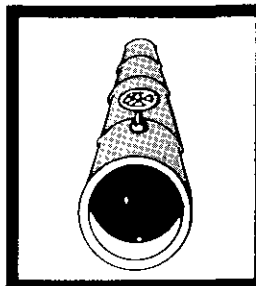
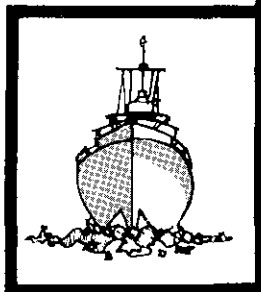
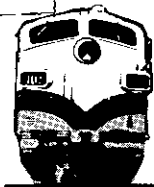
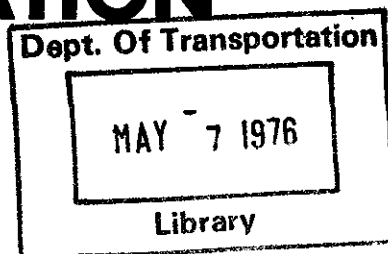


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**NATIONAL
TRANSPORTATION
SAFETY
BOARD**



WASHINGTON, D.C. 20594

RAILROAD ACCIDENT REPORT

**PENN CENTRAL TRANSPORTATION
COMPANY**

TRAIN COLLISIONS

LEETONIA, OHIO

JUNE 6, 1975

REPORT NUMBER: NTSB-RAR-76-2.

UNITED STATES GOVERNMENT

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FOREWORD

This report is based upon an investigation by the National Transportation Safety Board under the authority of the Independent Safety Board Act of 1974.

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D. C. 20594

RAILROAD ACCIDENT REPORT

Adopted: February 17, 1976

PENN CENTRAL TRANSPORTATION COMPANY
TRAIN COLLISIONS
LEETONIA, OHIO
JUNE 6, 1975

SYNOPSIS

About 11:00 p.m. on June 6, 1975, three freight trains of the Penn Central Transportation Company (PC) were involved in a collision near Leetonia, Ohio. Extra 6330 West collided with the rear of standing Extra 2278 West. Immediately thereafter, Extra 6259 East, which was on an adjacent track, struck the wrecked cars from the other two trains. One employee was killed and seven others were injured. Property damage amounted to about \$1.25 million.

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the engineer and brakeman to assure the operation of the train at a speed slow enough to stop it within the visibility range. This violated the restricted speed rule required by the signal indication.

FACTS

The Accident

On June 6, 1975, Extra 2278 West of the Penn Central Transportation Company (PC) was in the vicinity of Leetonia, Ohio. The train consisted of locomotive units 2278 and 3060, 17 loaded cars, and 42 empty cars. Extra 2278 West had a full crew including a fireman. Unit 2278 had a radio, but it was malfunctioning and it could receive only. The caboose had no radio, but it was equipped with operable flashing red markers displayed to the rear. The train passed Leetonia block station on No. 2 track west at 10:43 p.m. (See Figure 1.) When the train started up the grade west of Leetonia, it lost speed rapidly until it stalled. The caboose stopped 1,728 feet west of signal 653. The crew discovered that unit 3060 was not operating because the engine coolant was so low that it had actuated the low water and governor buttons, which had shut down the engine. Attempts to restart the unit were unsuccessful.

Extra 6330 West of the PC was on No. 2 track east of Leetonia, where it was waiting for Extra 2278 West to pass. It consisted of

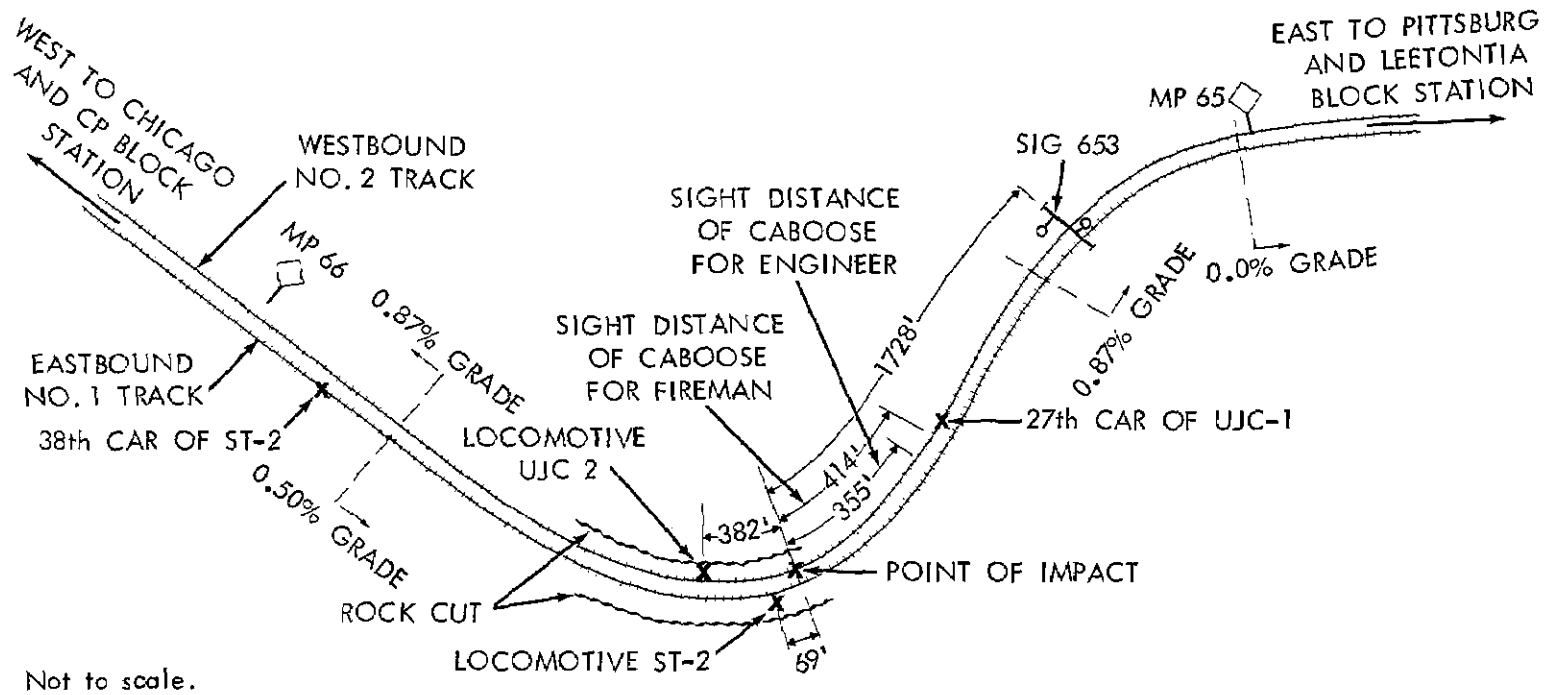


Figure 1. Pertinent points in connection with the accident involving Penn Central Transportation Company's Extra 6330 West, Extra 2278 West, and Extra 6259 East near Leetonia, Ohio, June 6, 1975.

locomotive units 6330, 6336, 6321, and 3020, 100 loaded cars, and 4 empty cars, including the caboose. Extra 6330 West had a full crew including a fireman. Both unit 6330 and the caboose were equipped with an operable radio.

Extra 6259 East of the PC was approaching Leetonia on the eastbound track (No. 1) adjacent to No. 2 track. Extra 6259 consisted of locomotive units 6259, 6072, and 6054, 60 loaded cars, and 5 empty cars. Unit 6259 had an operable radio, but there was no radio on the caboose.

After Extra 2278 West had cleared the interlocking at Leetonia block station, the block operator cleared the interlocking home signal for Extra 6330 West to follow Extra 2278 West on No. 2 track. Extra 6330 West moved to the interlocking home signal, where it stopped to comply with the "stop-and-proceed" signal indication. Before the fireman could restart the train, the signal indication changed to "approach." The train proceeded past Leetonia block station at 10:56 p.m.

The speed of the train was increased to about 25 mph between Leetonia and signal 653, the first automatic signal west of Leetonia interlocking. The surviving engine crewmen said that as signal 653 came into view, the signal displayed a proper "stop-and-proceed" indication. They called out the signal in accordance with rule 34.

The conductor and engineer gave conflicting statements as to whether Extra 6330 West stopped at signal 653. The engineer stated that he advised the fireman, who was operating the locomotive, to make a heavy brake application of about 30 pounds of air and to keep the train stretched. The engineer said that the fireman stopped the train for 2 to 3 minutes. The conductor stated that the train did not stop after leaving Leetonia block station until the emergency stop.

As Extra 6330 West moved past signal 653, the engineer said he cautioned the fireman to be alert because of the sharp curve ahead. The engineer got out of his seat on the fireman's side and stood at the front door, peering ahead. Suddenly, he saw the caboose and markers of Extra 2278 West on the track ahead. He also saw two white lights moving off the caboose toward the south. He called an alarm to his crew, told them to hit the floor, and told the fireman to apply the brakes in emergency. The engineer and the brakeman estimated the train's speed at 7 mph at this point. The engineer and head brakeman could not state positively whether the fireman applied the brakes in emergency.

The locomotive of Extra 6330 West struck the caboose of Extra 2278 West and forced it and the rear cars southward until they blocked No. 1 eastbound track. Extra 6330 West's locomotive units derailed northward, but they continued moving westward for about 380 feet between Extra 2278 West's train and the rock wall by the track.

About the time Extra 6330 West struck the rear of Extra 2278 West, Extra 6259 East entered the west end of the cut in which the accident occurred. The engineer had no advance warning of the situation ahead.

Extra 6259 East struck the cars of Extra 2278 West which were fouling No. 1 track. The estimated speed of Extra 6259 East at the time of impact was 28 to 30 mph. The locomotive units of Extra 6259 East derailed to the south against the south wall of the rock cut. Unit 6259 came to rest 69 feet west of the point of impact.

Postaccident Activities

After the accident, the conductor of Extra 2278 West went eastward to get help; he met the conductor of Extra 6330 West, who was heading to the front of his train and who had a portable radio. The conductor of Extra 2278 West used that radio to report the accident to Leetonia block station. The conductor of Extra 6330 West already had reported that his train was in emergency.

Rescue and emergency units from a number of area fire departments and rescue squads responded to the call for help. Railroad personnel assisted in freeing the injured, who were moved to a hospital.

The Accident Site and Method of Operation

The accident site is about 2.5 miles west of Leetonia block station and the town of Leetonia, Ohio. (See Figures 2 and 3.) The accident occurred in a rock cut which is on a 0.50-percent ascending grade westward, in a 4°5' curve to the right. There are two adjacent tracks, one eastbound and one westbound. The point of impact was 1,728 feet west of signal 653. At this point the tracks run through a cut. The walls of the cut are sheer rock. The inside (north) wall of the cut is about 35 to 40 feet high at the point of impact. The clearance between the rock wall and the north rail of the No. 2 track westbound is 6 to 8 feet.

The south wall of the cut is lower and farther from the eastbound track than the north wall is from the westbound track. There are 20 feet of clearance between the south rail of the eastbound track and the south wall of the cut. The distance between the track centers through the rock cut and accident site is 26 feet 6 inches.

At the time of the accident it was dark and clear and weather visibility was unlimited.

The accident occurred on the Valley Division of the PC. The Valley Division is equipped with automatic block signals; operation is governed by signal indications, timetable, train orders, general notices, and bulletins. There are no cab signals, speed controls, or other safety equipment in use except the deadman control on the locomotive.

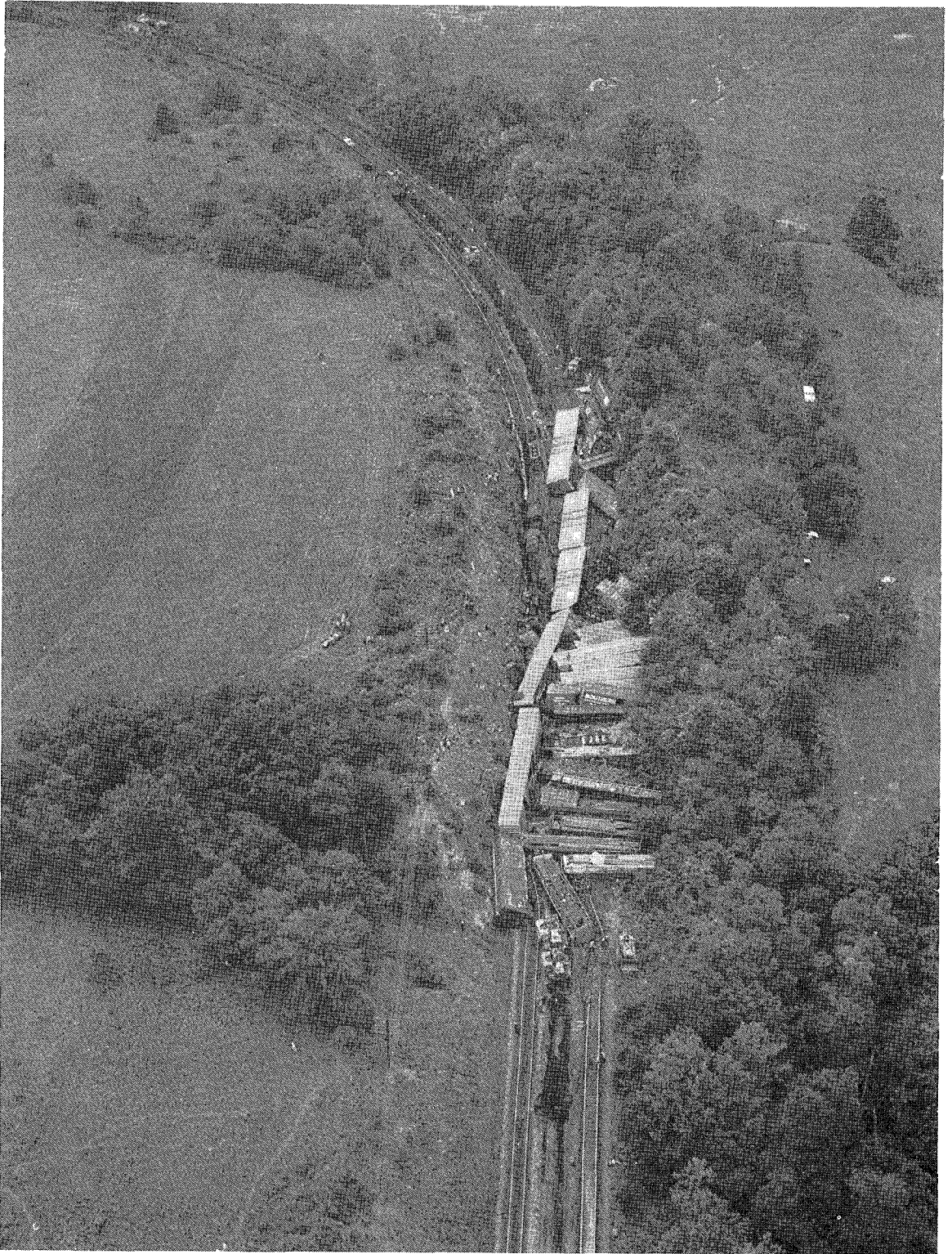


Figure 2. View of the accident site as seen from the west.



Figure 3. View of the accident site as seen from the east. The point of impact is off the bottom of the photograph.

Leetonia block station is located at milepost 63.2, east of the accident site, and CP block station is located at milepost 82.8, west of the accident site. The operators at these block stations report the passing of trains to each other and to the dispatcher.

Radio -- Most trains operating on the Valley Division are equipped with radios by which employees can communicate between the locomotive and the caboose, with another train, with the block operators, and with mobile stations. The dispatcher does not have a radio at his position, but he has access to one. However, some trains have no radio and some have radios only on the locomotive or caboose. Portable radios are assigned to conductors when possible. Employees in stations along the route are not advised whether a train is equipped with an operable radio.

History of train movements -- For the period of May 6, 1975, through June 6, 1975, records indicate that six trains stalled near mileposts 66 and 67. At least three of these involved motor failure. During that period, there were 670 trains operated westbound and 657 trains operated eastbound through this area.

Operating rules -- Operating rules governing employees are set forth in PC's "Rules for Conducting Transportation." Rules involved in this accident are Rule 251, Rule 291, Rule 400 N-3, Rule 34, and Rule 99. (See Appendix B.)

Rule 251 governs the movement of trains running in the same direction. The rule states that these trains will be governed by block signals, "whose indications will supersede the superiority of trains."

Rule 291 governs the use of the "stop-and-proceed" signal indication. The "stop-and-proceed" indication means that an engineer is to stop his train and then proceed at restricted speed. Restricted speed is defined: "...Proceed prepared to stop short of train, obstruction, or switch not properly lined looking out for broken rail, not exceeding 15 miles per hours."

Rule 400 N-3 governs the action of the engineer. It states that the engineer is responsible for the proper operation of the engine and for the conduct of other employees on the engine. The engineer must not allow any member of the crew to operate the engine except under his personal supervision.

Rule 34 states that all members of the crew must communicate a signal indication to one another as soon as it becomes clearly visible. If a train is not operated in accordance with the signal indication, the members of the crew must communicate this to the crewmember controlling the train, and they must stop the train if necessary.

Rule 99 relieves the flagman of the responsibility to flag in territory governed by automatic block signals. Therefore, the crew of Extra 2278 West was not required to flag against Extra 6330 West when Extra 2278 West stalled in the block of signal 653. Since Extra 2278 West was not stopped by an emergency brake application, there was no requirement to flag the adjacent track.

Property Damage

Cars 52 through 59, which included the caboose, were derailed from Extra 2278 West. The four locomotive units, cars 4 through 9, and car 27 were derailed from Extra 6330 West. The three locomotive units, cars 4 through 29, and car 38 were derailed from Extra 6259 East.

The locomotive cabs of unit 6330 on Extra 6330 West and unit 6259 on Extra 6259 East were crushed by the forces of the impact and by cars jamming them against the walls of the cut. The cabs were not sheared from the frames of the locomotives, and all of the crewmen who remained in the cabs survived.

Twenty-two cars and one locomotive unit were demolished. (See Figure 4.) Damage to equipment and facilities and the costs associated with clearing the wreckage were estimated to be \$1.25 million, which is broken down as follows:

Locomotives	\$ 825,000
Car Equipment	283,000
Tracks	6,600
Signals	1,000
Lading	30,600
Clearing Wreck	<u>105,964</u>
Total	\$1,252,164

Medical and Pathological Information

The fireman of Extra 6330 West was killed. The engineer's pelvis was fractured and his hip dislocated. The head brakeman suffered head, face, and chin lacerations and a loosened tooth.

The right foot of the engineer of Extra 6259 East was fractured and he sustained severe lacerations. The head brakeman was scalded by boiler water and suffered fractured vertebrae, internal injuries, and lacerations. The flagman and conductor reported bruised knees.

The flagman of Extra 2278 West suffered a lumbosacral strain which he believed occurred as he was climbing the bank to avoid the wreckage.



Figure 4. General view of accident, showing locomotive of Extra 6330 West and cars of Extra 2278 West. View is toward the east.

Blood tests for alcohol, performed on the engineer and head brakeman of Extra 6330 West, were negative. No autopsy or blood alcohol tests were performed on the fireman.

(For information on the crew's qualifications, see Appendix A.)

Crashworthiness of Cabs

The crashworthiness of locomotive cabs has been addressed in other Safety Board accidents. ^{1/} The FRA has conducted some crash tests at the DOT test center, Pueblo, Colorado, with such things as refuge shelter and structural changes in mind. Thus far, changes have been suggested in the design of collision posts and certain deflection devices. Suggested changes in about 16 items have been made and became a part of the AAR Manual of Standards and Recommended Practices as of January 1, 1976. They include such things as shielded hinges, recessed water coolers and refrigerators, recessed radio sets, etc.

However, there is still an urgent need for continuing work in the crashworthiness of locomotive cabs. A better or different design may have reduced or eliminated the injuries in this accident.

Tests and Research

The tests performed on the signal system after the accident indicated that the system was functioning normally. The only discrepancies found in the system were that the bulb in the marker light unit of Signal 653 was missing and that the left horizontal bulb was misaligned in the socket, probably because someone had tampered with it. Also, the side doors to the light units had been removed on one or two units, probably by vandals.

Train Tests -- Several tests were conducted after the accident to determine Extra 6330 West's stopping distances, its sight distances both to signal 653 and to the rear of Extra 2278 West, and its minimum possible speed. (See Table No. 1 for the results of the visibility tests. Also, see Figure 5.)

^{1/} "Railroad Accident Report -- Burlington Northern Inc. Derailment of Extra 5701 East, at Sheridan, Wyoming, March 28, 1971," NTSB-RAR-72-4. "Railroad/Highway Accident Report -- Illinois Central Railroad Company Train No. 1, Collision with Gasoline Tank Truck at South Second Street Grade Crossing, Loda, Illinois, January 24, 1970," NTSB-RHR-71-1. "Railroad Accident Report -- Illinois Central Railroad Company, and Indiana Harbor Belt Railroad Company, Collision Between Yard Trains at Riverdale, Illinois, on September 8, 1970," NTSB-RAR-71-3.

TABLE NO. 1

TEST	SIGHT OBJECT	SIGNAL ASPECT	LIGHT CONDITIONS	SIGHT DISTANCE FROM ENGINEER'S SIDE-FEET	SIGHT DISTANCE FROM FIREMAN'S SIDE-FEET
Caboose Visibility	Simulated Caboose	N/A -	Daylight	355	414
Signal Visibility	Signal 653	Clear	Daylight	1155	1115
Signal Visibility	Signal 653	Clear	Night	1161	1136
Signal Visibility	Signal 653	Stop and proceed	Daylight	1147	1143
Signal Visibility	Signal 653	Stop and proceed	Night	1188	1146

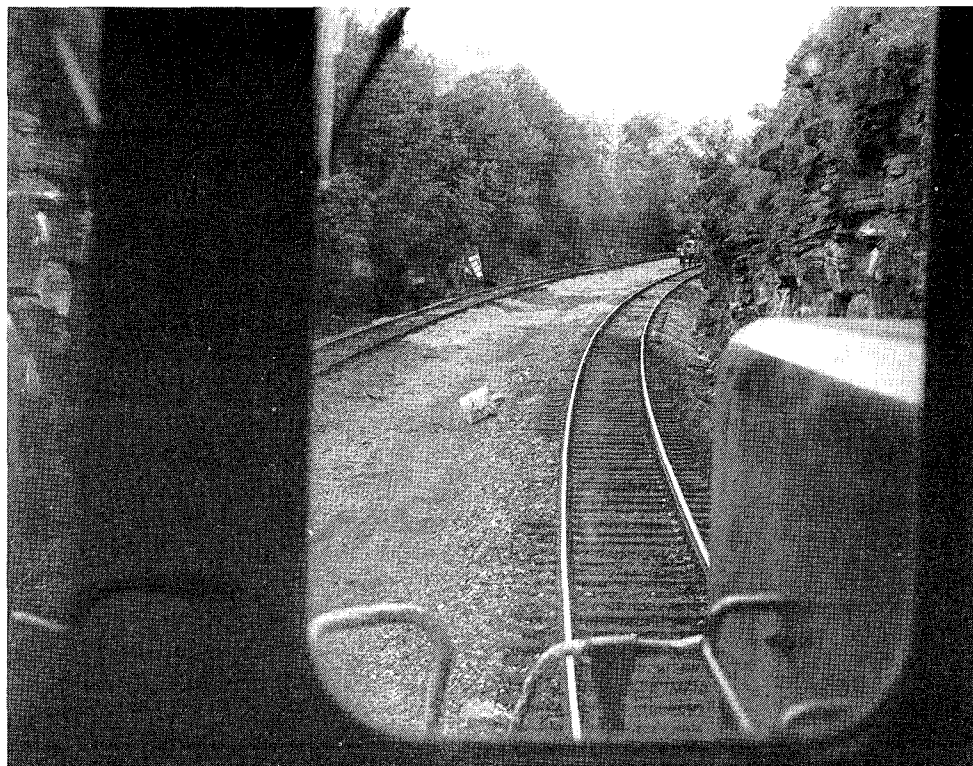


Figure 5. Fireman's view from the approaching locomotive to the point of impact. Men standing in the foreground represent the position of the caboose of Extra 2278 West.

The train used for the stopping tests was similar in consist to Extra 6330 West. The test train consisted of units 6312, 6309, 6341, and 3009, 100 loaded cars, and no empty cars. The tests showed that at 10 mph, Extra 6330 West could have been stopped 59 feet before impact with the caboose. At 17 mph, the test train passed the location of the caboose by 326 feet. These tests indicate that Extra 6330 West was moving faster than the 7 mph estimated by the engineer and brakeman. It was not possible to determine the actual speed of the train.

Stopping tests were made with the automatic brake only. Table No. 2 shows the differences in equipment characteristics between the actual train and the test train:

TABLE NO. 2

	Extra 6330 West	Test Train
ABD Brakes	98	84
AB Brakes	6	17
Composition Shoes	78	62
Iron Shoes	26	39
Roller Bearings	98	86
Friction Bearings	6	15

A mathematical simulation of stopping distances showed that a train similar to Extra 6330 West, with a brake pipe pressure of 95 psi, should have stopped in 271 feet from a speed of 15 mph. The simulated tests did not allow for reaction time, curvature, or grade, and the stops were made by an emergency brake application.

To determine the minimum speed at which Extra 6330 West could have moved, a train with a consist similar to Extra 6330 West was used. After a stop at signal 653, the train proceeded westward to the point of impact at 1.92 mph without stalling.

Air brake tests, inspection of the undamaged portion of Extra 6330 West, and inspection of those facilities of the locomotive that could be tested did not reveal any fault that would have caused a brake failure. No brake tests were performed on the undamaged portions of Extra 2278 West or Extra 6259 East.

An inspection showed that the radio on Extra 2278 West had a blown power fuse to the transmitter. At the time of the depositions, no cause had been found for the failure of Extra 2278 West's locomotive unit 3060. At Conway Yard, Pa., where Extra 6278 West was inspected last, inspectors found that unit 3060 had a leak in the No. 14 water jumper, but they did not think that it was the cause of the loss of water which caused the shutdown.

Because of the damage and the severity of impact, the Safety Board does not believe that the positions of the locomotives' controls after the collision necessarily indicate their positions approaching the point of impact.

ANALYSIS

Operating Rules

The accident occurred because the crew of Extra 6330 West did not comply with Rules 291, 400 N-3, and 34. According to Rule 291, the crew was required to stop the train and then proceed at restricted speed. According to Rule 400 N-3, the engineer was responsible for the actions of all employees on the engine. When the fireman of Extra 6330 West operated the train too fast for the "stop and proceed" indication, Rule 34 required the engineer and the brakeman to take preventive action.

If the crewmembers on the locomotive of Extra 6330 West had complied with the operating rules, the collision would have been avoided. When the fireman operated Extra 6330 West into the occupied block at such a speed that he could not stop the train short of Extra 2278 West, he violated Rule 291, which governs the "stop-and-proceed" signal. Even though the crew may have interpreted the signal to be a grade signal rather than a "stop-and-proceed" signal, the requirement to proceed at restricted speed still applied.

The engineer, who was responsible for the safe operation of the train and was the most experienced employee on the locomotive, failed to assure that the fireman operated the locomotive at a speed slow enough to stop short of a train ahead.

The responsibility for observing speed requirements is assigned primarily to the engineer; however, other members of the crew are required to take action if the engineer fails to comply. In this case, the brakeman did nothing to prevent the train from being operated too fast. He may have been hesitant to take action because the engineer was his superior. Or it may be that the brakeman did not realize that the train was moving too fast.

The determination of what constitutes a "restricted" speed is based on an engineer's judgment. If an engineer had never struck a train or obstruction while running at restricted speed, he may not know when he is running too fast for the prevailing conditions. Since the safe operation of a train is dependent on the engineer's judgment, carriers should assure that their engineers are trained adequately in judging their trains' speeds. There is a need to study ways to teach employees to comply with restricted speed. Effective action under the restricted

speed rule requires knowledge of the stopping distance of a train at various speeds under prevailing conditions and the distance at which a train or obstruction can be perceived in each portion of track. Employees must know how to combine these two factors to determine the acceptable speed for each circumstance.

As restricted speed is now defined, the restricted speed rule is unenforceable except where the maximum, allowable speed is exceeded. Unless the train strikes something or incurs other trouble specifically named in the restricted speed rule, the rule has not been violated. Despite the fact that Extra 6330 West was moving faster than the 7 mph estimated by the engineer and the brakeman, the restricted speed rule was not violated until he hit Extra 2278 West. If safe operation of a train is dependent upon the engineer's judgment of the proper speed for given conditions, the carrier should provide a dependable speed indicator.

If Rule 99 had required the crew of Extra 2278 West to provide flag protection against a following train, the collision could have been prevented. Even if Rule 99 had required protection only against a train moving at restricted speed, the oncoming Extra 6330 West, moving at excessive speed, would have received a warning sooner than when the engineer saw the rear of Extra 2278 West. But since Rule 99 states that the crew of a train in a block protected by automatic block signals does not have to flag following trains, Extra 6330 West did not receive advance flag warning.

Locomotive Cab Crashworthiness

After the impending crash was recognized by the engine crew of Extra 6330 West, the action of the fireman could not be accounted for by the engineer or brakeman. Since he was found outside the cab, it is probable that he attempted to leave the locomotive cab. If there had been a crash refuge available in the cab, the fireman may not have been tempted to leave the cab and he could have survived the crash.

Backup System

A backup system such as automatic train control probably would not have prevented this accident under the circumstances. However, with the restricted visibility in that block because of the high rock wall on the inside of the curve, a "stop" indication instead of a "stop-and-proceed" indication at signal 653 would be justified.

Radio

The use of radio to enhance safety in train operation has fallen short of its potential. In at least eight cases that the Safety Board has examined, carriers have not been positive in their policies regarding

the use of radio. Consequently, lax and questionable practices have developed. Employees have developed too much dependence upon radios without the proper guidance and analysis of the effects of imprecise procedures.

Sometimes the use of radio where there are insufficient guidelines is as bad as the nonuse or lack of a radio. Confusion results when there is uncertainty as to whether a train is radio-equipped. There is also an unknown element when it is not known under what conditions or circumstances a radio will be used to alert other trains or employees of an emergency or an abnormal situation. Therefore, more positive controls are necessary. 2/

If Extra 2278 West's locomotive radio had been functioning properly when Extra 2278 West stalled, or if the conductor had been provided an operable portable radio, the engineer or conductor could have cautioned the oncoming Extra 6330 West that the caboose was stopping in a hazardous location. The actions of Extra 6330 West's engineer indicate that he probably expected a situation ahead that would delay his train, because he had advised the train following him each time Extra 6330 West stopped. If that is true, it emphasizes the danger of uncontrolled radio use and the resultant dependence upon it.

To realize the radio's potential, radio rules must be enforced consistently and they must be supplemented by dependable equipment on all trains. Trains should be equipped with radios as a standard procedure. Confusion results when it is not known whether a train is equipped with radios, and when and how they are to be used is not specified, but is left as an option for the crewmembers to exercise.

At the present time the FRA is studying the problems in railroad radio application and is considering rules to govern its use.

CONCLUSIONS

1. Extra 2278 West was operating in compliance with the applicable Penn Central operating rules.
2. The crew of Extra 2278 West was not required by Rule 99 to provide flag protection to the rear or for the adjacent track.
3. Rule 34 was not adequate to assure the safe operation of Extra 6330 West.

2/ Recommendations on use of railroad radio, issued May 17, 1972.
Safety Recommendations R-72-9 and 10.

4. The Safety Board concludes that the engineer and brakeman of Extra 6330 West did not comply with Rule 34 in that they did not stop the train when it moved through the occupied block at excessive speed. There is conflicting testimony whether Extra 6330 West actually stopped at signal 653; however, in either case, it did not affect the outcome of the accident.
5. Although there were certain discrepancies in the indication displayed by signal 653, under the rules, the signal had to be considered a "stop-and-proceed" indication.
6. With the available visibility and braking capability, Extra 6330 West could have stopped short of collision if the train had been running at the 7 mph estimated by the engineer and brakeman.
7. Because of the damage and the severity of impact, the Safety Board does not believe that the positions of the locomotives' controls after the collision necessarily indicate their positions approaching the point of impact.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the engineer and brakeman to assure the operation of the train at a speed slow enough to stop it within the visibility range. This violated the restricted speed rule required by the signal indication.

RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board has made two recommendations to the Administrator, Federal Railroad Administration. (See Appendix D.) Also, the Safety Board believes that two recommendations made to the Federal Railroad Administration concerning the head-on collision of two Penn Central trains at Herndon, Pennsylvania, on March 2, 1972, have not been implemented fully. Since these recommendations are applicable to the accident at Leetonia, the Safety Board reiterates the following recommendations.

1. The FRA promulgate regulations to require that a railroad equipped with radio communication facilities install radios in appropriate parts of trains and maintain them in operating condition, unless all personnel involved are notified to the contrary by appropriate railroad procedures, such as a train order or general order. (Recommendation R-73-10)

2. The FRA, in the promulgation of regulations governing railroad operating rules, where responsibility for safe operation of the train is assigned jointly to the engineer and the conductor, require that they be located and informed so that they can make quick, effective decisions. (Recommendation R-73-11)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD.

/s/ WEBSTER B. TODD, JR.
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

February 17, 1976

APPENDIX A

CREW INFORMATION

Extra 6330 West -- The engineer was hired by the PC on August 20, 1957, and was promoted to engineer on November 26, 1963. He was fully qualified on Penn Central requirements and was familiar with the route over which he was operating. He last attended a rules class on September 15, 1974.

The fireman was hired on April 8, 1970. He was promoted to engineer on March 25, 1975, after having attended the engineer training course conducted by the Penn Central. He was qualified over the territory in which the accident occurred. He last attended a rules class on January 8, 1975.

The head brakeman was hired on September 9, 1969. He had been a regular crewmember on Extra 6330 West for about 3 weeks. His last physical was in May 1975. He attended a rules class on September 6, 1974.

Extra 2278 West -- The engineer was hired on June 28, 1946, and was promoted to engineer in December 1951. He was a regular member of the crew pool that operates train FC-9 (Extra 2278 West). He last attended a rules class on March 6, 1974.

The fireman was a regular member of the crew pool that operates train FC-9 (Extra 2278 West). He began work as a fireman on July 2, 1970.

The head brakeman was hired on March 2, 1971. He last attended a rules class on November 7, 1974.

The conductor was hired on April 4, 1964. He last attended a rules class on January 25, 1974.

The flagman was hired on June 25, 1956. He last attended a rules class in November 1974.

Extra 6259 East -- The engineer was hired on July 1, 1941. He last attended a rules class on November 6, 1974.

The head brakeman was hired May 29, 1973.

APPENDIX B

Excerpts from Penn Central Transportation Company's
Rules for Conducting Transportation.

BLOCK SIGNAL SYSTEMS

AUTOMATIC BLOCK SIGNAL SYSTEM (ABS)—A block signal system wherein the use of each block is governed by an automatic block signal, cab signal, or both

RESTRICTED SPEED—Proceed prepared to stop short of train, obstruction, or switch not properly lined looking out for broken rail, not exceeding 15 miles per hour

NOTE—Speed applies to entire movement

34 All members of the crew must when practicable, as soon as the next signal ahead affecting the movement of their train or engine becomes clearly visible, communicate the indication to each other by name, and thereafter continue to observe the signal and call any change of indication until it is passed

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

99 When a train stops under circumstances in which it may be overtaken by another train, a member of the crew must go back immediately with flagging equipment a sufficient distance to insure full protec-

tion, placing two torpedoes, and when necessary, in addition, displaying lighted fuses

When recalled and safety to the train will permit, he may return

When conditions require, he will leave the torpedoes and a lighted fuse

The front of the train must be protected in the same way when necessary

When a train is moving under circumstances in which it may be overtaken by another train, a member of the crew must take such action as may be necessary to insure full protection. By night, or by day when the view is obscured, lighted fuses must be dropped off at proper intervals

When day signals cannot be plainly seen, owing to weather or other conditions, night signals must also be used

Conductors and enginemen are responsible for the protection of their trains

When a pusher engine is assisting a train, coupled behind the cabin car, and the member of the crew that protects the rear end of the train is riding in the cabin car, the requirements as to the use of fuses should be met by dropping them off between the cabin car and pusher engine on the track the train is using, and not between that track and an adjacent track

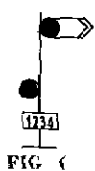
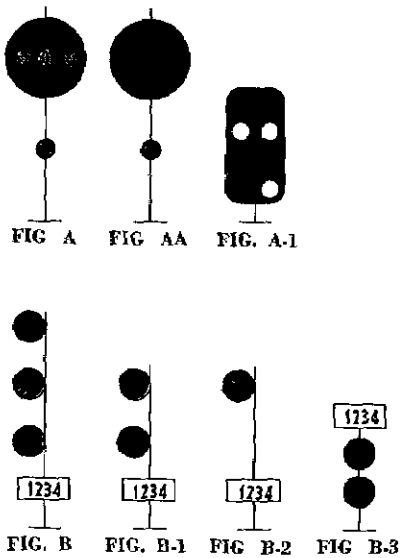
NOTE—When trains are operating under automatic block signal system rules or traffic control system rules, the requirements of Rule 99 do not apply for following movements on the same track

NOTE—When trains are operating under manual block signal system rules, the requirements of Rule 99 will not apply for following movements on the same track where Rule 316 is in effect, except when required by train order or timetable special instructions

**RULES GOVERNING THE MOVEMENT OF TRAINS
IN THE SAME DIRECTION BY BLOCK SIGNALS**

251. On portions of the railroad, and on designated tracks so specified in the timetable, trains will run with reference to other trains in the same direction by block signals whose indications will supersede the superiority of trains

Rule 291



INDICATION—Stop; then proceed at Restricted speed

NAME: Stop and proceed

NOTE—Where, in addition to the number plate, a letter G, grade marker, is displayed as part of these aspects, Rule 290 applies

ENGINEMEN

400N-3 Report to and receive instructions from the Superintendent or other designated officer. They will be governed by current mechanical, electrical and air brake instructions pertaining to the safety, inspection, preparation, and operation of trains and engines. They must comply with the orders of the Road Foreman of Engines, Trainmaster or other designated officer within their jurisdiction.

They must obey the instructions of Station Masters, Station Agents, Yard Masters, and Operators within their jurisdiction; and the conductor in charge of their train as to general management of their train, unless by so doing they endanger its safety or commit a violation of the rules.

They must be qualified on type of engine to which assigned including any devices or auxiliaries attached thereto. At a point where no mechanical forces are on duty and except on through trains, they will check the prescribed form in the cab to be sure that the unit or units of the engine consist have been inspected within the previous 24 hour period for road service or within one calendar day in yard service.

If the engine unit or units are not within date they will make an inspection. After making inspection, they will then record date, time and location on the prescribed form in the cab and prepare and sign regular work report.

APPENDIX B

At points where mechanical forces are employed and on duty, they will accept the inspection of the mechanical forces, except air brake test, as to the condition of the engine

They will at the end of the trip make written report on the prescribed forms

They will be responsible for the observance of all signals controlling movements accordingly and the regularity of speed between stations, exercise discretion, care, and vigilance in moving the engine with or without cars to prevent injury to persons, damage to property, and lading, avoiding collisions and derailments. While acting as pilot they will operate the engine unless otherwise instructed and when in charge of the engine to which no qualified conductor is assigned or is disabled they must perform the duties of and conform to the rules relating to conductors. They will require the assistance of crew members in any duties relative to the prompt and safe movement of their trains, engine and cars, promptly reporting irregularities or failures

They must not allow any member of the crew to operate the engine except under their personal supervision. They will be responsible for the proper operation of the engine and must not leave it while on duty except in case of necessity in which case the engine must be secured

They must, if anything withdraws attention from constant lookout ahead, or weather conditions make observation of signals or warnings in any way doubtful, at once so regulate speed as to make train progress entirely safe

When a train has more than one engine the rules apply alike to the engineman of each engine, but the use of the engine bell, whistle and air brake except in emergency must be limited to the leading engine

The engineman is responsible for the vigilance and conduct of other employes on the engine. He will see that they are familiar with their duties and instruct them if necessary

APPENDIX C

Results of actual stopping tests performed with Extra 6312 West on June 10, 1975:

Train consist.....Diesel units 6312-6309-6341-3009
 Loads 100
 Empties None
 Tons 8,249

Start of Tests	Speed (mph)	Stopping Distance (From point caboose sighted)	Distance to caboose (From point stopped)	Automatic Brake Reduction (Pounds of air)	Throttle Position
Signal 653	3	156	258	15	2
Signal 653	10	355	59	23	6
Signal 653	17	740	326+	30	8

Results of simulated tests for a train similar to Extra 6330 West of June 6, 1975:

Simulated conditions for tests:

- a) Train on level track
- b) Weather clear - Temperature 55°F
- c) Brakes on locomotive operative
- d) Ascending grade disregarded
- e) Curvature disregarded

STOPPING DISTANCE (EMERGENCY APPLICATION)		
Test Speed (mph)	Brake Pipe Pressure 80 psi	Brake Pipe Pressure 95 psi
5	58 Ft	52 Ft
10	155 Ft	145 Ft
12	203 Ft	191 Ft
15	289 Ft	271 Ft

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

APPENDIX D

ISSUED:

Forwarded to:

Honorable Asaph H. Hall
Administrator
Federal Railroad Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

R-76-6 through R-76-9

About 11:00 p.m. on June 6, 1975, three freight trains of the Penn Central Transportation Company were involved in a collision near Leetonia, Ohio. Extra 6330 West collided with the rear of standing Extra 2278 West. Immediately thereafter, Extra 6259 East, which was on an adjacent track, struck the wrecked cars from the other two trains. One employee was killed and seven others were injured. Property damage amounted to \$1.25 million.

According to Operating Rule 99, Extra 2278 West was not required to flag following trains. According to Operating Rule 291, Extra 6330 West was permitted to proceed past signal 653, which displayed a "stop and proceed" aspect because the block was occupied. Under ideal visibility conditions, the maximum unobstructed view westward from signal 653 was about 1,370 feet. Extra 2278 West was stopped just beyond this range. Also, visibility was decreased because of darkness. The protection that Extra 2278 West depended on was (1) The protection afforded by signal 653, and (2) the compliance with the restricted speed rule by the engineer of a following train. In this case, the protection was not adequate to prevent a collision.

The engineer of Extra 6330 West failed to comply with the requirements of Rule 291. Whether he did or did not stop at signal 653 before proceeding by it, he should have been operating his train at restricted speed. He might have been expecting a radio communique from the preceding train or he might have thought his speed was such that he could have stopped short of a hazard. Nevertheless, the system failed. The circumstances of this accident show the need to provide additional protection for trains in occupied blocks when a train stops in a spot where approach visibility is limited or obstructed.

The accident also indicates that radio procedures used by Penn Central crews were not well defined and that enforcement was lax. Basically, the procedures used by Penn Central crews have evolved gradually through trial and error. The crews of Extra 2278 West and Extra 6330 West apparently were dependent on their radios to report unusual circumstances. The engineer of Extra 6330 West had used his radio regularly that evening to report his frequent stops and starts to a following train. Even though the engineer of Extra 2278 West knew his radio would not transmit, his actions after his train stalled indicated that he still considered the radio to be the most expedient means of reporting his disabled locomotive unit, because he used the radio of another train to report his unit's failure.

These actions indicate that the crews were accustomed to radio communications and dependent upon them to varying degrees. This dependence may have detracted from the effectiveness of other safeguards. Also, the crews could not rely dependably on another train's being equipped with radio equipment since trains often were dispatched without radios and there was no policy in effect to make this known to other employees.

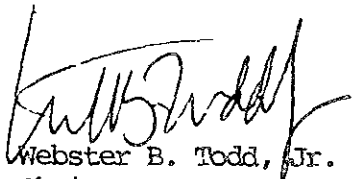
This accident illustrates a lack of guidelines to operating personnel from Penn Central management about proper radio procedures for them to follow if a train is stopped in an area of restricted visibility.

Therefore, the National Transportation Safety Board recommends that the Federal Railroad Administration:

1. Promulgate regulations to prohibit trains from operating in occupied blocks except through the authority of a train order or by some other procedure with similar safeguards. (Recommendation R-76-6) (Class II, Priority Followup)
2. Establish guidelines for and require carriers to establish radio procedures to insure that trains which stop in restricted visibility areas will notify by radio or flag trains to the rear. (Recommendation R-76-7) (Class II, Priority Followup)
3. Require that trains be equipped with operable radios and that railroad management provide guidelines for their use in normal service and in emergency situations. (Recommendation R-76-8) (Class II, Priority Followup)
4. Continue the investigation of the crashworthiness of locomotive cabs with emphasis on personnel safety and consideration of a readily accessible crash refuge. (Recommendation R-76-9) (Class II, Priority Followup)

APPENDIX D

TODD, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members,
concurred in the above recommendations.


By: Webster B. Todd, Jr.
Chairman