

failed to withstand the stresses to which they were subjected in the collision.

- 12. The presence of the massive locomotive on the head of the passenger train assured the movement of the train through the impact area. A lighter train, or a train made up of self-propelled cars, might have been damaged over its entire length.
- 13. The rear portion of the lead locomotive of the passenger train was not materially damaged due to the fact that the impact was concentrated in the forward end of the locomotive. If the locomotive had been operated with the long hood end forward, the crew compartment would not have been in the impact area.
- 14. The industry's present practice of using interlocking couplers on the passenger train kept the cars together and in line, and thus minimized passenger injury.
- 15. The track guardrail over the bridge prevented the excursion of the derailed passenger train; the level of injury to the passengers and the crews of the two trains was low because the excursion was prevented.
- 16. There are no mandatory industrywide Federal safety requirements for railroad aerial track structures; the Federal Railroad Safety Act of 1970 provides the Federal Railroad Administration with the authority to establish safety standards for these structures.
- 17. The Fire Department at Sound View had not received educational materials from the railroad company concerning management of hazardous materials spills and emergency procedures.
- 18. The joint usage of a railroad right-of-way by passenger and freight trains constitutes a hazard to the passenger train unless positive means of preventing interference between modes is provided.

V. PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the

derailment of the freight train was the breakage of a truck side of a car on the freight train which followed a progressive fatigue crack failure. The fatigue crack was probably caused by increased shock loading on the side frame due to improper application of a 40-ton spring package in a car which carried 50-tons. The breakage of the truck side resulted in damage to a turnout, which was the immediate cause of derailment of the following cars.

The cause of the collision, derailment, and damage to the passenger train was the obstruction of track No. 2 by derailed cars of the freight train. The cause of the injuries to the crew of the passenger train locomotive and to the crew of the freight train caboose was the absence of systematic crash protection design of the railroad equipment.

VI. RECOMMENDATIONS

The Safety Board recommends that

R-72-1 - S

- 1. The Federal Railroad Administration
 - a. To the extent that data is available, promulgate regulations to insure the retirement of critical car components before normal service failure.
 - b. Where data regarding useful safe life of critical car components is not available, initiate programs to determine the data required to promulgate regulations in those areas.
 - c. Promulgate regulations to prevent misapplication of critical components.

One recommended approach in the formulation of these regulations would be to use the existing history or experience data, and to develop criteria to assure the replacement of critical components before normal wear life has expired and the component fails. This could be undertaken by such steps as:

R-72-1

- (1) A review of accident experience.
- (2) Identification of component failures that caused the accidents and failures that aggravated the accidents which made them more serious.
- (3) Designation of these components as critical components.
- (4) A review of maintenance records to determine average failure rates of these components.
- (5) Establishment of a maintenance schedule for inspection and replacement of these components on a regular interval prior to expiration of useful life.
- (6) Establishment of an inventory or recordkeeping system that would assure that replacement is made by installing new components at proper intervals.

These steps should be followed by a safety analysis of the operational system to determine what component failures, human errors, and conditions, or combinations of these, could cause accidents to occur. The results of this analysis will provide management visibility of hazards, high-risk assumptions, and areas for effective resource allocation to reduce risks. Because other possible approaches exist, a range of approaches should be studied.

R-72-2

R-72-3

2. The Federal Railroad Administration promulgate regulations requiring interlocking couplers on all passenger-carrying equipment including the passenger locomotive.
3. Federal Railroad Administration initiate studies to identify the hazards involved in the joint use of tracks by passenger and freight trains as a means of understanding the risks assumed. This study should be done jointly with the Urban Mass Transportation Administration and should include, but not be limited to, clearance,

R-72-5

R-72-7

R-72-8

means of keeping derailed cars in line, danger of shifted lading, and systems for detecting when track space has been violated.¹¹

4. The Federal Railroad Administration include in its research the determination of the value of track guardrails to keep derailed equipment in line with the track, and the development of safety standards for railroad aerial track structures.
5. The Federal Railroad Administration continue to a conclusion its recently initiated efforts in the matter of the improvement of the design of locomotive operator compartments to resist crash damage, and, in conjunction with the Association of American Railroads, undertake a review of modern design crashworthiness concepts in an effort to identify areas of applicability in the railroad industry.
6. The Federal Railroad Administration, in collaboration with the U. S. Coast Guard, develop a definition for an "empty" tank car for safety regulations, taking into account the potential losses attributable to various hazardous substances remaining in tank cars after unloading, and initiate rulemaking action to incorporate this definition and such related requirements as may be found necessary into 49 CFR 170-179.
7. The Federal Railroad Administration review the testing procedures of critical components in the industry, and determine where Federal standards may be required to assure the adequacy of the tests.
8. The Federal Railroad Administration consider the problems found in this accident in their current review of railroad communication systems and establishment of standards.

R-72-4

R-72-6

¹¹National Transportation Safety Board Special Study of Rail Rapid Transit, *op. cit.*, Recommendation 8.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOHN H. REED

Chairman

/s/ OSCAR M. LAUREL

Member

/s/ FRANCIS H. McADAMS

Member

/s/ LOUIS M. THAYER

Member

/s/ ISABEL A. BURGESS

Member

December 22, 1971