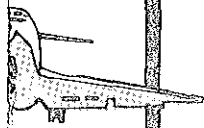
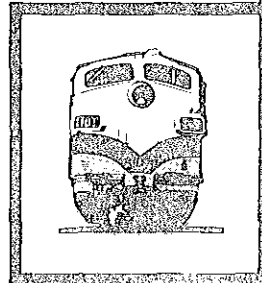




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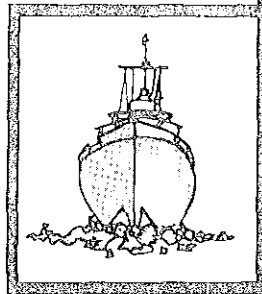


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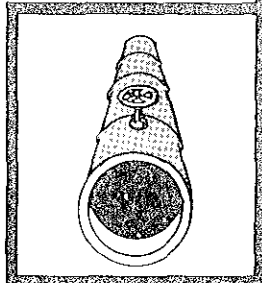
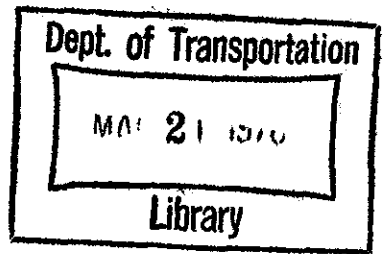
## RAILROAD ACCIDENT REPORT



### HEAD-ON COLLISION OF TWO GREATER CLEVELAND REGIONAL TRANSIT AUTHORITY TRAINS

CLEVELAND, OHIO

JULY 8, 1977



REPORT NUMBER: NTSB-RAR-78-2



UNITED STATES GOVERNMENT

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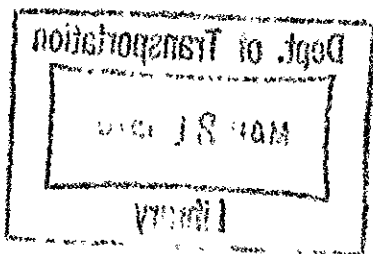
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| 16 Abstract<br><br>About 10:05 a.m., e.d.t., on July 8, 1977, two trains of the Greater Cleveland Regional Transit Authority collided head-on on the eastbound track of the Shaker Heights Line, near 92nd and Holton Streets in Cleveland, Ohio. Sixty persons were injured and property damage was estimated to be \$100,000.<br><br>The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Greater Cleveland Regional Transit Authority to have established rules and procedures, and special instructions to assure safe train operations. Contributing to this accident were the failure of both supervisors to establish and coordinate adequate local procedures for operating trains in both directions on a single track, and, further, the vegetation along the curve which was allowed to grow to the extent that the view was blocked. |  |  |  |   |           |
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NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C. 20594

RAILROAD ACCIDENT REPORT

Adopted: February 9, 1978

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HEAD-ON COLLISION OF TWO  
GREATER CLEVELAND REGIONAL TRANSIT  
AUTHORITY TRAINS  
CLEVELAND, OHIO  
JULY 8, 1977

SYNOPSIS

About 10:05 a.m., e.d.t., on July 8, 1977, two trains of the Greater Cleveland Regional Transit Authority collided head-on on the eastbound track of the Shaker Heights Line, near 92nd and Holton Streets in Cleveland, Ohio. Sixty persons were injured and property damage was estimated to be \$100,000.

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Greater Cleveland Regional Transit Authority to have established rules and procedures, and special instructions to assure safe train operations. Contributing to this accident were the failure of both supervisors to establish and coordinate adequate local procedures for operating trains in both directions on a single track and, further, the vegetation along the curve which was allowed to grow to the extent that the view was blocked.

INVESTIGATION

The Accident

On July 8, 1977, the track department of the Greater Cleveland Regional Transit Authority (GCRTA) scheduled a tie-tamping machine (tamper) to work on a section of westbound track of the double-track Shaker Heights Line. Operating department personnel planned for westbound and eastbound trains to operate on a single track between crossovers at Shaker Square on the east and Pennsy Crossing on the west, approximately 3 miles apart. This would permit the tamper to work without interruption on the westbound track between the two points. Two supervisors were to control train operations between the two points and were to be stationed at each crossover. They were not instructed how to handle this assignment, and neither supervisor was designated in charge. Communications were not available at either crossover, and the supervisors could not obtain portable radios. Motormen operating on the line were not notified in advance of the planned single-track operation.

At 9:55 a.m., a supervisor was at Shaker Square when Block 12, 1/ a single-unit car, arrived on the westbound track for its scheduled westbound trip to Cleveland Union Terminal (CUT) via ~~Windermere Station~~ <sup>E. 53<sup>rd</sup> St.</sup> at 55th Street. The supervisor advised the motorman of Block 12 that after the tamper arrived at Shaker Square, Block 12 could cross over to the eastbound track and continue west.

The tamper arrived in a few minutes at Shaker Square on the eastbound track, closely followed by Block 1, an eastbound train; the tamper was crossed over to the westbound track to begin operations. The supervisor who was to control traffic at Pennsy Crossing passed that location and arrived at Shaker Square on the tamper to confer with the other supervisor. He then boarded Block 12 for the trip back to Pennsy Crossing.

Block 12 was crossed over to the eastbound track after the tamper had cleared the crossover. The supervisor on the train instructed the motorman to proceed west. The supervisor then contacted, by car radio, the tower operator at Windermere Station, the controlled entrance to the Shaker Heights Line. The tower operator testified that the supervisor asked him to contact eastbound Block 1 and instruct its operator to hold his train west of the crossover at Pennsy Crossing. The supervisor evidently did not know that Block 1 had arrived at Shaker Square immediately behind the tamper and already had departed east from Shaker Square. The tower operator did not know the location of Block 1 and was not able to contact its motorman by radio. The tower operator asked traffic control at CUT to relay the instruction. CUT relayed the instruction to Block 1, which was now east of Shaker Square. Block 12 was never informed about whether Block 1 had received the message or about the correct location of the train. Even though no eastbound trains were contacted, Block 12 continued west on the eastbound track.

At 9:55 a.m., Block 4, a single-unit car, departed CUT for Green Road Station, the eastern terminus of the Shaker Heights Line. Block 4 was the next regularly scheduled eastbound train after Block 1 to pass Pennsy Crossing. Block 4's scheduled time of arrival at Pennsy Crossing was after the single-track operation had begun; however, Block 4 had not been instructed to remain at Pennsy Crossing until Block 12 or any other westbound train had cleared the eastbound track. The motorman was not aware of the single-track operation. The supervisor who was to control train operations at Pennsy Crossing was still en route there on Block 12.

At the time this supervisor attempted to contact Block 1, via the tower operator at Windermere, Block 4 already had departed CUT. The tower operator did not contact Block 4 or ask CUT to contact Block 4. No attempt was made to hold Block 4 at ~~Windermere Station~~ <sup>E. 53<sup>rd</sup> St.</sup>, the last control point before entering the Shaker Heights Line.

1/ GCRTA assigns a block number to each crew by which they are identified on each run. It has no directional significance.

The motorman of eastbound Block 4 could not recall the aspect displayed by signal 38 at Pennsy Crossing; he operated his train past the signal in a normal manner. The motorman of westbound Block 12 also operated his train in a normal manner with approval of the supervisor in the car. About 2.7 miles past Shaker Square, westbound Block 12 moved into the spiral leaving a 6° curve near 92nd and Holton Streets, while eastbound Block 4 was approaching the same curve from straight track. While moving over a bridge at an undetermined speed, the cars collided head-on at 10:05 a.m.

The lead truck of Block 4 was derailed but the car remained upright; Block 12 was not derailed.

The motorman of westbound Block 12 stated that he did not see the approaching car until it was about 100 feet away, and that he immediately made an emergency application of the brakes. The motorman of eastbound Block 4 could not recall his actions; however, skidmarks indicated an emergency application of the brakes was made. The speed of each car was materially reduced by their brake applications before the collision. The motorman of Block 12 stated that his view of the approaching car was obstructed by vegetation along the track.

A westbound train leaving Woodhill Station, the first station east of the accident site, ascends a 4 percent grade for about 1 mile. At the summit of the grade the track is laid on a steel through-truss bridge over a railroad. The track then curves 6° to the left. (See figure 1.)

An eastbound train leaving Pennsy Crossing ascends a 2.5 percent grade on straight track for 1,350 feet up to the 6° curve where the accident occurred. The track at the accident site is laid on a ballasted deck concrete arch bridge over 92nd Street. A 4 1/2-foot-high concrete wall extends the entire length of the bridge along each side.

#### Injuries to Persons

| <u>Injuries</u> | <u>Crewmembers</u> | <u>Passengers</u> | <u>Other</u> |
|-----------------|--------------------|-------------------|--------------|
| Fatal           | 0                  | 0                 | 0            |
| Nonfatal        | 3                  | 57                | 0            |
| None            | 0                  | 14                |              |

#### Damage to Trains

The front end of car No. 65 of Block 12 was crushed rearward more than 3 feet. This included the sub-framing, sub-flooring, motorman's platform, formed front of roof and ceiling and side sheets. The front anticlimbers were also damaged. (See figure 2.)

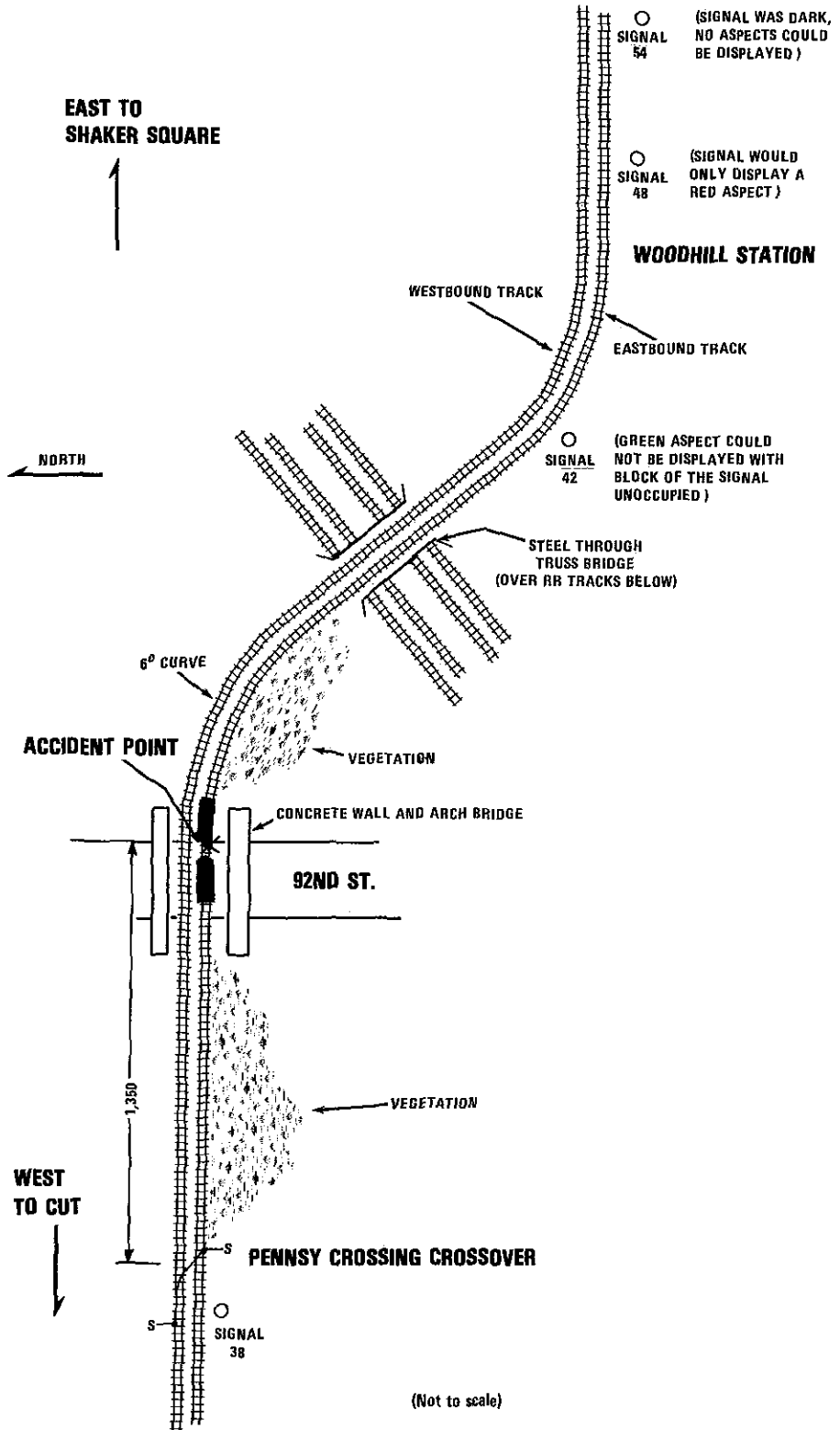


Figure 1. Plan of accident site.



Figure 2. Damaged car No. 65 of Block 12.



The control compartment was extensively damaged with the dashboard pushed back to the motorman's seat location. The almost total collapse of the entire nose section extended through the front entrance location.

Car No. 59 of Block 4 was similarly damaged throughout the front nose section. The sub-framing was crushed rearward equidistant as car No. 65. The sub-floor, motorman's platform, roof, ceiling, sides, and dashboard were all propelled rearward beyond the front entrance. (See figure 3.)

### Train Information

The cars were self-propelled and electrically operated; they were built in 1946 by the St. Louis Car Company. They were acquired by the Shaker Heights Rapid Transit Line (SHRTL) in 1954 and converted to multiple-unit capability. Propulsion power is obtained from a 600-volt d.c. catenary system. Each car was 46 feet 5 inches long, 9 feet wide, and 10 feet 2 inches high. The empty weight after each car was converted for increased seating was approximately 39,500 pounds. The cars had a seating capacity of 60 persons. All of the two-person seats were 34 inches wide and were mounted transversely including a wide seat at the rear which accommodated four persons.

The cars were equipped with three braking systems: (1) electrodynamic braking; (2) mechanical braking through drum brakes mounted on each of the four traction-motor driveshafts; and (3) electromagnetic braking through a linear brakeshoe suspended directly over the rail and between the wheels on each side of the car's two trucks. The brake systems on both cars were inspected on July 5, 1977; no deficiencies were noted.

Train movement was controlled by the use of three foot pedals. The left pedal was the safety control which required foot pressure at all times, unless the brakes were being applied. Releasing this pedal or increasing its pressure would have resulted in an emergency application of the brakes. The pedal at the operator's right controlled the train's speed. The center pedal activated the brakes.

A toggle switch was mounted on the dashboard, within easy reach of the operator, that could be used to activate the emergency brakes. There was no speedometer on either car.

### Crew Information

The supervisor who was riding on Block 12 was employed on February 18, 1957. He was promoted to a train dispatcher in October 1976. Most of his years of service, however, had been with bus operations for GCRTA or its predecessor. He would not discuss the accident with Safety Board investigators.



Figure 3. Damaged car No. 59 of Block 4.

The supervisor assigned to the Shaker Square Station was employed May 1, 1964. He started as a conductor in rail service and was promoted to motorman after 6 weeks. In 1967 he was promoted to part-time dispatcher and in 1974 he became a full-time dispatcher. In December 1976 he was promoted to inspector.

The motorman of Block 12 was employed June 18, 1969, as a trainman. He was promoted to motorman in September 1969. In December 1976 he was promoted to starter, a supervisory position on the Shaker Heights Line. In June 1977 he returned to an assignment as a motorman. The motorman of Block 4 was employed December 18, 1970. He became a motorman in September 1976. The motormen of both trains were originally employees of the SHRTL which merged with the GCRTA on September 5, 1975.

The motormen were not given blood-alcohol tests.

### Method of Operation

The Shaker Heights Line, between Windermere Station and Shaker Square, consists of two main tracks designated as eastbound and westbound. Trains operating with the current of traffic are governed by an automatic block system. The signal system does not provide for cab signals, automatic train stop, or speed control. The signals also are not designed to aid trains moving against the current of traffic on either track.

There are no written block signal rules in effect on the Shaker Heights Line. Through practice, the signals are interpreted by the motormen to mean the following:

| <u>Aspect</u> | <u>Indication</u>                     |
|---------------|---------------------------------------|
| Green         | Clear block; operate at normal speed. |
| Yellow        | Be prepared to stop at next signal.   |
| Red           | Stop.                                 |

At the time of the accident, block signal rules applied only on the track over which the Shaker Heights trains operated between ~~Windermere~~ <sup>E 5574</sup> Station and CUT.

The crossover switches at Shaker Square and Pennsy Crossing are trailing point, spring switches for operation with the current of traffic. The switches are not connected to the signal system.

"Headway" cards that showed the time that trains were due to leave their initial terminal, their turnaround points, and their scheduled departure times at Shaker Square were available to each supervisor; however, only one supervisor had one. There was no rule that established this "headway" card as the authority for the movement of regular trains.

Formal training had not been provided employees on the operating rules since the SHRTL merged with the GCRTA. Safety Board investigators found a wide difference of opinion among officers and employees as to what rules, if any, were in effect on the Shaker Heights Line. Officers of the operating department of the GCRTA did not express a clear understanding of the rules. Some of the employees believed that some of the old SHRTL rules were still in effect.

Employees were notified of changes in operating rules and procedures by the posting of bulletins at the crew change terminals. Employees were not required to acknowledge receipt of this information or that they understood the changes. Although management and employees generally believed that notices on the bulletin board superseded any rule with which they would conflict, no rule stated this. At the time of the accident, there were no specific rules in effect that governed a single-track operation. Notices of track work that required all trains to use a single track at a specific location were sometimes posted on the bulletin boards, but they were not required. Notices concerning the single-track operation on July 8, 1977, were not issued.

There were no speed restrictions in effect to govern the operation of trains running against the current of traffic. There was a wide variance in interpretation by employees as to what speed was permitted under this circumstance.

Trains operating on the Shaker Heights Line are equipped with 4-channel, two-way radios, which normally are assigned channel 2 for operational control communications. However, at 9:45 a.m. on the day of the accident, radio control at CUT transmitted a directive via channel 2 that all trains monitoring channel 2 switch to channel 1. Westbound Block 12 received this message and made the change. Eastbound Block 4, however, was located under the CUT building at 9:45 a.m., and the motorman stated that he did not receive the transmission. Therefore, his radio remained tuned to channel 2. GCRTA rules do not require that all units acknowledge receipt of such transmissions.

#### Meteorological Information

The weather on the day of the accident was clear and bright; visibility was good; the temperature was 80° F; the rails were dry.

#### Survival Aspects

The majority of the 74 persons involved in the accident were riding on the westbound car. Only a few of these persons were not injured to some extent. Of the 60 persons who reported injuries, 5 sustained fractured legs, 2 fractured arms, 2 fractured ribs, 2 fractured noses, and 1 a skull fracture. The other injuries consisted of lacerations and contusions

to the head and neck areas of 23 persons, to the arms and torso areas of 14 persons, and to the leg areas of 11 other persons. Two of the passengers who sustained fractured legs were trapped in the wreckage of the collapsed front end of the westbound car and considerable time was required to remove them from the wreckage. Many of the other persons who sustained lacerations and contusions were treated and released from the hospital the same day.

### Tests and Research

A postaccident inspection and test of the block signal system revealed that more than 150 rail bond wires <sup>2/</sup> were broken on the eastbound track within the limits of the single-track operation. Block signal No. 48 (see figure 1) displayed a red or stop indication regardless of block occupancy, and signal No. 42 displayed a permanent yellow aspect. Block signal No. 54 did not display any aspect; one witness testified that it had been in that condition for about 6 months.

A postaccident test and examination of the braking system components of each car indicated that the brake systems should have operated as intended at the time of the accident. Because of the severity of the cars' structural damage, however, a complete test of each system could not be performed. Testimony of witnesses and inspection of skidmarks at the site disclosed no evidence of malfunction.

Skidmarks on the rails indicated that the brakes were applied on Block 12 and Block 4, 100 feet and 130 feet, respectively, from the collision point. A dense growth of vegetation from 10 to 12 feet high extended 140 feet east of the point of the accident along the inside of the 6° curve. The density of the growth precluded a motorman from seeing across or around the curve as he approached from either the east or the west. The 4 1/2-foot-high concrete wall on the bridge did not interfere with the operators' vision around the 6° curve.

Stopping distances and range of visibility tests were conducted with cars similar to those involved in the accident and under similar conditions to those which prevailed at the time of the collision. The test westbound car approached the point of collision on the eastbound track about 30 mph. This was the estimated speed of Block 12 when its motorman first sighted Block 4. An emergency brake application was made at the point where the skidmarks of Block 12 began; it required 172 feet for the test car to stop. The stopping point was 52 feet west of the point of collision.

The test eastbound car approached the point of collision on the eastbound track about 30 mph, the estimated speed of Block 4 when its motorman sighted Block 12. The brakes were applied in emergency at the

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<sup>2/</sup> A metallic connection attached to adjacent rails to insure electrical conductivity.

point where skidmarks of Block 4 were found; it required 212 feet for the test car to stop. The point at which that car stopped was 92 feet east of the collision point. The stopping tests were made with only a motorman and an observer aboard each test car and did not allow for the weight of passengers on either car.

The tests also revealed that when a car of the same type as those in the accident was 160 feet east of the point of collision, it was not visible to the motorman of a train approaching the curve from the west on the eastbound track because of the trackside vegetation. (See figure 4.)

Visibility checks conducted after the vegetation had been removed from the inside of the curve provided sight distances far in excess of the required stopping distances. (See figure 5.)

#### Other Information

The Safety Board investigated an accident which occurred on the GCRTA on August 18, 1976. <sup>3/</sup> As a result of this investigation, recommendations were made to the GCRTA on August 19, 1977, concerning operating rules and procedures, training, and a method to enforce the rules. In addition, recommendations were made relative to operating trains in occupied signal blocks, the posting of general orders and bulletins, and test facilities for automatic train control equipment. (See appendix A.)

GCRTA's response to these recommendations indicated that they had been complied with or that compliance would be within 60 days. (See appendix B.) The GCRTA is not subject to any Federal or State regulatory authority.

#### ANALYSIS

The GCRTA did not have operating rules in effect to govern a single-track operation on the Shaker Heights Line at the time of the accident. The operating department personnel therefore developed their own procedures for the operation. These procedures included the use of two supervisors to notify trains at the crossovers of the need to change tracks. However, a supervisor was not at Pennsy Crossing when the single-track operation started and was not able to warn Block 4 of the approach of Block 12 on the eastbound track. Neither of the supervisors was specifically instructed to coordinate the operation, and trains were allowed to pass the crossovers at Shaker Square and Pennsy Crossing before anyone had determined that the track was clear. There was not even a method of communications between the crossovers.

<sup>3/</sup> "Railroad Accident Report - Rear End Collision of Two Greater Cleveland Regional Transit Authority Trains, Cleveland, Ohio, August 18, 1976" (NTSB-RAR-77-5).



Figure 4. The operator of eastbound Block 4 had this view of the 6° curve approaching the point of collision on the arch bridge (center). There is a transit car 180 feet beyond the collision point, near the truss bridge (background), which is completely hidden by trackside vegetation.

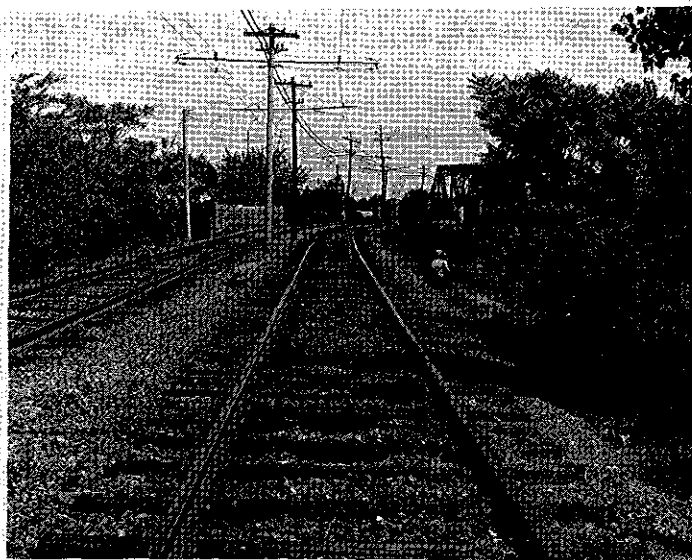


Figure 5. View of curve after vegetation was removed.

Eastbound Block 4 had no restrictions imposed on its movement, and its motorman did not violate any rules by proceeding on schedule past Pennsy Crossing. The motorman of Block 4 had no way of knowing that he had missed a transmission directing him to change radio channels. Radio control should not assume that all units will receive a transmission that is only broadcast once or twice. If all trains were required to acknowledge such an order, radio control would know when all units concerned had received the message. Apparently, this was not done. There is no evidence that anyone attempted to contact Block 4 after they all failed to contact Block 1. If Block 4 had switched to channel 1, the motorman might have heard the attempt made to stop Block 1 at Pennsy Crossing. Knowing he was approaching Pennsy Crossing, the motorman might have stopped Block 4 west of the crossing and radioed for instructions. He may have been informed of the single-track operation and the accident could have been averted.

The supervisor riding Block 12 should have known that Block 1 already had passed Shaker Square. The supervisors used poor judgment when they allowed Block 12 to leave Shaker Square and operate on the eastbound track against the current of traffic without assurance that all eastbound traffic was stopped at Pennsy Crossing and that the block was clear. The supervisor on board Block 12 exercised poor judgment when he allowed Block 12 to continue west after Block 1 could not be located. Without a "headway" card, the Pennsy Crossing supervisor had to rely on his memory for the schedules of trains; he obviously failed to account for Block 4.

Advance and proper planning is essential for an operation of this nature if it is to be carried out safely. An arrangement such as the one used on July 8, 1977, is especially hazardous when there is no signal protection in one direction, and when there are no safety appurtenances on the car that operate in conjunction with block conditions.

The motorman of Block 4 did not recall the aspect of signal 38 at Pennsy Crossing. Based on the sequence of events and relative positions of the trains before the accident, signal 38 was probably displaying a yellow aspect. This should have alerted the motorman to the fact that the second block ahead was either occupied or that there was a broken rail. However, because he had not been informed that a single-track operation had begun, the motorman would have assumed that a train in the second signal block ahead was moving in the same direction as his train, and that he could proceed to the next signal.

Although the discrepancies found in the signal system near the accident site were not a contributing factor to this accident, the Safety Board concludes that the system requires extensive upgrading to prevent other accidents. The discrepancies indicate poor maintenance practices by the GCRTA. If signals are allowed to deteriorate to the point where they are no longer dependable, operators will ignore them.



The vegetation along the 6° curve at the accident site was a significant safety hazard even under normal operating conditions. Vegetation should not be allowed to grow to the point where it blocks a motorman's view of a substantial portion of the track ahead. In this case, if the vegetation had not been excessive, the operators could have seen each other's car much earlier and might have stopped before colliding.

The failure of the GCRTA to provide training for those employees of the Shaker Heights Line at the time that it became a part of the GCRTA and the absence of any retraining to acquaint these employees with the policy and requirements of the GCRTA contributed in part to this accident.

GCRTA's response to the recommendations the Safety Board made after its investigation of the accident on August 18, 1976, indicated an agreement with the recommendations and the intention to implement them. If the GCRTA had implemented well defined and understandable operating rules after the 1976 accident, this accident probably would not have occurred. The actions contemplated by the GCRTA and outlined in its letter of November 18, 1977, to the Safety Board (see appendix B) should be implemented as soon as possible.

Since the cars were of identical construction, energy was absorbed through the crushing of each end section, which prevented one car from penetrating or overriding the other car. Although this collapse of the end section trapped two passengers riding in the front seat of one car, the energy absorbed may have reduced more extensive injuries to other passengers.

The injuries to the passengers' lower extremities may be attributed to the loosening of some seats. The head, face, and upper torso injuries may have been due to the passengers being propelled into the seats ahead.

## CONCLUSIONS

### Findings

1. The GCRTA did not have any rules, regulations, or instructions governing the procedure for a single-track operation.
2. The GCRTA did not provide for communication between the two supervisors in charge of the single-track operation at their respective locations.
3. The GCRTA did not instruct the two supervisors how to handle the single-track operation, and neither supervisor was designated in charge.

4. The GCRTA did not provide the operators of either train with advance information concerning the single-track operation.
5. The GCRTA did not provide for a maximum speed of operation for trains operating against the current of traffic.
6. The block signal system on the eastbound track between Pennsy Crossing and Shaker Square was not operating properly.
7. GCRTA's radio control changed the assigned radio channel for trains operating on the Shaker Heights Line and did not insure that all trains were notified of the change; the GCRTA does not require operators to acknowledge such messages.
8. Neither the motorman nor the supervisor on Block 12 determined if the eastbound track was clear to Pennsy Crossing before they allowed the car to cross over and proceed west on the track.
9. The motorman of Block 4 was not notified of the single-track operation between Pennsy Crossing and Shaker Square.
10. Vegetation on the inside of the 6° curve at the accident site prevented the motormen on each train from seeing each other in time to stop.
11. Proper identification of trains due or past Shaker Square or Pennsy Crossing was not reported to either supervisor or radio control when the single-track operation began.
12. No attempt was made to hold eastbound Block 4 at Windermere Station, the last control point before entering the Shaker Heights Line.

#### Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Greater Cleveland Regional Transit Authority to have established rules and procedures, and special instructions to assure safe train operations. Contributing to this accident were the failure of both supervisors to establish and coordinate adequate local procedures for operating trains in both directions on a single track, and, further, the vegetation along the curve which was allowed to grow to the extent that the view was blocked.

#### RECOMMENDATIONS

The Safety Board, on September 6, 1977, based on evidence obtained in the preliminary stages of this investigation, recommended that the Greater Cleveland Regional Transit Authority:

"Immediately inspect and repair the block signal system and implement procedures for its maintenance to insure that it continues to function as intended. (Class II, Priority Followup) (R-77-26)

"Until such time that the block signal system is repaired, establish a well-defined operational procedure which will insure the safe movement of all trains on the Shaker Heights Line. (Class II, Priority Followup) (R-77-27)"

As a further result of this investigation, the Safety Board recommended that the Greater Cleveland Regional Transit Authority:

"Provide established means of communication between control points during a single-track operation. (Class II, Priority Action) (R-78-7)

"Insure that all trains are notified of any change in the use of radio channels before using a new channel assignment. (Class II, Priority Action) (R-78-8)

"Implement on the Shaker Heights Line as soon as possible the Safety Board's Recommendation R-77-21 which recommended that the GCRTA:

'Operate trains on an absolute block. If it becomes necessary to enter an occupied block in an emergency, provide procedures that will insure safe operation.' (Class II, Priority Action) (R-78-9)"

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ KAY BAILEY  
Acting Chairman

/s/ FRANCIS H. McADAMS  
Member

/s/ PHILIP A. HOGUE  
Member

/s/ JAMES B. KING  
Member

February 9, 1978

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

APPENDIX A

ISSUED: August 19, 1977

Forwarded to:

Mr. L. Ronis  
General Manager  
Greater Cleveland Regional  
Transit Authority  
1404 East 9th Street  
Cleveland, Ohio 44114

SAFETY RECOMMENDATION(S)

R-77-20 through 23

About 11:35 a.m., on August 18, 1976, Greater Cleveland Regional Transit Authority (RTA) train No. 461 struck the rear of train No. 409 which was standing near the East 79th Street Station in Cleveland. Twenty persons were injured and property damage was estimated to be \$61,000. 1/

Investigation of the accident indicates that the method employed in the application of the automatic train stop (ATS) nullifies any protection that could be afforded by that system for an occupied signal block. Train No. 461 was only required to reduce speed to pass a stop signal with the trip arm in an up position. However, after No. 461 passed the stop signal, it resumed speed and passed the stop signal of the occupied block. The trip arm at this signal was not activated. Safety for the movement of the train rested with the operator, who failed to discharge his responsibility, sped past the signal, and struck the standing train.

The investigation also disclosed that the operators are orally informed of operating and safety rules during training and that they are not provided with a copy of those rules. Since the operators are not given refresher courses, the rules become vague and some are forgotten. Some operators have an almost indifferent attitude to the rules.

1/ For more detailed information on this accident, read "Railroad Accident Report, Rear End Collision of Two Greater Cleveland Regional Transit Authority Trains, Cleveland, Ohio, August 18, 1976" (NTSB-RAR-77-5).

APPENDIX A

RTA operators are not required to make predeparture tests of ATS, ATC, cab signals, brakes or radio equipment. A record of tests made by maintenance personnel is not provided to the operators. Also, cars that are disconnected from multicar trains to be used as single-unit trains may not be tested at all. The brakes are not tested by the operator until after the train departs the terminal.

The requirement that delays be reported to central control is apparently not being enforced. All delays beyond a normal station stop should be immediately reported and central control should in turn notify all trains in the area.

Therefore, the National Transportation Safety Board recommends that the Greater Cleveland Regional Transit Authority:

Develop a system assurance and safety program that will provide and insure the following:

1. A set of operating rules and procedures that will provide objective requirements for a safe and efficient operation.
2. A training program that will originally acquaint operating personnel with the rules and a system of reexamination to keep them current with the rule requirements.
3. A system of supervision which will enforce the rules and will provide an efficient operation.  
(Class II, Priority Followup) (R-77-20)

Operate trains on an absolute block. If it becomes necessary to enter an occupied block in an emergency, provide procedures that will insure safe operation.  
(Class II, Priority Followup) (R-77-21)

Implement a system to insure that general orders and bulletins are read and understood. (Class II, Priority Followup) (R-77-22)

APPENDIX A

Expand the current test facilities for the ATC so that all equipment entering main track service can be tested, require more comprehensive inspections and tests to include all vital components or systems of the equipment, and provide a record of the results to the operator using the equipment. (Class II, Priority Followup) (R-77-23)

TODD, Chairman, BAILEY, Vice Chairman, McADAMS, HOGUE, and HALEY, Members, concurred in the above recommendations.



*WBT* By: Webster B. Todd, Jr.  
Chairman

The Greater Cleveland  
**REGIONAL TRANSIT AUTHORITY**  
1404 East Ninth Street  
Cleveland, Ohio 44114  
Phone (216) 781-5100



APPENDIX B

November 18, 1977

Ms. Kay Bailey  
National Transportation  
Safety Board  
Washington, D.C. 20594

Dear Ms. Bailey:

In response to the National Transportation Safety Board recommendations R-77-20 through 23, the Greater Cleveland Regional Transit Authority has accomplished the following:

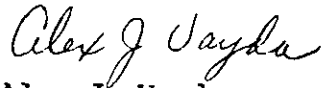
1. Developed a set of operating rules which are in the draft form at this time and will be printed and implemented within sixty days.
2. Developed an outline of the basic operator training procedures along with a schedule of the succeeding reviews and an annual re-examination to keep them current with the rule requirements.
3. Implemented a system of supervision which will enforce the rules through proficiency testing which will provide efficient operation. (R-77-20)
4. Trains now operate on an absolute block. When it becomes necessary to enter an occupied block, in an emergency, permission must be received from the tower control Supervisor. (R-77-21)
5. To insure that general orders and bulletins are read and understood, operators must sign the bulletins.
6. Test facilities are now in operation at the Windemere and Brookpark yards to insure predeparture tests of ATC, cab signals, before trains enter main line service. This will be expanded with the installation of testing equipment, which is on order, to be installed at the Windemere and Airport terminals where cars are disconnected from multi-car trains to be used as single-unit trains. The defect card

continued . . .

Mc Kay Bailey  
November 18, 1977  
Page Two.

now in use does provide a record for the operator  
indicating when inspections and repairs were made.  
(R77-23)

Very truly yours,



Alex J. Vayda  
Administrative Assistant

AJV/cw