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RAILROAD ACCIDENT INVESTIGATION

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REPORT NO. 4170

DEPARTMENT OF
TRANSPORTATION

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PENN CENTRAL TRANSPORTATION COMPANY

MASSILLON, OHIO

JUNE 14, 1970



FEDERAL RAILROAD ADMINISTRATION

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2 BUREAU OF RAILROAD SAFETY,

Washington, D C 20590

Summary

DATE:	June 14, 1970	
RAILROAD:	Penn Central	
LOCATION:	Massillon, Ohio	
ACCIDENT TYPE:	Rear-end collision	
TRAINS INVOLVED:	Mail	Freight
TRAIN NUMBERS:	9	Extra 2253 West
LOCOMOTIVE NUMBERS:	Diesel-electric units 3208, 3261	Diesel-electric units 2253, 2639, 6508
CONSISTS:	16 cars, caboose	38 cars, ca- boose
SPEEDS:	Standing	25 m p h
OPERATION:	Signal indications	
TRACKS:	Double; 1°00' curve; 0.87% descending grade westward	
WEATHER:	Cloudy	
TIME:	5:12 p m	
CASUALTIES:	1 killed; 4 injured	
CAUSE:	Failure of engineer to operate the following train in accordance with a restrictive sig- nal indication	

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FEDERAL RAILROAD ADMINISTRATION
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PENN CENTRAL TRANSPORTATION COMPANY

JUNE 14, 1970

Synopsis

On June 14, 1970, a rear-end collision occurred between a mail train and a freight train of the Penn Central Transportation Company near Massillon, Ohio. It resulted in death to one and in injury to four train employees.

Cause

The accident was caused by failure of the engineer to operate the following train in accordance with a restrictive signal indication.

Location and Method of Operation

The accident occurred on that part of the railroad extending westward from Pittsburgh, Pa to Colson, Ohio, a distance of 200.5 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. 2 westward and No. 1 eastward.

The collision occurred on track No. 2, 107.6 miles west of Pittsburgh and 1.9 miles east of Massillon, Ohio.

Interlockings are at McKinley, Reed and Mace, 7.4 miles east, 4.1 miles east and 1.2 miles west of Massillon, respectively. Between McKinley and Reed, the railroad is a multiple-track line. Tracks No. 1 and No. 2 of this line correspond to tracks No. 1 and No. 2 of the double-track line.

Track No. 2

From the east on track No 2 there are, successively, a tangent 2271 feet long, a $2^{\circ}35'$ curve to the right 1881 feet, a tangent 1161 feet, and a $1^{\circ}00'$ curve to the left 648 feet to the collision point and a short distance westward. The grade for westbound trains in this area is 0.87% descending.

Time and Weather

The collision took place at 5:12 p m , under cloudy weather conditions.

Authorized Speed

The maximum authorized speed for freight trains in the accident area is 40 m p h

Sight Distance

Because of track curvature and trees alongside the railroad, a caboose standing on track No 2 at the collision point cannot be seen from an approaching westbound train at a distance greater than about 2400 feet (see photo below).



Westward view from point on track No. 2 about 2400 feet from collision point (arrow).

Radio Equipment

The locomotives of the trains involved in the accident were equipped with radio telephones. The cabooses had no radio equipment

Signal

Semi-automatic signal 6 Lab, governing westbound movements on track No 2, is 2.3 miles east of the collision point. It is mounted on a signal bridge at Reed interlocking, which is remotely controlled by the McKinley interlocking operator. The signal is of the position color-light type and is continuously lighted. Its applicable aspects, and corresponding indications and names are as follows:

<u>Signal</u>	<u>Aspect</u>	<u>Indication</u>	<u>Name</u>
6 Lab	2 red lights in horizontal position	Stop	Stop signal
	2 red lights in horizontal position over 3 amber lights in diagonal position to left	Proceed at restricted speed	Restricting

The circuits are so arranged that when its block is occupied signal 6 Lab displays a Stop aspect, unless the McKinley operator has initiated a control which causes the signal to indicate Restricting

Dragging-Equipment Detector

Track No 2 is provided with a dragging-equipment detector, 4017 feet west of signal 6 Lab. When the detector is actuated, a warning device in the Mace interlocking station functions

Carrier's Operating Rules

Restricted Speed - Proceed prepared to stop short of train, obstruction *** not exceeding 15 miles per hour

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If train or engine is not operated in accordance with the signal indication, or other condition requiring speed be reduced, other members of the crew must communicate with crew member controlling the movement at once and if necessary stop the train

A provision of the carrier's operating rule No 99 (flagging rule) reads as follows:

When trains are operating under automatic block signal system rules *** the requirements of Rule 99 do not apply for following movements on the same track.

Circumstances Prior to Accident

Train No. 9

This was a westbound first-class mail train consisting of 2 diesel-electric units, 15 flat cars loaded with high-way trailers, 1 baggage car, and a caboose. It left Pittsburgh at 2:35 p.m. the day of the accident and passed McKinley interlocking at 4:50 p.m. A few minutes later, while moving westward on track No. 2, it passed signal 6 Lab at remotely-controlled Reed interlocking. The engineer, fireman and front brakeman were on the first locomotive unit. The conductor and flagman were in the caboose.

Signal 6 Lab

This signal was caused to display a Stop aspect when No. 9 passed it. Due to a control initiated by the McKinley operator, the aspect of signal 6 Lab then changed to Restricting while No. 9 continued to occupy the block of that signal.

Train Extra 2253 West

Extra 2253 West, a westbound freight train consisting of 3 road-switcher type diesel-electric units, 38 cars and a caboose (2062 tons), left Conway, Pa., 22.6 miles west of Pittsburgh, at 3:16 p.m. the day of the accident after having the prescribed brake test. At 5:01 p.m. (11 minutes after No. 9), it passed McKinley interlocking and proceeded westward on track No. 2. The engineer, fireman and front brakeman were in the control compartment at the front of the first locomotive unit. The conductor and flagman were in the caboose.

The Accident

No. 9

Soon after passing signal 6 Lab at Reed interlocking, No. 9 moved over a dragging-equipment detector and actuated it, causing a warning device in the Mace interlocking station to function. The operator there promptly informed the engineer of No. 9 by radio that the dragging-equipment detector had been actuated, and the engineer replied that he would stop his train for an inspection. Soon afterward, at approximately 5:00 p.m., No. 9 stopped on track No. 2 in the block of signal 6 Lab. Its rear end stopped 2.3 miles west of that signal, on a curve to the left.

The front brakeman alighted from the locomotive when No 9 stopped and proceeded back alongside the train, inspecting its equipment in an effort to discover what had actuated the dragging-equipment detector. On arrival at the fourth or fifth car ahead of the caboose, he met the conductor and told him the reason for the stop. In addition, he informed the conductor that he had found nothing wrong with the front portion of the train. The conductor replied that he had seen nothing wrong with the rear portion, and instructed the front brakeman to return to the locomotive and inform the Mace interlocking operator by radio that it was alright for the train to proceed. The front brakeman then started, apparently at about 5:07 p m, to return to the locomotive. About that time, according to the Mace and McKinley operators, a crew member of No. 9 informed them by radio that an inspection had found nothing wrong with No 9 and the train was ready to proceed. The indications are that it was the engineer who so informed the operators. He said "I might have done that when I seen the brakeman coming up, I wouldn't say for sure."

After the front brakeman left, the conductor walked toward the caboose and discovered that the steam coupling assembly at one end of the last (baggage) car was hanging low from its support. Feeling this low assembly might have caused the actuation of the dragging-equipment detector, he decided to wire it in a higher position. To provide protection for himself while doing this, he had the flagman re-board the caboose and apply the train brakes in emergency by use of the conductor's valve.

The front brakeman was at the front of the train when he heard the brakes apply in emergency. He then boarded the first locomotive unit and discussed the probable cause of that brake application with the engineer. After deciding that the conductor or flagman had discovered something wrong with a car near the rear of the train and had applied the brakes for safety while making repairs, the front brakeman alighted from the locomotive and waited near its rear end for a proceed signal from the conductor or flagman. About the time he reached the rear of the locomotive, Extra 3152 East, a 99-car eastbound freight train, began to pass his train while moving eastward on track No 1 at a speed of approximately 45 m p h. Also about that time, the conductor finished wiring up the steam connecting assembly on the last car; noticed Extra 3152 East approaching on track No. 1; proceeded between the main tracks to the rear end of his caboose, and waited there with the flagman for the eastbound train to pass so that he could subsequently walk forward between the main tracks to the front of his train.

A few seconds after the caboose of Extra 3152 East passed, the conductor of No 9 saw Extra 2253 West closely approaching his train from the rear on track No 2, and also saw one of its crew members preparing to jump from the locomotive. Realizing a collision was imminent, he called a warning to his flagman and both then began to run to safety on the north side of the main tracks. Immediately after-

ward, at 5:12 p m , while it was standing on track No 2 in the block of signal 6 Lab, No 9 was struck from the rear by Extra 2253 West

Crew Members of Extra 3152 East

As Extra 3152 East moved eastward on track No. 1, its crew members saw No 9 standing on track No 2. After the front of the eastbound train passed the caboose of No 9 and proceeded about three-fourths of a mile beyond, the crew members on the locomotive saw Extra 2253 West closely approaching on track No 2. At that time, the fireman of the eastbound train was in the control compartment of the second unit of the locomotive consist. The front brakeman was on the fireman's seat in the control compartment of the first unit. The fireman said that because he thought Extra 2253 West was approaching the point where No 9 was stopped a "little faster than it should," he called over the radio "Look out, there's a train standing ahead of you," and heard someone reply "OK, thank you." The front brakeman said that as the trains were about to pass, he signalled the crew members on the locomotive of Extra 2253 West that a train was stopped on the track a short distance ahead but did not see or hear any response.

The conductor and flagman of the eastbound train were on the rear platform of their caboose when it passed the rear end of No. 9. They stated that when the caboose had moved about 900 feet east of the rear end of No 9, they saw the locomotive of Extra 2253 West pass on track No 2 and realized it would not stop short of a collision with No. 9.

Extra 2253 West

As this train moved westward on track No 2 in the vicinity of McKinley interlocking, the operator of that interlocking overheard the radio conversation between the Mace interlocking operator and the engineer of No 9 concerning actuation of the dragging-equipment detector, and thus became aware that No 9 was about to stop in the block of signal 6 Lab for an inspection of its equipment. He promptly relayed this information to the engineer of Extra 2253 West by radio, and informed him that he (the operator) would cause signal 6 Lab to indicate Stop if Extra 2253 West could be stopped at Reed interlocking. Having sufficient braking distance, the engineer replied he could stop at that interlocking. The operator thereupon caused signal 6 Lab at Reed interlocking to indicate Stop. According to his statements, he took this action to prevent Extra 2253 West from blocking rail-highway grade crossings, and unnecessarily actuating crossing gates, in the block of signal 6 Lab while being delayed due to No 9 having stopped on the track ahead.

Extra 2253 West stopped short of signal 6 Lab at approximately 5:05 p m. Two or three minutes later, the McKinley operator heard a crew member of No 9 report by

radio that nothing had been found wrong with his train, and that the train was ready to proceed. The operator promptly relayed this information to the engineer of Extra 2253 West by radio, then cleared signal 6 Lab for that train, causing the signal to display a Restricting aspect. Immediately afterward, when the crew members on the locomotive saw the aspect of signal 6 Lab change to Restricting, Extra 2253 West started forward on track No. 2 and entered the block of that signal.

The front brakeman stated that he could not estimate the speed at which Extra 2253 West proceeded westward in the block of signal 6 Lab. The engineer estimated the train had attained a speed of 10 to 12 m.p.h. upon reaching a rail-highway grade crossing located 1.2 miles west of signal 6 Lab. He said he initiated a service brake application about that time to control the speed while he watched for the rear end of No. 9 on the track ahead. However, the speed tape indicates (after corrected in accordance with calibrations of the speed-recording device) Extra 2253 West was moving about 35 m.p.h. and accelerating when it reached the aforesaid highway crossing. While the train was moving in the area of this crossing, the crew members on the locomotive apparently could see Extra 3152 East closely approaching on track No. 1. Although statements made by the fireman of the eastbound train indicate otherwise, the engineer of Extra 2253 West said he had no radio communication with Extra 3152 East. In this connection, the front brakeman said he saw the engineer use the handset of his radio equipment for a short period while moving in the block of signal 6 Lab, but was unable to hear what was said. Both the engineer's and front brakeman's statements tend to indicate that neither saw the hand signals given by the front brakeman of the eastbound train as the locomotives of the opposing trains were about to pass.

Extra 2253 West apparently began to pass the eastbound train about the same time it entered a 2°35' curve to the right while moving at a speed of 38 m.p.h., as indicated by the speed tape. The engineer then apparently initiated a light service brake application, which began to reduce the speed slowly. When the locomotive reached a point 591 feet from the west end of the 2°35' curve, it was 2400 feet from the collision point, the maximum distance at which train equipment standing at the collision point can be seen from an approaching westbound train (see photograph, Page 2). However, the engineer of Extra 2253 West did not see the caboose of No. 9 at that time, apparently due to it being on another curve ahead and the eastbound train obstructing his view. Upon leaving the west end of the 2°35' curve, Extra 2253 West proceeded 1161 feet on tangent track to a 1°00' curve, which extends 648 feet westward to the collision point and a short distance beyond.

According to their statements, the engineer and front brakeman first saw the caboose of No. 9 on the track ahead at a distance of 800 to 900 feet, just before their locomotive entered the 1°00' curve on which the caboose of No. 9

was stopped. The engineer estimated that his train was moving between 12 and 18 m.p.h. at that time and said he immediately applied its brakes in emergency. The speed tape, however, indicates the service brake application made previously had not reduced the speed to below 32 m.p.h. when the engineer initiated the emergency brake application. It further indicates that the latter brake application became effective when Extra 2253 West was at a distance of about 475 feet from the caboose of No. 9, apparently just after its locomotive had entered the 1°00' curve and passed the rear end of the eastbound train on track No. 1. All the crew members on the locomotive immediately recognized that a collision was inevitable. The front brakeman jumped from the locomotive just before the collision. According to his statements, the engineer thought the impact would only be equivalent to that of a rough coupling and therefore remained in the control compartment. Neither he nor the front brakeman noticed the fireman's actions nearing the collision point. As a result of the emergency brake application, the speed of Extra 2253 West was reduced to 25 m.p.h. at the time of the collision, as indicated by the speed tape.

Damages

No. 9

The impact moved No. 9 about 40 feet westward, and caused its caboose and last six cars to derail. The six derailed cars overturned onto their right sides and stopped in line along the north shoulder of the track No. 2 structure. The caboose rose from its trucks; overrode the underframe of the first locomotive unit of Extra 2253 West and struck the control and engine compartments of that unit. It stopped crosswise on top of the rear, or east, end of the first unit, and with one side against the control compartment at the front of the second locomotive unit of Extra 2253 West. The derailed cars and caboose were damaged considerably (see photograph on the following page).

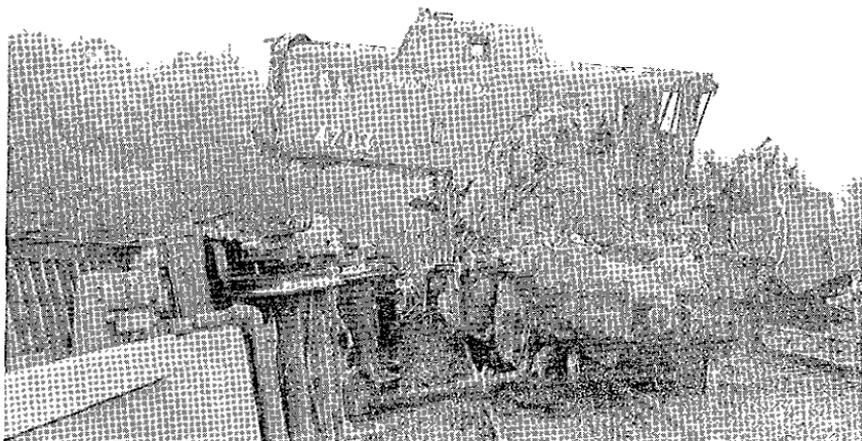
Extra 2253 West

This train stopped with the front end 258 feet west of the collision point. Only the front truck of the first locomotive unit derailed. This unit stopped upright on and in line with the structure of track No. 2, alongside the derailed cars of No. 9. The control compartment at the front of the first unit was completely demolished, and the long engine hood was torn loose, as a result of being struck by the caboose of No. 9.

The first locomotive unit was destroyed; the second unit was damaged moderately.

Cost of Damages

According to the carrier's estimate, the cost of damages to the track structure and equipment of both trains was \$417,000.



Front of first diesel-electric unit of Extra 2253 West (control-compartment end). Torn off control-compartment shown at right. Caboose of No. 9 at top, and derailed cars of that train at left.

Casualties

No. 9

The flagman fractured a rib when he fell while running to safety before the collision. The conductor was treated for shock.

Extra 2253 West

The front brakeman sustained multiple contusions and abrasions as a result of jumping from the locomotive before the collision.

The engineer was seriously injured. He was found lying on the south side of track No. 1.

The fireman was killed. He was found lying between the rails of track No. 2 and under debris, opposite the third locomotive unit.

Train Crews' Hours of Service

No. 9

The engineer and fireman had been on duty 3 hours 7 minutes, and the other crew members 2 hours 37 minutes, at the time of the accident. They had been previously off duty eight hours or more.

Extra 2253 West

All the crew members of this train had been on duty 3 hours 12 minutes at the time of the accident, after having been off duty more than eight hours

Engineer, Fireman, Front Brakeman - Extra 2253 WestEngineer

This crew member, age 49, was first employed by the carrier as a laborer in 1940. In April 1941, he began to perform service as a fireman. He was promoted to engineer in September 1945. His record as an engineer indicates that on two occasions in 1964 he was subjected to disciplinary action, for exceeding the maximum authorized speeds related to a timetable instruction and a restrictive signal indication. Other than for these two cases his record as an engineer was clear. He passed a rule book examination in April 1969, and a physical examination in November 1969.

Fireman

This crew member, age 27, was first employed by the carrier as a brakeman in February 1968. In May of the same year, he began to perform service as a fireman. He passed a physical examination in January 1969 and a rule-book examination in April 1969. His record was clear.

Front Brakeman

The front brakeman, age 60, was first employed by the carrier as a brakeman in August 1941. He was promoted to conductor in June 1943. He passed a physical examination in August 1967 and a rule-book examination in July 1969. Prior to March 1957, he was subjected to disciplinary action for failure to close a siding switch, and for his responsibility related to two minor switching-type accidents. His record since March 1957 was clear.

Analysis

At the time of the accident, No. 9 was standing on track No. 2 under protection afforded by signal 6 Lab. No crew member was providing flag protection against following trains, as the carrier's operating rules do not require such protection in the territory involved.

Shortly before the accident, the engineer of No. 9 prematurely informed the Mace and McKinley interlocking operators by radio that his train was ready to proceed, and the McKinley operator transmitted this information to the engineer of Extra 2253 West by radio. The aforesaid radio transmissions apparently were of an informational nature only. Consequently, they are not considered to have been causal factors in the accident.

After having been advised by radio that No 9 was stopped in the block of signal 6 Lab, the engineer of Extra 2253 West stopped his train at that signal, which displayed a Stop-signal aspect. A few minutes later, the McKinley interlocking operator informed the engineer by radio that No 9 was ready to proceed and caused signal 6 Lab to display a Restricting aspect. In clearing signal 6 Lab for Extra 2253 West, the operator merely caused it to display the aspect it had previously displayed as a result of No 9 having entered its block, and he was permitted to do this under the carrier's operating rules. Hence, the operator's action of causing signal 6 Lab to display a Restricting aspect for Extra 2253 West is not considered to have been a causal factor in the collision, although his action evidently had a bearing on the accident inasmuch as it permitted Extra 2253 West to enter the block occupied by No 9.

After the crew members on the locomotive saw the aspect of signal 6 Lab change to Restricting, Extra 2253 West started forward and passed the signal. Under the existing circumstances, it was required to proceed in the block of signal 6 Lab at a speed not exceeding 15 m p h, prepared to stop short of a train or obstruction. The train, however, attained a speed of about 38 m p h, as it moved in that signal block and apparently neither the fireman nor the front brakeman called the engineer's attention to the excessive speed or took action to stop the train, as required. It is further apparent that as Extra 2253 West was about to pass Extra 3152 East on track No 1, the engineer heard the fireman of the eastbound train warn by radio that a train was stopped on track No 2 ahead. It appears he then initiated a light service application of the brakes that reduced the speed of his train slightly while passing the eastbound train and nearing the curve on which the caboose of No 9 was standing. Although his view of the track in the curve was apparently obstructed by the eastbound train passing on track No 1, the engineer took no action to reduce speed further. As a result, the train was moving at a speed of 32 m p h when the locomotive passed the rear end of the eastbound train and the engineer saw the caboose of No 9 standing on track No 2 a short distance ahead. He immediately applied the brakes in emergency. However, because of its excessive speed, there was insufficient braking distance for Extra 2253 West to stop short of the train ahead resulting in it colliding with the caboose of No 9 while moving at a speed of 25 m p h.

This accident was similar to one that occurred between two freight trains in the block of signal 6 Lab on March 22, 1961. In that case, a westbound freight train passed signal 6 Lab, which displayed a Restricting aspect, and collided with the rear end of a freight train standing on track No 2 while moving at 42 m p h, on a restricted-view curve. The collision point was in the 2°35' curve located a short distance east of the 1°00' curve where the accident of June 14, 1970 occurred. The fireman of the following train was killed, and the engineer and front brakeman of that train were injured.

The aforesaid two accidents illustrate the danger inherent in the operation of a train at speed in excess of that authorized by restrictive-signal indications, particularly in territory where the view ahead is restricted. They also illustrate the necessity of other crew members to take appropriate action for the safety of their train when the engineer neglects to operate the train in accordance with a restrictive-signal indication or other condition requiring the speed to be reduced. If other crew members decline to take such action, they do so at risk to their own safety as well as the safety of fellow employees and, perhaps, members of the general public also.

Findings

1. No. 9 was standing on track No. 2, in the block of signal 6 Lab, in accordance with applicable rules of the carrier.

2. Signal 6 Lab displayed a Restricting aspect for Extra 2253 West, the following train. This aspect authorized the train to proceed in the block of signal 6 Lab at a speed not exceeding 15 m p h, prepared to stop short of a train or obstruction.

3. Extra 2253 West attained a speed of 38 m p h in the block of signal 6 Lab and was moving at 32 m p h, when the caboose of No. 9 came into view a short distance ahead.

4. Because of its excessive speed when the caboose of No. 9 came into view, Extra 2253 West was unable to stop short of a collision.

5. The accident was due to failure of the engineer to operate Extra 2253 West, as required by the Restricting aspect displayed by signal 6 Lab.

6. A significant causal factor in the accident was failure of the fireman and front brakeman of Extra 2253 West to take appropriate action for the safety of their train when the engineer failed to operate the train in the block of signal 6 Lab in accordance with the Restricting aspect displayed by that signal.

Dated at Washington, D. C., this 24th
day of August 1971
By the Federal Railroad Administration

Mac E. Rogers, Director
Bureau of Railroad Safety