

RAILROAD ACCIDENT INVESTIGATION

REPORT NO 4073

THE BALTIMORE AND OHIO RAILROAD COMPANY

BOND, MD

JANUARY 10, 1966

INTERSTATE COMMERCE COMMISSION

WASHINGTON

SUMMARY

DATE	January 10, 1966
RAILROAD	Baltimore and Ohio
LOCATION	Bond, Md
KIND OF ACCIDENT	Derailment
TRAIN INVOLVED	Freight
TRAIN NUMBER	Extra 7401 East
LOCOMOTIVE NUMBERS	Diesel-electric units 7401, 7403, 7405
CONSIST	81 cars, caboose
SPEED	56 m p.h
OPERATION	Signal indications
TRACKS	Double, 10°30' curve, 2.02 percent descending grade eastward
WEATHER	Clear
TIME	8 30 p m
CASUALTIES	1 killed
CAUSE	Failure of the engineer to take proper action to reduce the speed of, or stop, the locomotive with one car, resulting in excessive speed on a curve and the derailment

RECOMMENDATION

It is recommended that the Baltimore and Ohio Railroad Company immediately take action to insure that a penalty brake application originating on the locomotive, or an emergency brake application originating from any point in the train air brake system, results in a brake application on the locomotive and in loss of power to the traction motors of the locomotive consist so that the locomotive brakes are effective in stopping and holding the locomotive

INTERSTATE COMMERCE COMMISSION
RAILROAD SAFETY AND SERVICE BOARD

RAILROAD ACCIDENT INVESTIGATION

REPORT NO 4073

THE BALTIMORE AND OHIO RAILROAD COMPANY

JANUARY 10, 1966

SYNOPSIS

On January 10, 1966, the locomotive and first car of an eastbound Baltimore and Ohio Railroad freight train derailed on a curve near Bond Maryland, resulting in the death of one employee

The accident was caused by failure of the engineer to take proper action to reduce the speed of, or stop, the locomotive with an car, resulting in excessive speed on a curve and the derailment

LOCATION AND METHOD OF OPERATION

The accident occurred on that part of the Cumberland Division extending between East Grafton, W Va , and Cumberland, Md., a distance of 99 1 miles In the accident area this is a double-track line over which trains moving with the current of traffic operate by signal indications of an automatic block-signal system From the north, the main tracks are designated as No 1 westward, and No 2 eastward.

The derailment occurred on track No 2, 66 6 miles east of East Grafton and 1 8 miles east of Bond, Md.

Another main track, designated as track No 3, is between tracks No 1 and No, 2 west of the derailment point Track No 3 is 1 4 miles long and is connected at each end to tracks No 1 and No 2 by power-operated switches, which are controlled by the Bond operator The switch connecting the west end of track No 3 to track No 2 is 17 feet east of the Bond station

an automatic signal 32L, governing eastbound movements on track No 2 and eastward movements from track No 2 to track No 3, is 33 feet west of the Bond station

Details concerning the tracks, train involved, damages and other factors are set forth in the appendix

DESCRIPTION AND DISCUSSION

Extra 7401 East, an eastbound freight train consisting of diesel-electric units 7401, 7403 and 7405, 79 cars and a caboose, left Fairmont, W. Va., 24.4 miles west of East Grafton, at 10:37 a.m. on the day of the accident. All the surviving crew members conversed with the engineer before or after leaving Fairmont, and they said he appeared to be normal in all respects. About 3:15 p.m., Extra 7401 East stopped at Frick's Crossing, Md., 14.5 miles west of Bond, and picked up two cars. While it was at this point, a crew member telephoned the train dispatcher and was informed that a car of a preceding eastbound freight train had derailed on track No. 3 while that train was crossing over from track No. 2 to track No. 1 at Bond. He was instructed by the dispatcher to detach the locomotive from his train and proceed to the scene of the derailment to assist in reassembling the preceding train.

The locomotive of Extra 7401 East left Frick's Crossing, proceeded to track No. 3 at Bond, and was coupled to the rear portion of the preceding train. It then moved in reverse to track No. 2 and pushed the rear portion of the train to Piedmont, W. Va., 6.0 miles east of Bond, where the front portion of the preceding train had been moved after leaving the derailed car on track No. 3 at Bond. After it arrived at Piedmont, the locomotive of Extra 7401 East was detached from the rear portion of the preceding train. The engineer then repositioned the controls of the locomotive for operation from the control compartment of diesel-electric unit 7405, the westernmost unit, while returning westward 20.5 miles to his train at Frick's Crossing. The engineer apparently positioned the controls properly, including movement of the "Engine Run" and "Control and Fuel Pump" switches on the control panel of unit 7405 to ON position.

After the locomotive returned to Frick's Crossing and was recoupled to its train, the engineer repositioned the controls for operation of the locomotive from the control compartment of unit 7401, the first unit. However, he apparently neglected to

restore the "Engine Run" and "Control and Fuel Pump" switches of unit 7405, the third unit, to OFF position as required when this unit is operated as a trailing locomotive unit. With these two switches in ON position, the PC, or pneumatic control (power cutoff), switch on unit 7401 could not function to reduce power to the traction motors of the locomotive consist.

Extra 7401 East left Frick's Crossing at 7 10 p.m. and proceeded eastward on track No. 2. Approximately 20 minutes later, it moved onto a heavy descending grade designated at 17-Mile Grade and at this time, according to the conductor, the caboose air gauge indicated the brake pipe pressure was 92 pounds. The conductor said that while the train was approaching Bond on this descending grade, the engineer made three light brake applications and reduced the brake pipe pressure to 79 pounds. At 8 03 p.m., the train stopped short of signal 32L, which the Bond operator had caused to indicate Stop while a wrecking train rerailed the car that had previously derailed on track No. 3. Soon afterward, the wrecking train rerailed the derailed car and started to move westward on track No. 3, at which time the Bond operator caused signal 32L to indicate Proceed. The engineer of Extra 7401 East then released the brakes and, at 8 23 p.m., the train started to pass signal 32L and the Bond station.

About two minutes later, the brakes of Extra 7401 East applied and the train stopped on track No. 2 with its front end about 850 feet east of the Bond station. At this time, both the conductor and flagman looked at the caboose air gauge and noticed that it indicated a brake pipe pressure of 70 pounds, and that the brake pipe pressure was slowly decreasing, apparently at a service rate. The flagman then alighted from the caboose to provide flag protection against following trains. The conductor also alighted from the caboose and started to apply hand brakes on cars at the rear of the train to assist in controlling the slack when the brakes released. After applying the hand brakes on the last three cars, the conductor heard the train air brakes apply in emergency, evidently when the locomotive and first car separated from the train and moved toward the curve where both the locomotive and car derailed. He said he then heard a long continuous blast of the locomotive horn and heard locomotive engines operating as though they were under full throttle. He and the flagman were unaware of the derailment until some time after it occurred.

The front brakeman, the only crew member on the locomotive other than the engineer, stated that shortly after the train stopped the second time at Bond, the engineer told him the train brakes had applied in emergency and the PC switch had lighted. The front brakeman promptly alighted from the locomotive and started to apply hand brakes on the cars as required by instructions when a train stops on a heavy grade. He said there was no separation between cars in the front portion of the train and that he did not hear the air brakes apply in emergency before or after the train stopped, nor did he hear a warning whistle sound to indicate actuation of the safety control apparatus. After applying the hand brakes on about the first 18 cars, the front brakeman reached the vicinity of the Bond station. He entered the station at this time and was informed by the operator that the locomotive had run away from the train. The front brakeman said he had not heard or seen the locomotive leave the train.

The Bond operator observed the locomotive of Extra 7401 East when it passed the station and he thought it was operating under power at this time. He saw the train stop soon thereafter and, three or four minutes later, heard its air brakes apply in emergency. He then overheard a trainmaster, who was at the scene of the previous derailment on track No. 3, report by telephone that an eastbound locomotive with one car had just passed him on track No. 2 and that it appeared to be moving out of control.

About 8:30 p.m., the trainmaster at the scene of the previous derailment on track No. 3, about 500 feet west of the east end of that track, saw the locomotive and first car of Extra 7401 East pass on track No. 2 at a speed which he estimated to be 50 to 60 miles per hour. He heard the locomotive horn sounding intermittent short blasts and thought the locomotive engines were operating under full power at this time. In addition, he saw sparks flying from under the locomotive units and rings of fire around the locomotive wheels, indicating that the locomotive brakes were heavily applied. The trainmaster immediately realized the locomotive with one car was moving out of control on the descending grade and telephoned the dispatcher to warn the crew of a train at Piedmont.

Shortly after passing the trainmaster, the locomotive and first car of Extra 7401 East entered a 10°30' curve to the right. While moving on the curve at 56 miles per hour, as indicated by the

speed-recording tape, both the locomotive and car derailed and overturned to the left, 1.8 miles east of the Bond station.

The engineer was killed.

Examination after the accident disclosed that the coupler knuckle at the rear, or west, end of the first car of Extra 7401 East was broken. The surfaces of the fracture showed 15 percent old break.

Examination of diesel-electric unit 7401, the first unit, revealed that all of its controls were properly positioned for control of the locomotive consist from the control compartment of this unit. The automatic brake valve was found in emergency position, the independent brake valve was in full application position, the throttle was in 8th, or full power, position and the "Engine Run" and generator field switches were in ON position. All the controls of units 7403 and 7405, the second and third units, respectively, were positioned properly for operation of these units in trailing positions in the locomotive consist, with the exception that the "Engine Run" and "Control and Fuel Pump" switches of unit 7405 were in ON position, instead of OFF position as required. The hand brake of the first car was applied. The wheels of the locomotive and first car showed evidence of overheating, indicating the brakes of the locomotive and first car had been heavily applied.

Tests made after minor repairs to brake piping on diesel-electric unit 7401 disclosed that the air brake equipment of this unit functioned properly, except the safety control apparatus. It was found that release of downward pressure on the pedal of this apparatus resulted in initiation of a penalty service brake application in one second without a warning whistle sounding, and without the normal 4- to 6-second delay during which action may be taken to forestall the penalty brake application. This defect was the result of the choke and whistle assembly missing from the exhaust of the pedal valve. The threads of the exhaust were clean and undamaged, and there was no evidence to indicate the choke and whistle assembly was missing because of the accident. According to the carrier's records, the pedal valve of the safety control apparatus of diesel-electric unit 7401 was replaced on January 4, 1966, at the time of required periodic attention. The choke and warning whistle assembly of the pedal valve apparently was not replaced.

Examination of the track structure after the accident disclosed flange marks on two ties on the field side of the north rail of

track No. 2 at the derailment point. No marks of derailment appeared on the gage side of this rail, indicating that the locomotive had overturned to the north on the curve as a result of excessive speed.

According to the carrier's computations, the safe and overturning speeds for diesel-electric units 7401, 7403 and 7405 on the curve involved were 43.9 miles and 67.5 miles per hour, respectively. The safe and overturning speeds for the derailed car were computed as 38.2 and 58 miles per hour, respectively. However, from the marks of derailment and the speed at which the locomotive and car were moving at the time of the derailment, it is evident that, under the circumstances involved, the overturning speed for this equipment on the 10°30' curve was 56 miles per hour or less.

FINDINGS

Shortly after Extra 7401 East stopped the second time at Bond, the engineer told the front brakeman the train brakes had applied in emergency and the PC switch indicator had lighted. However, it is evident from statements made by the conductor, flagman and Bond operator that the engineer was mistaken about the brake application and the brakes did not apply in emergency until three or four minutes after the train stopped. It is possible that after the locomotive passed the Bond station, the engineer unknowingly released downward pressure on the pedal of the safety control apparatus, automatically reducing the speed of the locomotive engines to Idle, and causing the PC switch indicator to light and a penalty service brake application that stopped the train. Because the choke and whistle assembly of the safety control apparatus was missing, no whistle would sound to warn the engineer that the brake application had occurred due to actuation of the safety control apparatus.

As the engineer was killed, details concerning his actions after the train stopped could not be determined. It appears, however, that three or four minutes after stopping he moved the throttle lever to accelerate the locomotive engines and expedite operation of the air compressor for release of the air brakes. He evidently failed to place the generator field switch in OFF position, as required before taking this action, thus power was transmitted to the traction motors. Apparently because of a surge in power, the high tractive effort of the locomotive, and the train brakes being

applied, the defective coupler knuckle at the rear of the first car broke, resulting in a separation between the first and second cars and an emergency application of the train brakes, including the brakes of the locomotive and first car. The tractive effort of the locomotive exceeded the braking effort, and the locomotive with the first car moved forward on track No. 2. Since the "Engine Run" and "Control and Fuel Pump" switches of the third diesel-electric unit had been left in ON position, the PC switch on the first unit would not function to reduce power to the traction motors.

The locomotive and first car increased speed on the descending grade and the emergency brake application resulting from the separation was not effective in reducing the speed. Although the automatic brake valve apparently was in emergency position at this time, it also was ineffective in reducing the speed and did not reduce the speed of the locomotive engines to Idle, because the PC switch of the first diesel-electric unit could not function to reduce power. Soon after separating from the train, the locomotive and car entered a 10°30' curve to the right. The throttle apparently was in 8th, or full power, position at this time. While moving at excessive speed on the curve, the locomotive and car derailed and overturned to the left.

It is evident that had the engineer moved the throttle lever to Idle position, or moved the generator field switch to OFF position after the locomotive and car separated from the train, power to the traction motors of the locomotive would have been shut off. Thus, the emergency brake application caused by the separation would have stopped the locomotive and car, and the accident would have been avoided. The reason why the engineer failed to take such action is not known.

The accident also probably would have been averted had the electrical circuit system of the locomotive consist been so installed or arranged that an emergency brake application, originating from any point in the train air brake system, would automatically shut off power to the locomotive traction motors, regardless of the position of the "Engine Run" and "Control and Fuel Pump" switches of the locomotive consist.

CAUSE

This accident was caused by failure of the engineer to take proper action to reduce the speed of, or stop, the locomotive with

one car, resulting in excessive speed on a curve and the derailment

RECOMMENDATION

It is recommended that the Baltimore and Ohio Railroad Company immediately take action to insure that a penalty brake application originating on the locomotive, or an emergency brake application originating from any point in the train air brake system, results in a brake application on the locomotive and in loss of power to the traction motors of the locomotive consist so that the locomotive brakes are effective in stopping and holding the locomotive

*Dated at Washington, D C , this 16th
day of May 1966*

*By the Commission, Railroad Safety and
Service Board*

(SEAL)

H NEIL GARSON
Secretary

APPENDIX

Track

Eastward on track No. 2 from the point where the locomotive and first car separated from the train, there are, in succession, a series of tangents and curves, than a tangent 277 feet long, a compound curve to the left having a maximum curvature of $6^{\circ}45'$, 1,809 feet, a tangent 213 feet, a spiral 290 feet, and a $10^{\circ}30'$ curve to the right 31 feet to the derailment point and 529 feet eastward. In this area, the average grade for eastbound trains is 2.13 percent descending and is 2.02 percent descending at the derailment point.

The structure of the main track in the derailment area consists of 140-pound rail, 39 feet long, laid new in 1965 on an average of 22 treated ties per rail length. It is fully tie-plated with double-shoulder tie plates, spiked with 2 rail-holding spikes per tie plate and 2 plate-holding spikes at every other tie, and is provided with 8 rail anchors per rail. It is ballasted with crushed stone to a depth of 8 inches below the ties.

The super-elevation of the north rail at the derailment point was 4 1/2 inches.

Train

Extra 7401 East consisted of road-switcher type diesel-electric units 7401, 7403 and 7405, coupled in multiple-unit control, 81 cars and a caboose. The train brakes had been tested and had functioned properly, with the exception of the second car. This car was picked up at Frick's Crossing, and its air brake system was cut out. It was being moved to Piedmont, where facilities were available for repairs.

Diesel-electric unit 7401 was provided with 26-L type brake equipment and a safety control feature, actuated by a pedal. When downward pressure on the pedal is released while the automatic brake valve is in release position, a penalty service brake application occurs. The PC switch on unit 7401 normally reduces power to the equal of Idle position of the throttle in the event of a penalty service brake application or an emergency brake application.

If an "Engine Run" switch on a trailing unit is left in ON position, an emergency brake application will result in loss of

power to the traction motors for 20 to 30 seconds, after which power will automatically restore to the equal of the throttle position

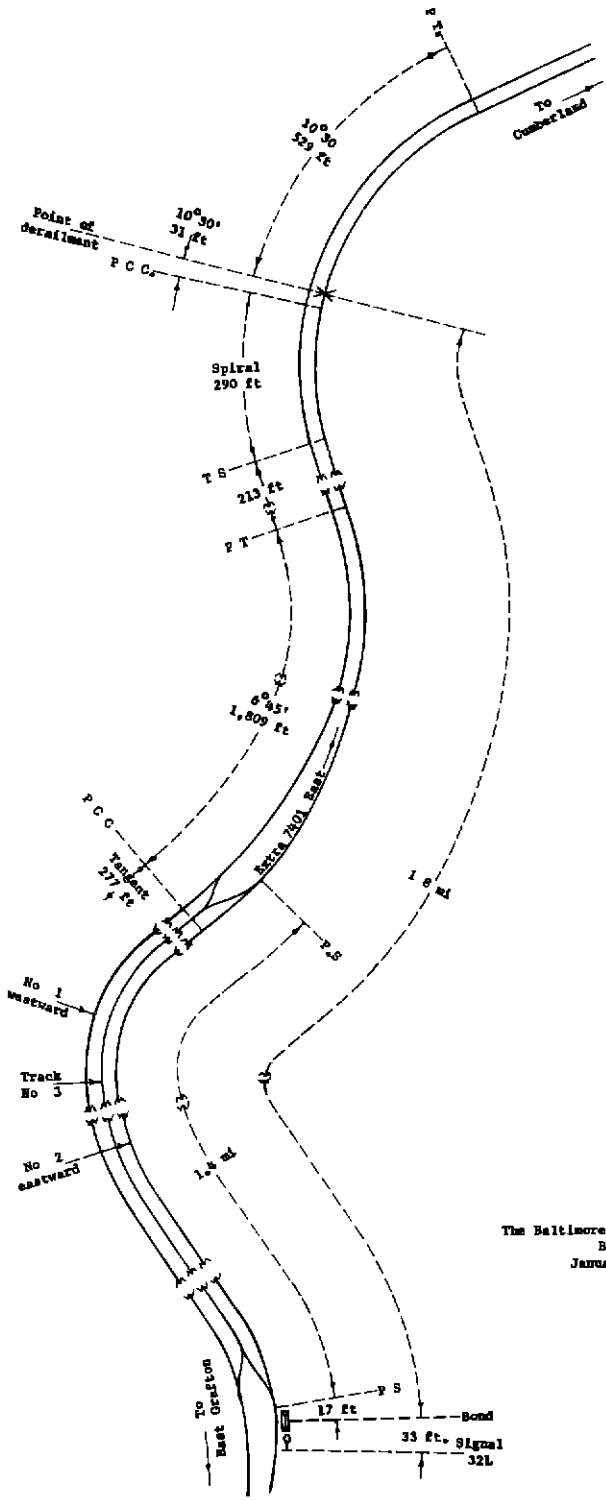
Damages

The locomotive and first car stopped with the front of the first diesel-electric unit 380 feet east of the derailment point. The three locomotive units and car were derailed. Separations occurred at both ends of the second unit, and between the third unit and the car. The first unit overturned onto its left side and stopped with the front and rear ends 59 and 41 feet north of track No. 2, respectively. The second unit overturned onto its left side and stopped in line with, and 36 1/2 feet to the rear of, the first unit. The third unit and the car also overturned to the north and stopped in line with the first and second units, with the front of the third unit 10 1/2 feet to the rear of the second unit. All three diesel-electric units were heavily damaged, and the derailed car was destroyed.

Other Factors

The accident occurred about 8 30 p m., in clear weather. The maximum authorized speed for Extra 7401 East in the derailment area was 25 miles per hour.

- Cumberland Md
28.3 mi
- Gladmont, W Va
4.2 mi
- ✕ Point of derailment
1.8 mi.
- Bond, Md
14.5 mi.
- Frick's Crossing
50.3 mi.
- East Grafton W Va



The Baltimore and Ohio Railroad
 Bond, Md
 January 10, 1966

**Interstate Commerce Commission
Washington, D. C. 20423**

**Official Business
Return After Five Days**

**Postage and Fees Paid
Interstate Commerce Commission**