



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date:

In reply refer to: H-98-42

Ms. Mary E. Peters
Director
Arizona Department of Transportation
206 S. 17th Avenue
Phoenix, Arizona 85007

About 5:56 a.m., on August 9, 1997, National Railroad Passenger Corporation (Amtrak) train 4, the Southwest Chief, derailed on the Burlington Northern Santa Fe Railway (BNSF) tracks about 5 miles northeast of Kingman, Arizona. Amtrak train 4 was en route from Los Angeles, California, to Chicago, Illinois, and had just left the Kingman station. The train was traveling about 89 mph on the eastbound track when both the engineer and assistant engineer saw a “hump” in the track as they approached bridge 504.1S. They applied the train’s emergency brakes. The train derailed as it crossed the bridge. Subsequent investigation revealed that the ground under the bridge’s supporting structure had been washed away by a flash flood. Of the 294 passengers and 18 Amtrak employees on the train, 173 passengers and 10 Amtrak employees were injured. No fatalities resulted from the accident. The damages were estimated to total approximately \$7.2 million.¹

The National Transportation Safety Board determined that the probable cause of this accident was displacement of the track due to the erosion and scouring of the inadequately protected shallow foundations supporting bridge 504.1S during a severe flash flood because the BNSF management had not provided adequate protection, either by inspection or altering train speeds to fit conditions. Contributing to the accident was the failure of the BNSF management to adequately address the erosion problems at bridge 504.1S.

Among other issues, the Safety Board investigation examined the adequacy of the design, maintenance, inspection, and drainage area characteristics of BNSF bridge 504.1² in light of the severe weather and flash flood conditions affecting the bridge and the subsequent failure of a

¹For more detailed information, read Railroad Accident Report—*Derailed Amtrak Train 4, Southwest Chief, on the Burlington Northern Santa Fe Railway, near Kingman, Arizona, August 9, 1997* (NTSB/RAR-98/03).

²The BNSF designates bridges by their milepost numbers. There are two separate bridges at milepost 504.1; one for the eastbound track and another for the westbound track. The bridges are designated by the BNSF as the south and north bridges, respectively.

crosswall and the bridge supporting structure. The investigation raised concerns regarding the highway box culverts downstream from bridge 504.1.

Following the accident, the BNSF hired a consultant, HDR Engineering, Inc., to conduct a site reconnaissance, surface exploration, and laboratory testing of soils from the site. In its report to the BNSF,³ HDR Engineering noted concerns regarding the concrete box culverts under Arizona State Route 66 adjacent to and downstream of the BNSF bridges in the accident area. Results of the BNSF hydrology study revealed that the highway box culvert downstream from railroad bridge 504.1 was apparently engineered to withstand a 25-year flood. According to the study,

At this time, based on the bed degradation which has developed below all five of the downstream highway 66 bridge structures, the highway structures have the potential of being washed out with the next major flood event, with the potential for the resultant headcut (of a potential magnitude of 5 feet) proceeding through the railway bridges (Br. 503.1, 504.1, and 505.9).

As you are aware, ADOT inspectors did not find any significant problems with the bridge (box culvert) either during the last scheduled inspection in February 1997 or the postaccident inspection of August 12, 1997. Although scour observations and measurements were made by the ADOT inspector, no scour calculations were made during either inspection.

Although the Safety Board did not request that the BNSF conduct a hydrology study or a scour vulnerability assessment of either the highway box culvert or the railroad bridges for the Kingman investigation, the BNSF provided this information to the Safety Board in its report. The Safety Board is concerned about the statements made in the BNSF report regarding the vulnerability of the box culverts and the potential effect such culverts might have on the railroad bridges in another severe storm situation. However, the BNSF report did not include ADOT bridge inspection data or pictures of the streambed dating back to 1971, information that would have been helpful in determining the relationship between the box culverts and the railroad bridges. The Safety Board therefore concluded that the relationship of the two structures and their respective zones of influence is not fully understood.

Therefore, the National Transportation Safety Board makes the following safety recommendation to the Arizona Department of Transportation:

Examine the “System Analysis Seligman Subdivision Bridge No.’s 503.1-505.9” report in light of your own historical bridge inspection information and take any action you deem appropriate. (H-98-42)

Also, the Safety Board issued Safety Recommendations R-98-48 through -53 to the Burlington Northern Santa Fe Corporation, R-98-54 through -57 to the Federal Railroad Administration, H-98-41 to the Federal Highway Administration, R-98-58 through -61 to the National Railroad Passenger Corporation (Amtrak), R-98-62 to the Mohave County Sheriff’s

³The report is entitled “System Analysis Seligman Subdivision Bridge No.’s 503.1-505.9.”

Department, R-98-63 to the International Association of Chiefs of Police, R-98-64 to the National Sheriffs' Association, R-98-65 to the Association of American Railroads, and R-98-66 to the American Short Line and Regional Railroad Association.

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 H-98-42 in your reply. If you need additional information, you may call (202) 314-6430.

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

By: Jim Hall
Chairman