed storm cells developing 20 to

^{1/} For more detailed information, read Railroad Accident Report—"Derailment of Amtrak Passenger Train No. 60, The Montrealer, on the Central Vermont Railway near Essex Junction, Vermont, July 7, 1984" (NTSB/RAR-85/14).

40 miles south and southwest on the radar. The first of these storms reached the Vermont shore 16 miles southwest of Essex Junction at 6 p.m. Rain began falling at the weather station at 6:25 p.m., and a 30-minute episode of heavy rain began there at 7:04 p.m. The second and most prolonged episode of heavy rain began about 9 p.m., and during the next hour the weather station recorded .64 inch of rainfall, bringing the total measurement of rain since the onset of the first downpour to 1.25 inches.

The meteorologist stated that he continuously monitored the radar to establish the intensity of the storm cells and, as a result, he knew that heavy storms were passing 4 to 5 miles east of the weather office. Nevertheless, none of the special weather statements or subsequent flood watch and flood warning broadcasts actually reflected this knowledge or the significance of reports of flooding along what was probably a major storm track. By 10 p.m., the meteorologist had been informed that roads were awash with water east and southeast of Essex Junction along the path of the heavy cells. He knew that the Essex Junction power dam periodically measured rainfall, yet he did not contact the dam personnel who were about midway between the weather station and the flooded roads. Had he done so, he would have learned that more than twice as much rain had fallen at the dam than at the weather station during the second episode of heavy rain.

The 8:27 p.m. special weather statement referred generally to heavy showers moving through the upper Champlain Valley and northern Vermont. The only specific information provided was that about a half inch of rain had fallen at Burlington and more showers were expected. The direction the storms were moving and their probable tracks were not given. The second special weather statement, issued at 10:15 p.m., reported heavy showers north and east from Burlington into the counties to the north. None of the specific information that Burlington NWSO had concerning the line of heavy storms passing to the east and flooded ground conditions was included.

By 11:15 p.m., when a third special weather statement was issued, the meteorologist was aware that Highway 15 had been closed in the foothills northeast of Essex Junction. The location was on the same line as the flood locations reported to him earlier. Although the statement referred to the closing of Highway 15 and to water over the road on Highway 128 in Essex, the significance of these reports and the probability of extraordinary rain along the line that connected these locations was not mentioned. The statement did, however, advise that a flood watch was in effect for this and other parts of Vermont. The 11:10 p.m. flood warning covered the entire northwestern quarter of Vermont, including Chittenden County where the accident occurred. The warning included almost no site-specific information other than general references to flooded and washed-out roads in five townships, three of which were along the principal storm path.

Had the personnel at the Burlington weather station realized the historic magnitude of the rainfall that had been measured along the storm track by the time they issued the flood warning, they probably would have been more site-specific in the warning. It is possible, as well, that they may have been sufficiently alarmed to have issued a flash flood warning instead of a flood warning. Persons along the storm track had, by this time, observed that the rain gauges were full and overflowing, and they knew that a phenomenal weather event had occurred. Yet, none of the observers informed the weather station of the fact, possibly because they did not have access to the weather station's unlisted telephone number.

The NWS office has the responsibility for issuing severe weather information for the State of Vermont, and, in the case of flooding conditions, the responsibility often must be met with limited real-time information about conditions throughout the State. The

number of rainfall observations obtained after the July 7 accident demonstrates that observations were being made near the derailment site and that many observers would be willing to assist in providing weather information.

The Safety Board believes that the NWS should endeavor to enlist the cooperation of amateur observers to submit observations in a timely manner during periods of severe weather conditions when there is a likelihood of injury to people or damage to property. Through such a system, the NWS office could significantly increase its knowledge of local conditions and improve both the timeliness and accuracy of severe weather condition reports.

Neither the flood watch that was extended to include Vermont, nor the flood warning issued by Burlington NWSO suggested the possibility of flash flooding. Had a flash flood watch or a flash flood warning been issued, the required sounding of the alarm tone over the National Oceanic and Atmospheric Administration (NOAA) weather radio would have occurred. This was also required in the event a flood warning was broadcast. However, the alarm tone was not to be sounded for a flood watch. NWS instructions indicated that the requirement for sounding the alarm tone was "not applicable" for a flood watch.

Because the NWS Operations Manual does not require the weather radio Alert Tone to be sounded when special weather statements or a flood watch are broadcast, the alarm tone was not sounded until the 11:50 p.m. flood warning was issued. Unless persons who had the weather radio receivers were continuously monitoring them, they would not have heard the information that was broadcast prior to 11:50 p.m. The value of the weather radio receivers is considerably diminished if the users are not alerted until a very serious weather event is about to occur, or more likely, is occurring. Inasmuch as the local NOAA Weather Wire was out of service until 10:30 p.m., the media subscribers to the wire apparently missed the early special weather statements. As a result, very little information on the weather situation was available in time for the late news broadcasts.

The Safety Board believes that the Burlington NWSO may have failed to radar-monitor adequately the third storm that moved along the main storm track after midnight, or having monitored it, failed to relate the event to the earlier storms and the effect it would have on streams in the foothills. There was no upgrading of the flood warning to reflect the third storm, and the warning was allowed to expire at 6 a.m., 50 minutes before the derailment. It seems inconceivable that the weathermen would not have been aware of the potential for flash flooding that a third major storm would create after the heavy rains and flooding that had previously occurred in the area, and to which they had become alerted after 10 p.m. by local authorities on July 6.

The decision of the Albany weather office to issue a flood watch instead of a flash flood watch was inconsistent with the reports of 2 to 3 inches of rain falling in less than an hour in mountainous localities. A flash flood could be expected to occur under such circumstances with sudden and far more serious consequences than would occur with the gradual overflow of streams and accumulation of water in low-lying places which the definition of a flood clearly implies. Since the Green Mountains of western Vermont were being subjected to an extension of the weather system affecting the Catskill and Adirondack Mountains of New York, it was probable that they would also receive similarly locally intense rainfall. For this reason, the Safety Board believes the issuance of a flash flood watch and, ultimately, a flash flood warning for the area would have been more suitable and entirely justified.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the National Weather Service:

Solicit the voluntary submission of real-time severe weather observations from interested citizens and cooperative observers to provide a more complete overview of selected types of weather parameters at remote locations. (Class II, Priority Action) (R-85-130)

Evaluate the revision of the criteria for use of the tone alert signal with the National Oceanic and Atmospheric Administration Weather Radio to include special weather statements, flood watches, and other information which may be critical to surface transportation interests issued by National Weather Service Offices and Forecast Offices as information requiring a warning alarm when broadcast. (Class II, Priority Action) (R-85-131)

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 actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations R-85-130 and -131 in your reply.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, Member, concurred in these recommendations.

By: 
Jim Burnett
Chairman