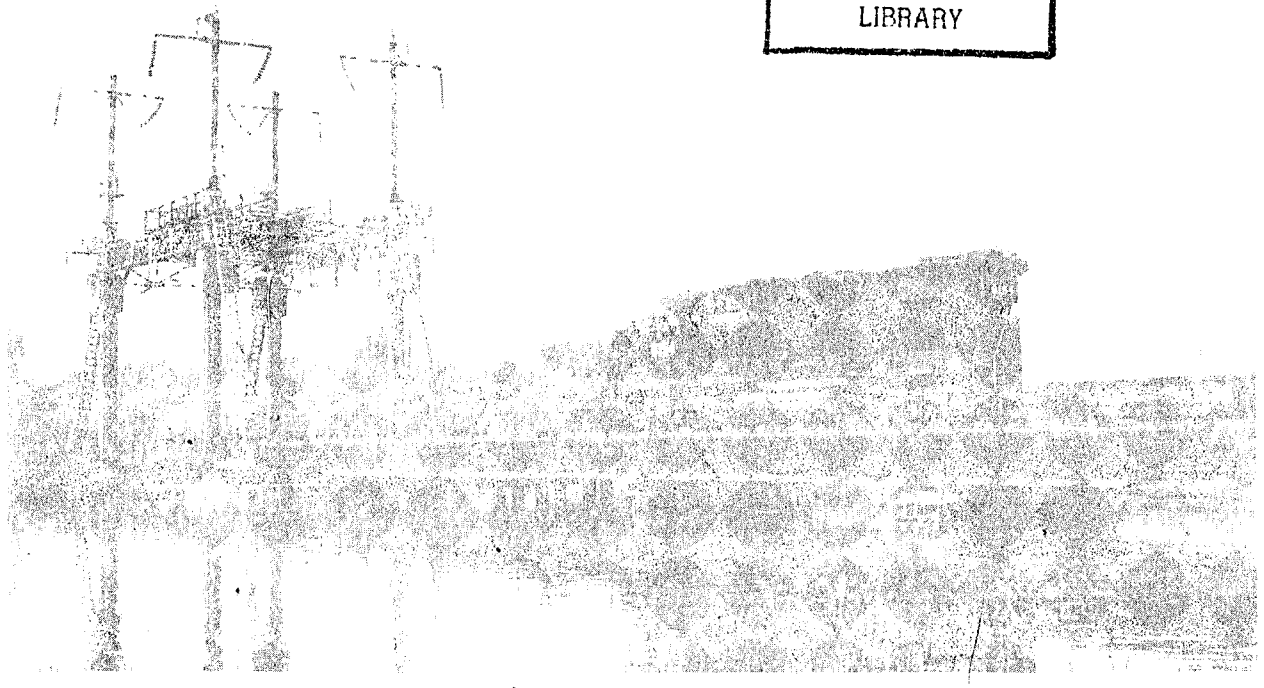
Railroad Accident Investigation Reports



1977

U.S. ~~Department of Transportation~~
Federal Railroad Administration,
Office of Safety.

DEPARTMENT OF TRANSPORTATION

FEDERAL RAILROAD ADMINISTRATION

RAILROAD ACCIDENT INVESTIGATION

REPORTS -- 1977

INTRODUCTION

During 1977, the Federal Railroad Administration (FRA) conducted 3 major train accident investigations. The accident data collected were reviewed and analyzed, and the 3 narrative reports contained in this volume represent the FRA's findings and subsequent conclusions for each of the accidents investigated. FRA believes these reports can be beneficial to railroad management, rail labor, the rail employee and all others interested in enhancing safety in the rail industry.

R. H. Wright
Chairman
Railroad Safety Board

INDEX

NATIONAL RAILROAD PASSENGER CORPORATION/CONSOLIDATED RAIL CORPORATION

MANOR, PENNSYLVANIA

FEBRUARY 19, 1977

Synopsis

Nine passengers and eight National Railroad Passenger Corporation (Amtrak) employees were injured when eastbound Amtrak train No. 30 derailed near Manor, Pennsylvania, on February 19, 1977, at 11:24 a.m. The train was operating on track owned by the Consolidated Rail Corporation (ConRail).

Cause

Lateral thrust from the locomotive trucks turned the outside rail on a 2°00' curve and widened the gauge of the track.

Location and Method of Operation

Amtrak train No. 30 derailed on that part of the Pittsburgh Division extending between Pittsburgh, Pennsylvania, and JD Interlocking Station in New Florence, Pennsylvania, a distance of 62.5 miles. In the accident area trains operate over three parallel main tracks, designated from the south as Track No. 1 for eastward movement, Track No. 2 for eastward and westward movements, and Track No. 3 for westward movement. Trains moving with the current of traffic on Tracks No. 1 and 3 operate by signal indications of an automatic block signal system, supplemented by a cab signal system. Trains on Track No. 2 operate in both directions by signal indications of an automatic block signal system, supplemented by a cab signal system.

The train derailed on Track No. 2, 1.07 miles west of the station at Manor, Pennsylvania. Approaching this site from the west on Track No. 2, a train encounters a compound curve to the left, 0°33' for 7,491 feet, and then 2°00' for 800 feet to the point of derailment and 428 feet beyond. The grade for eastbound trains in this area is 0.25% ascending.

Although the maximum authorized speed for passenger trains in the derailment area is 45 m.p.h., timetable General Order No. 106 restricts the maximum speed of Amtrak SDP 40 locomotives to 40 m.p.h.

Consolidated Rail Corporation
Central Region Timetable

GENERAL ORDER NO. 106 * * *
(f) ENGINES
MAXIMUM SPEED, UNLESS OTHERWISE RESTRICTED
AMTRAK UNITS MODEL SDP 40 ..... 40 MPH

Circumstances Prior to the Accident

Amtrak train No. 30, an eastbound first-class passenger train, consisted of two diesel-electric units 638 and 611 (EMD SDP-40F), 1 coach, 2 baggage cars, 2 sleeping cars, 1 dining car and 4 coaches, coupled in that order. The control compartments of the carbody-type locomotive units faced east (unit 638) and west (unit 611). Both were equipped with type F tightlock couplers; all cars, with type H tightlock couplers.

At 10:48 a.m., Amtrak No. 30 left Pittsburgh, 1 hour 56 minutes late. As the train approached the accident point at a speed of 40 m.p.h., about a half hour after leaving Pittsburgh, the engineer was operating the locomotive from his seat on the south side of the control compartment of unit 638. The fireman was standing in the left side of the cab; the conductor was in the fourth car, a sleeping car, and both brakemen were riding in the ninth car, a coach. Sixty-three passengers and eight dining car and passenger attendants also were aboard the train when it left Pittsburgh.

The Accident

In his post-accident statement, the engineer said the throttle was in the No. 2 position as the train approached the accident point. Because SDP-40 units are subject to General Order 106, he initiated a minimum brake application to maintain train speed at the maximum authorized 40 m.p.h. As the train entered the 2°00' section of the compound curve, the locomotive lurched. Looking in the rear view mirror and seeing fire coming from the second locomotive unit, the engineer increased the brake application to stop the train. But the train brakes applied in emergency as a result of the derailment.

Casualties and Damages

The second locomotive unit, No. 611, and all 10 cars derailed but remained upright and in line with the track. The fuel tank on the second unit ruptured, causing the fire beneath that unit and the first car, an unoccupied coach. No equipment separated in the derailment. ConRail and Amtrak officials estimated the cost of damage to track structure and train equipment at $151,697.

Eight Amtrak dining car and passenger attendants and nine passengers sustained minor injuries.

Post-Accident Examinations

In the derailment area, Track No. 2 consists of 39-foot-long sections of 140 pound rail, laid new in 1953 with about

22 treated ties per rail length. Each double-shoulder tie plate has two rail holding and two plate holding spikes. Each rail joint has six-bolt-hole, 36-inch-long joint bars. And there are about 16 rail anchors per rail section. Stone ballast is 18 inches below the ties.

When inspecting Track No. 2 on February 19, 1977, several hours before the accident, a track foreman took no exceptions to conditions at this point. Under Federal standards, Track No. 2 in the derailment area complied with Class 3 standards with a maximum speed of 60 m.p.h. for passenger trains.

Accident investigators examining the 3,000 feet west of the derailment point on Track No. 2 and the general derailment area found nothing which might have contributed to the derailment. They found the first derailment marks on the gauge side of the north rail, about 40 feet west of the point of derailment.

Scuff marks around the circumference of the L-6 wheel on locomotive 638, the lead locomotive, indicated that the truck of this unit had generated a sufficient lateral force to turn the south rail and cause the L-6 wheel to drop inside the track gauge. Although this wheel rerailed almost immediately, all following equipment derailed.

Following the accident, a committee composed of representatives from ConRail, Amtrak and the Electromotive Division (EMD) of General Motors, the locomotive manufacturer, inspected both locomotives 638 and 611 at Altoona, Pennsylvania. Pertinent results of the locomotive inspections are summarized in Table 1.

At the time of the accident, all locomotive wheel diameter tolerances were within the limits prescribed by the Federal Railroad Administration (FRA) and the locomotive manufacturer. However, subsequent to this and other derailments involving EMD SDP-40F locomotives, FRA and EMD recommended new tolerance limits such that the difference between the diameters of wheels on the same axle would be no greater than 3/32" and that between the diameters of wheels on the same truck, no greater than 1/2". In recommending these limits, FRA and EMD sought to reduce the possibility of locomotive trucks generating excessive lateral force during certain dynamic operating modes.

Table 1 indicates that the difference between the diameters of wheels on the same truck was greater than 1/2" on all trucks except on the No. 1 truck of unit 611. This was the trailing truck on the westernmost unit. At the extreme, the difference between wheel diameters on the No. 2 truck of locomotive 638 was 2 5/8", or 2 1/8" greater than the newly recommended allowable deviation. This truck was the first to derail.

Findings

1. Amtrak Train No. 30 was being operated in accordance with all applicable carrier rules.

2. Post-accident examinations of the track structure and train equipment revealed no condition that could have contributed to the cause of the accident.

3. When examined after the accident, all components of locomotives 638 and 611 were within the manufacturer and FRA tolerances existing at the time of the accident.

4. The difference between the diameters of the wheels on the same truck on the No. 1 and 2 trucks of locomotive 638 and the No. 2 truck of locomotive 611 exceeded the newly recommended 1/2" deviation. However, these recommendations were not in effect at the time of the accident.

TABLE 1

WHEEL DIAMETERS LOCOMOTIVES 611 AND 638

AMTRAK Locomotive 611 Truck No. 1		AMTRAK Locomotive 638 Truck No. 1	
Wheel Set	Wheel Diameter	Wheel Set	Wheel Diameter
1	38 3/8"	1	39 1/2"
	38 1/2"		39 1/2"
2	38 5/8"	2	38 1/2"
	38 5/8"		38 1/2"
3	Not Available	3	40"
	Not Available		39 15/16"
	Truck No. 2		Truck No. 2
4	37 7/8"	4	37 7/8"
	38 1/8"		37 7/8"
5	39 1/8"	5	39 1/4"
	38 1/8"		39"
6	38 1/2"	6	40 1/2"
	38 3/4"		40 3/8"