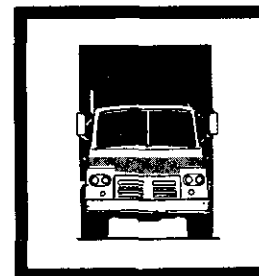
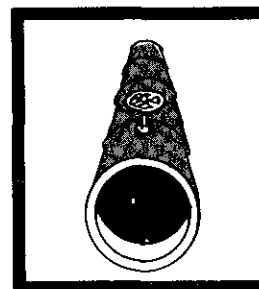
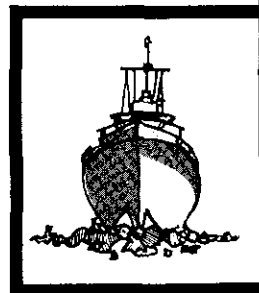
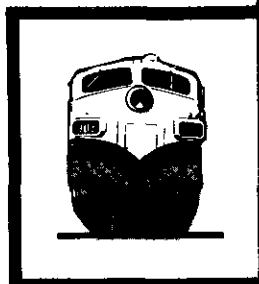


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## **RAILROAD ACCIDENT REPORT**

**HEAD-ON COLLISION BETWEEN  
BALTIMORE & OHIO RAILROAD COMPANY  
TRAIN NO. 88 AND THE BRUNSWICK HELPER  
NEAR GERMANTOWN, MARYLAND  
FEBRUARY 9, 1981**

**NTSB-RAR-81-6**

**UNITED STATES GOVERNMENT**

01-6  
TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. NTSB-RAR-81-6		2. Government Accession No. PB81-218877		3. Recipient's Catalog No.	
4. Title and Subtitle Railroad Accident Report: Head-on Collision Between Baltimore & Ohio Railroad Company Train No. 88 and the Brunswick Helper 7603-7545 Near Germantown, Maryland, February 9, 1981				5. Report Date May 27, 1981	
				6. Performing Organization Code	
7. Author(s)				8. Performing Organization Report No.	
9. Performing Organization Name and Address  National Transportation Safety Board Bureau of Accident Investigation Washington, D.C. 20594				10. Work Unit No. 3263	
				11. Contract or Grant No.	
12. Sponsoring Agency Name and Address  NATIONAL TRANSPORTATION SAFETY BOARD Washington, D. C. 20594				13. Type of Report and Period Covered Railroad Accident Report February 9, 1981	
				14. Sponsoring Agency Code	
15. Supplementary Notes The subject report was distributed to NTSB mailing lists 8A, 8D and 14A.					
16. Abstract At 9:56 a.m. on February 9, 1981, Baltimore & Ohio Railroad Company's Brunswick Helper 7603-7545 and eastbound train No. 88 collided head-on while being operated in opposing directions on the No. 2 eastward main track. The trains collided in a 1°40' curve about 4,000 feet east of Germantown, Maryland. The fireman and front brakeman of No. 88, and the engineer and front brakeman of the Brunswick Helper were injured. Damage was estimated at \$701,000.  The National Transportation Safety Board determines that the probable cause of this accident was the train dispatcher's oversight in authorizing the Brunswick Helper to operate westward on the No. 2 eastward main track between Gaithersburg and Rocks, while opposing train No. 88 was en route eastward on the same track. Contributing to the accident was an inadequate Baltimore & Ohio Railroad Company operating procedure which did not provide means for the train dispatcher and the tower operator to positively verify the location of all trains between Rocks and QN Tower, and did not provide for a backup system that would require coworkers to verify train locations when train orders are being used.					
17. Key Words Manual Block Operating Rules; Centralized Traffic Control; Traffic Control System; Helper Engine; Train Orders; Remote Interlocking; Current of Traffic; Train Dispatcher; Tower Operator; Train Radio; Environmental Conditions				18. Distribution Statement This document is available to the public through the National Technical Information Service-Springfield, Virginia 22161 (Always refer to number listed in item 2)	
19. Security Classification (of this report) UNCLASSIFIED		20. Security Classification (of this page) UNCLASSIFIED		21. No. of Pages 32	
				22. Price	

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**NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C. 20594**

**RAILROAD ACCIDENT REPORT**

**Adopted: May 27, 1981**

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**HEAD-ON COLLISION BETWEEN BALTIMORE & OHIO RAILROAD COMPANY  
TRAIN NO. 88 AND THE BRUNSWICK HELPER 7603-7545  
NEAR GERMANTOWN, MARYLAND,  
FEBRUARY 9, 1981**

**SYNOPSIS**

At 9:56 a.m. on February 9, 1981, Baltimore & Ohio Railroad Company's Brunswick Helper 7603-7545 and eastbound train No. 88 collided head on while being operated in opposing directions on the No. 2 eastward main track. The trains collided in a 1°40' curve about 4,000 feet east of Germantown, Maryland. The fireman and front brakeman of No. 88, and the engineer and front brakeman of the Brunswick Helper were injured. Damage was estimated at \$701,000.

The National Transportation Safety Board determines that the probable cause of this accident was the train dispatcher's oversight in authorizing the Brunswick Helper to operate westward on the No. 2 eastward main track between Gaithersburg and Rocks, while opposing train No. 88 was en route eastward on the same track. Contributing to the accident was an inadequate Baltimore & Ohio Railroad Company operating procedure which did not provide means for the train dispatcher and the tower operator to positively verify the location of all trains between Rocks and QN Tower, and did not provide for a backup system that would require coworkers to verify train locations when train orders are being used.

**INVESTIGATION**

**The Accident**

Train No. 88--At 9:03 a.m. on February 9, 1981, Baltimore & Ohio Railroad Company (B&O) train No. 88, en route from St. Louis, Missouri, to New York, with 3 locomotive units, 49 cars and 41 empty cars, for a trailing tonnage of 5,216 tons, left Brunswick, Maryland, after a satisfactory airbrake test. The engineer, fireman, and head brakeman were on the lead locomotive unit, which had the short hood forward, and the conductor and flagman were on the caboose. The fireman was operating the locomotive. The enginecrew had checked the radios on all units before leaving the Brunswick yard, and they were operating satisfactorily. No. 88 passed Rocks, Maryland, at 9:17 a.m., continuing on the eastward main track (No. 2 track) of the Metropolitan Subdivision (Metro SD). (See figure 1.) At Point of Rocks (Rocks), it left the jurisdiction of the Old Main Line (OML) dispatcher and became the responsibility of the Baltimore Terminal (Metro SD) dispatcher.

The assigned engineer of No. 88 left the operating compartment of the lead locomotive unit about 15 minutes at Barnesville, Maryland, 6.7 miles west of Germantown, to see if the dynamic brakes were functioning properly on the second and third units as the train descended a grade east of Barnesville. After having made the

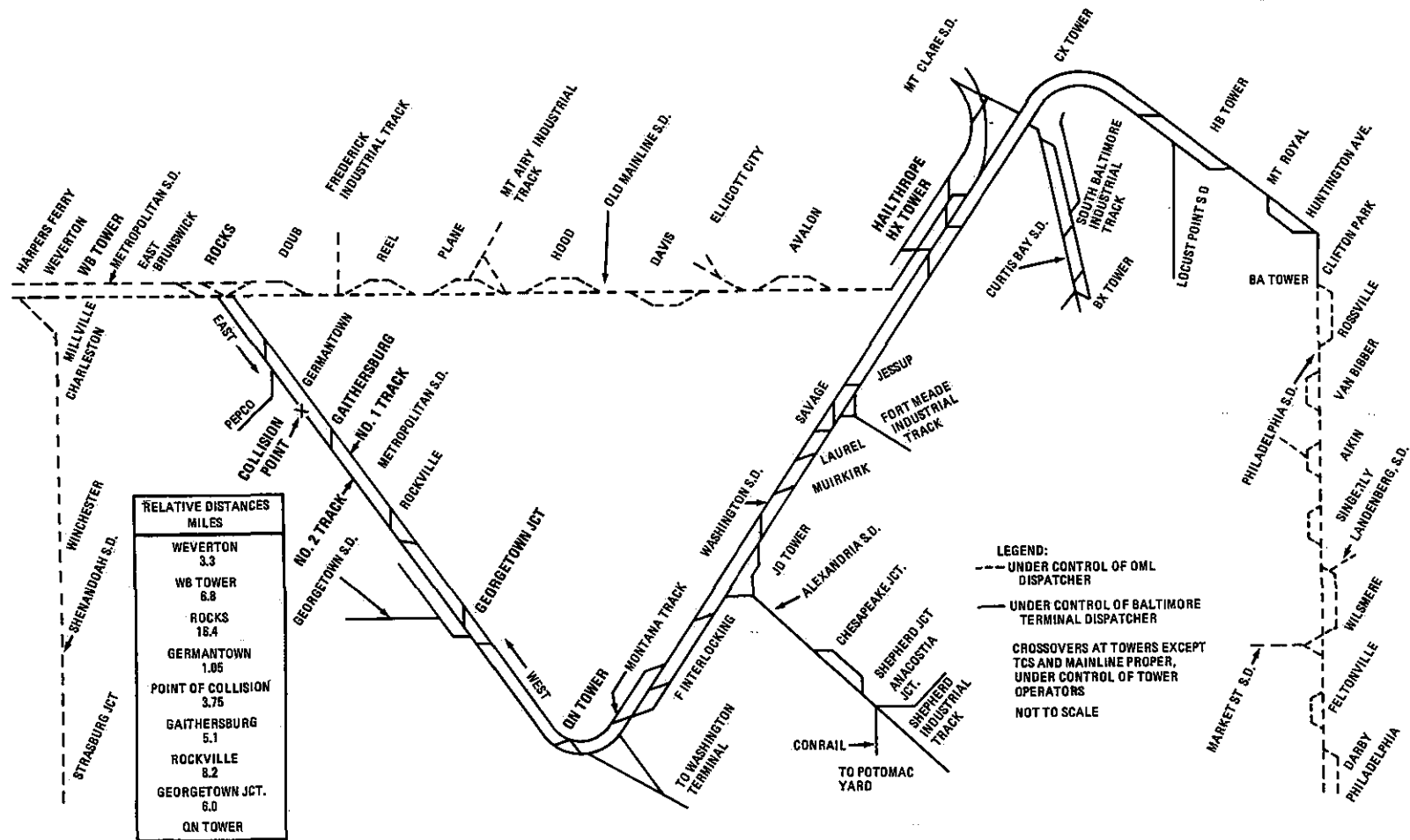


Figure 1.--Maryland Division--Baltimore District.

inspection, he was returning to the lead unit through the operating compartment of the second unit when he heard his fireman radio the conductor, in accordance with the rules, that train No. 88, eastbound on No. 2 track at Seneca Fill, had encountered an approach signal aspect. The engineer heard the conductor acknowledge this message, and he too used the radio in the second unit to acknowledge it. The fireman made a 6-pound airbrake reduction to slow the train from about 50 mph to about 25 mph to comply with the signal indication. The engineer remained in the operating compartment of the second unit after the radio transmission to observe the passing of a westbound freight train on the adjacent westward main track (No. 1 track). After entering a 1°40' curve, the fireman of No. 88 saw a locomotive from an estimated 250 feet approaching on No. 2 track. He immediately applied the train's brakes in an emergency application and started to leave the operating compartment through a door located directly behind the control stand. The engineer was preparing to leave the operating compartment of the second unit when he saw the fireman attempting to leave the lead locomotive unit's operating compartment and about the same time he too saw the approaching locomotive.

The Brunswick Helper. 2/--At 10:30 p.m. on February 8, 1981, the Brunswick Helper's crew, composed of an engineer and a brakeman, had been called for duty at Brunswick and were assigned locomotive units 7545 and 7603. When the crew boarded the locomotives, they tested the brakes and found no defects. They also checked the radios on each unit and found no fault with the radio on unit 7545. The speaker on the radio on unit 7603 was inoperable; however, the radio was fully operable by use of the handset. (According to B&O supervisors, an inoperable speaker causes the radio to be classified as inoperable, but there are no Federal or company rules to prohibit a locomotive from leaving a terminal with an inoperable radio.) After these checks, the Brunswick Helper began its assigned tasks of pushing trains over the steep grades on either the Old Main Line Subdivision (OML SD) or the Metro SD east of Brunswick.

On February 9, about 7:00 a.m., the Brunswick Helper returned to Rocks after assisting B&O No. 396 to Gaithersburg. The operator at WB Tower in Brunswick instructed the crew to assist Extra 4294 East from Rocks to Gaithersburg. After the Brunswick Helper had coupled to the caboose of Extra 4294 East and a satisfactory train airbrake test had been completed, which included the brakes of the helper locomotive, it departed from Rocks eastbound on No. 2 track at 8:43 a.m.

The B&O operating instructions require that a helper engine uncouple from the assisted train without causing it to stop. When Extra 4294 East reached Gaithersburg, the Brunswick Helper was uncoupled from the moving train without stopping it, in compliance with the operating instructions. After the Brunswick Helper came to a stop, the engineer reported his arrival at Gaithersburg at 9:30 a.m. by radio to the operator at QN Tower in northeast Washington, D.C. By this time, the Brunswick Helper had only 1 hour in which to return to Brunswick before it would exceed the 12-hour time limit imposed by the Federal hours-of-service regulation. If it exceeded the limit, the crew would have to be relieved immediately regardless of their location. Therefore, the company believed that it was urgent that the train return to Brunswick without delay in order to comply with the regulations. The operator at QN Tower asked the crew of the Brunswick Helper if they had met any westbound freight trains on No. 1 track before they arrived at Gaithersburg. When he was told that they had not and the operator had relayed this information to the dispatcher, the dispatcher told him to copy a 235D-R train order, which would allow the Brunswick Helper to return to Rocks on No. 2 track. (See appendixes B and C.) The dispatcher stated that he could not allow the Brunswick Helper to return to Rocks over the normal route via No. 1 track because he did not know the location of the two

2/ A helper engine is used to assist high-tonnage trains over steep grades.

westbound freight trains. (No attempt was made to contact the trains by radio to determine their locations.)

The operator at QN Tower instructed the engineer of the Brunswick Helper to use a local railroad block telephone to copy a train order. The train order, relayed from the train dispatcher to the Brunswick Helper through the operator at QN Tower, was transmitted and repeated satisfactorily; it was made complete at 9:43 a.m. The dispatcher told the operator at QN Tower to give the Brunswick Helper a "verbal clear block" 3/ on No. 2 track from Gaithersburg to the West Absolute Signal (WAS) at Rocks. Since the helper would be operating against the established current of traffic, it would not have wayside signal aspects to indicate the condition of the track ahead to WAS Rocks.

When the train order was given to the Brunswick Helper and the train was given the verbal clear block information, neither the operator nor the engineer mentioned or questioned the location of No. 88. At this point, the engineer and brakeman moved from unit 7545 to unit 7603 and the Brunswick Helper departed westbound from Gaithersburg on No. 2 track about 9:45 a.m. on the authority of train order No. 107. (See appendix B.) The engineer was operating the locomotive from the northside of the operating compartment and the brakeman was seated on the southside. The short hood was facing forward. Except for reducing the locomotive's speed to 30 mph over two facing point switches, the speed was maintained about 35 mph.

As the Brunswick Helper entered a 1°40' curve to the right near Germantown, the engineer saw a locomotive approaching head on from about 750 feet. He immediately set the locomotive's brakes in emergency, and he and the brakeman jumped from the walkway of the locomotive and landed between the two main tracks.

The Collision.-- Train No. 88 and the Brunswick Helper collided about 9:56 a.m. (See figure 2). The speed of No. 88, as recorded by the speed recorder on the first and third locomotive units, was 24 mph at impact. The speed of the Brunswick Helper, as recorded on the speed recorder of the second locomotive unit, was between 35 mph and 40 mph. The track grade averaged 1.05 percent descending eastward through the area of the accident.

When the trains collided, the lead unit of No. 88 was elevated to an almost vertical position. It pivoted on its west end and fell toward the north across the No. 1 track. The second unit of No. 88 overrode the lead unit of the Brunswick Helper, and the third unit and the first car behind the locomotive derailed. Both units of the Brunswick Helper were moved eastward about 300 feet from the point of impact, but only the lead unit derailed.

When the lead unit of No. 88 overturned, it landed on a low bank and fell on the engineer from the Brunswick Helper and pinned him so that he could not free himself. The brakeman of the Brunswick Helper and the engineer of No. 88 were not seriously injured, and they were able to free the engineer. (See figure 2.)

3/ A clear block is defined in the Chessie System Operating Rules as, "A term used in connection with Manual Block System Rules indicating the block is clear of trains authorized to move in the same direction as the train addressed. The Operating Rules relating to train dispatchers also specify that, "When trains are to be moved against the current of traffic, train order Rule 235 D-R must not be made complete to the train(s) to be moved against the current traffic until the section of track on which the train is to run has been cleared and is maintained clear of all opposing train movements [except train(s) specified in Rule 235 D-R Example (2)] within the designated limits until the diverted train(s) has arrived."

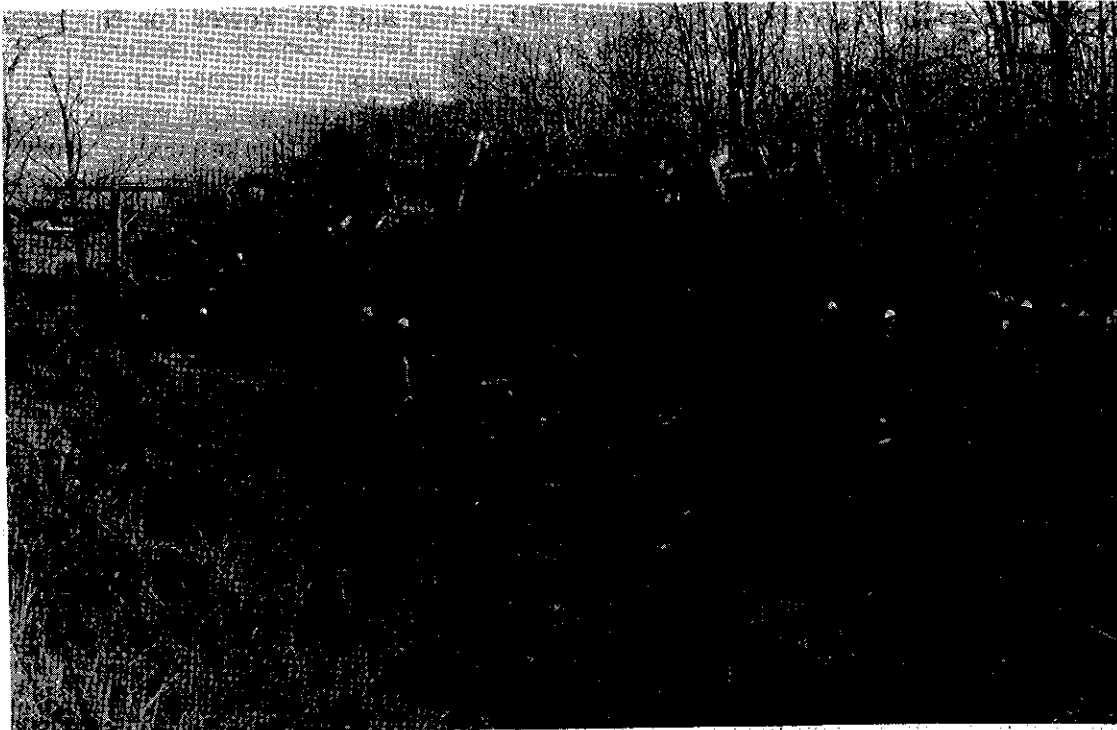


Figure 2.--Scene of accident.

After the collision, the fireman of No. 88 was seen alternately sitting and lying on the side of the overturned locomotive unit. The head brakeman was pinned inside the operating compartment of the lead unit. The fuel tanks of each lead locomotive unit ruptured, and some of the crewmen and the surrounding area were saturated with fuel oil. Fire erupted with a loud explosion, and residents of a nearby community heard the crash and explosion and called local emergency forces. Local fire departments responded promptly and had the fire under control quickly. Also, local rescue squads and the Maryland State Police medical helicopters arrived at the scene quickly. The injured were treated and then removed to nearby medical facilities.

Handling of the Trains.--The Baltimore Terminal train dispatcher, who directs train movements and operations on the B&O 4/ Metro SD, began his tour of duty about 6:30 a.m., on February 9, after a routine "situation" transfer from the 11:00 p.m. dispatcher. The transfer procedure included a review of the train sheet, the storage tracks for cars that were being held, the tracks that were out of service, the train order books, the locations of maintenance-of-way personnel, and any other items affecting train movements.

About 7:23 a.m., commuter train No. 52, en route from Brunswick, Maryland, to Washington, D.C., over the Metro SD, reported to the operator at QN Tower that there was a broken rail on the No. 2 track about 500 feet west of Georgetown Junction. (Georgetown Junction is an interlocking installation near Silver Spring, Maryland, which is remotely controlled by the operator at QN Tower.) The broken rail information was relayed to the Baltimore Terminal train dispatcher. Four eastbound commuter trains, Nos. 60, 40, 702, and Amtrak No. 32, were scheduled to pass over the broken rail within the next hour and a half. Additionally, Extra 4294 East, assisted by the Brunswick

4/ B&O is part of the Chessie System.



Helper, had passed Rocks at 8:43 a.m., and train No. 88 was at Brunswick. The dispatcher issued instructions through the operators at WB Tower and QN Tower for the passenger trains to pass over the broken rail at 5 mph.

However, the engineer of No. 60 reported to the operator at QN Tower that in his judgment it would not be safe for No. 702 to move over the broken rail. No. 40 had already passed the last available crossover point, and since it was composed of lightweight equipment, it proceeded on No. 2 track over the broken rail without mishap. Based on the rail's condition as reported by train No. 60, the dispatcher made arrangements to operate Nos. 702 and 32 eastbound on the westbound No. 1 track between the crossovers at Rockville, Maryland, and Georgetown Junction. Before this could be done, the dispatcher had to wait for an eastbound train to arrive at Georgetown Junction which earlier had been given a train order to operate on No. 1 track from Rocks to Georgetown Junction to avoid delaying it and the commuter and Amtrak trains on No. 2 track.

The dispatcher then instructed the operator at QN Tower to hold two westbound trains clear of No. 1 track at Georgetown Junction, after the eastbound train arrived. He also instructed the operator at WB Tower to notify Extra 4294 East via radio to call the operator at QN Tower from Rockville in case it was necessary to reroute the train. The dispatcher then completed his predeparture instructions to No. 88 through WB Tower and told the operator to instruct No. 88 to call the operator at QN Tower from Rockville again in case it had to be rerouted. The operator at WB Tower reported to both dispatchers that No. 88 departed from Brunswick at 9:03 a.m. eastbound on No. 2 track after the OML dispatcher determined from the Baltimore Terminal dispatcher that it was alright for the train to leave. Appropriate train orders were issued to trains No. 702 and 32, and they were allowed to leave Rockville on No. 1 track. When No. 32 arrived at Georgetown Junction, the dispatcher released the two westbound freight trains about 9:10 a.m.

About 9:30 a.m., the operator at QN Tower told the dispatcher that the Brunswick Helper had arrived at Gaithersburg. At that time, the dispatcher decided to move the Brunswick Helper back to Rocks on the No. 2 track. As he prepared for the return of the Brunswick Helper from Gaithersburg to Rocks on the No. 1 track, the Baltimore Terminal dispatcher asked the collocated OML SD dispatcher to give him a stop signal eastward on No. 2 track at Rocks. When the request was made, the OML dispatcher was talking on a Bell System telephone and he held his hand up, indicating "wait a second." Nevertheless, he understood what was asked, and he properly aligned the track switches and the direction of traffic at Rocks, and blocked the signal and switch levers on the control machine to provide the maximum protection for the proposed movement. The Baltimore Terminal dispatcher recorded only "SD (stop displayed) east at KG (Rocks)" in his train order book. Neither the OML dispatcher nor the Baltimore Terminal dispatcher mentioned to each other that No. 88 was the last train past Rocks at 9:17 a.m. on track No. 2.

#### Injuries to Persons

<u>Injuries</u>	<u>Crewmembers Train No. 88</u>	<u>Crewmembers Brunswick Helper</u>	<u>Total</u>
Fatal	0	0	0
Nonfatal	2	2	4
None	3	0	3
Total	5	2	7

### Damage

The Brunswick Helper's lead unit was demolished when it was overridden by No. 88's second unit. The operating compartment and the components under the short hood were destroyed. (See figure 3.) The second unit of the Brunswick Helper was damaged only slightly.

The operating compartment of No. 88's lead unit was crushed and the unit overturned onto its side; it was heavily damaged. The operating compartment of the second unit was crushed badly and was damaged heavily. The third unit was damaged only slightly. One car in No. 88 derailed with no significant damage. The distribution of damage was:

<u>Item</u>	<u>Damage</u>
Equipment	\$ 686,600.00
Track	1,000.00
Rerailing costs	<u>13,335.35</u>
Total	\$ 700,935.35

### Crewmember Information

The crewmembers of the Brunswick Helper were on the extra list from which helper crews are called. The engineer and brakeman had been off duty 27 hours and 28 hours, respectively, before reporting for duty on February 8. They were qualified for their positions in accordance with company requirements.

The five-member crew reported for duty at 8:00 a.m. on February 9, at Brunswick, to operate train No. 88 from Brunswick to Baltimore. They had been off duty 10 hours 45 minutes since their arrival at Brunswick on a westbound train the previous day. Each person was qualified for his position in accordance with company requirements.

The crewmembers from both trains had been trained for their positions by on-the-job training, except for the fireman of No. 88 who had attended the Chessie System's engineer training school at Cumberland, Maryland. His training lasted 6 months, including 5 weeks of 6 days per week of classroom instruction.

### Train Dispatcher and Operator Information

The Baltimore Terminal train dispatcher regularly works a relief assignment at Baltimore. His assignment is: 2 days from 7:00 a.m. to 3:00 p.m., 2 days from 3:00 p.m. to 11:00 p.m., and 1 day from 11:00 p.m. to 7:00 a.m. His rest days are Saturday and Sunday, but they run from 7:00 a.m. Friday until 7:00 a.m. Monday. On Monday, February 9, he had reported for duty at 6:20 a.m. following his two rest days. He qualified for his position as train dispatcher by on-the-job training and working as a tower operator at several locations on the Maryland Division for about 10 years.

Similarly, the OML train dispatcher works a relief position with his rest days on Friday and Saturday. He also qualified for his position as train dispatcher by on-the-job training and by working as a tower operator for about 12 years. He reported for duty about 6:20 a.m. on February 9, and began working about 6:30 a.m. His transfer routine is similar to that of the Metro SD dispatcher.



Figure 3.--Brunswick Helper. Damage to Unit 7603.

The tower operators at WB and QN Towers began their tour of duty at 7:00 a.m. on February 9, and they were scheduled to work until 3:00 p.m. Each operator had been off duty 16 hours since his previous tour, as required by the Federal hours-of-service regulations. Each qualified for his respective position by on-the-job training. (See appendix D.)

#### Train Information

The locomotive assigned to the Brunswick Helper consisted of two Electro-Motive Division (EMD) General Motors Corporation model SD-40 units -- 7603 and 7545. Unit 7603, the lead unit westbound, had a low-profile short hood with the control stand on the right side. It was equipped with a speed indicator/recorder, a 26-L schedule airbrake system, and a radio. The unit was not equipped with an alertor device or a deadman control. <sup>5/</sup> The locomotive weighed 780,700 pounds.

Train No. 88 consisted of one EMD model GP-40 unit, one EMD model GP-35 unit, and one EMD model GP-38 unit (units Nos. 3773, 3815, and 3550, respectively). The GP-40, unit 3773, was added to the train at Brunswick as the lead unit, and it had a low-profile short hood with the controls on the right side. It was equipped with a speed indicator/recorder, a 26-L schedule airbrake system, and a radio. The unit did not have an alertor device or deadman control. The locomotive weighed 806,000 pounds.

<sup>5/</sup> Alertor--A device to detect physical movement of an engineer. If a movement is not detected by the device within a predetermined time, a warning signal will sound and if it is not acknowledged by the engineer, the train will be stopped.

Safety Control--A safety device that must be depressed at all times during train movement to forestall an automatic brake operation. It is generally known as a deadman control.

### Method of Operation

On March 12, 1961, the B&O consolidated three dispatching districts into two dispatching districts after a train control system (TCS) was put into service between Rocks and Philadelphia, Pennsylvania.

The OML SD, part of the Maryland Division, begins at Rocks, 6.9 miles east of Brunswick, and extends eastward 59 miles to HX Tower at Baltimore. The OML dispatcher directs train movements on the Metro SD between Weverton, Maryland, and Brunswick, and from East Brunswick to Rocks, except for those interlocking installations at WB Tower and East Brunswick which are controlled by the operator at WB Tower. The TCS begins at Rocks. Using the TCS console, the OML dispatcher controls the signals and switches at Rocks, which routes trains either to or from the Metro SD from the OML SD. The TCS extends eastward from Rocks 23.6 miles to East Plane, Maryland. Between East Plane and HX Tower, 35.4 miles, there is a segment of manual block track where trains must operate by train orders. TCS operation is resumed at BA Tower in East Baltimore where the OML dispatcher begins control of the Philadelphia subdivision between Baltimore and Philadelphia. Because he controls the Philadelphia subdivision, he is sometimes referred to as the Eastend dispatcher..

In addition to the OML SD and the Philadelphia subdivision, the OML dispatcher also controls train movements on the Shenandoah subdivision, between Harpers Ferry, West Virginia, and Strasburg Junction, Virginia, and on the Landenberg and Market Street subdivisions. These areas of control give him a total of 221 miles of operational responsibility.

During December 1980, 112 trains moved east and 25 trains moved west over the OML SD. During January 1981, 66 trains moved east and 37 trains moved west. Over the Philadelphia subdivision, during December 1980, 114 trains moved east and 100 trains moved west; during January 1981, 112 trains moved east and 104 trains moved west. These trains represent the combined traffic load of the OML SD dispatchers.

The Metro SD, also a part of the Maryland Division, extends eastward from Weverton, through Rocks, 42.2 miles to Washington, D.C. The Baltimore Terminal dispatcher directs the operation of trains between Rocks and QN Tower and train movements are controlled by the signal indications of an automatic block signal system, train orders, and bulletin orders (rules D-251 to D-254). (See appendix C.) When trains are operated against the established current of traffic, Manual Block System rules are in effect (rules 97 and 300 to 327). The two main tracks of the Metro SD between Rocks and QN Tower are numbered north to south as No. 1 for westbound traffic and No. 2 for eastbound traffic. In addition, the Baltimore Terminal dispatcher has jurisdiction over trains on the two-track Washington subdivision, which extends from F interlocking in Washington to HX Tower and the Baltimore Terminal. (See figure 1.) The Baltimore Terminal includes a section of the OML SD between HX Tower and Curtis Bay Junction in Baltimore, the Mt. Clare, the Curtis Bay, and the Locust Point subdivisions; a section of the Philadelphia subdivision between BA Tower in Baltimore & HB Tower; and the Georgetown and the Alexandria subdivisions. He has control over B&O trains entering and leaving Union Station of the Washington Terminal Company in Washington, D. C. He also operates a small centralized traffic control unit for Jessup, Maryland. In all, he oversees train operations on 109.4 miles of track.

During November 1980, 253 eastbound trains and 334 westbound trains moved over the Metro SD; during January 1981, 234 eastbound trains and 257 westbound trains moved over the subdivision. About seven tower operators are under the supervision of the Baltimore Terminal dispatcher, and several agent-operators receive instructions from him.

The trains operating over the Metro SD are equipped with radios, but the Baltimore Terminal dispatcher does not have a radio. Radio messages to and from trains and the dispatcher must be relayed through the tower operators.

When an eastbound train leaves Brunswick for Baltimore, it may be routed from Rocks over either the OML SD or the Metro SD. In most instances, specified trains or types of trains are dispatched regularly over the same subdivision. However, there are times when circumstances dictate a change of routing after a train has left Brunswick. When this happens, the operator at QN Tower often is not told of such a change, and he does not know what to expect when a train approaches his location. Normally, when it is known that a given train will be routed over the OML SD, it will be "cleared" at WB Tower by the OML dispatcher. When the train leaves Brunswick, the operator at WB Tower will report the departure time to the OML dispatcher only. If it is known that a train will be routed over the Metro SD, the Baltimore Terminal dispatcher will issue messages pertinent to the train's operating over his subdivision, and the OML dispatcher will "clear" the train with WB Tower. When the train is ready to leave Brunswick, the OML dispatcher will ask the Baltimore Terminal dispatcher if it is alright to let the train leave. When approval is given and the train leaves Brunswick, the operator at WB Tower will report its departure to both train dispatchers. In addition, the operator at WB Tower will call the operator at QN Tower to tell him that the train is entering his traffic block. When a train leaves Brunswick and is routed over the Metro SD, the only other reporting point between Brunswick and QN Tower is Rocks. The OML dispatcher has an annunciator indicator light and a bell at Rocks, both of which are activated by a train's presence. Although he records the time a train passes that point, he does not report this time to either the operator at QN Tower or the Baltimore Terminal dispatcher, unless a train is moving onto or out of the Metro SD that did not originate at Brunswick or will terminate at Brunswick. The two dispatchers are neither required nor prohibited from exchanging passing times at Rocks with each other or with the operators at QN, HX, or WB Towers.

When helper engines are required, they push trains from Rocks to Waterville, Maryland, on the OML SD or to Gaithersburg on the Metro SD. The helper locomotive is coupled to the trains at either Brunswick or Rocks. When the coupling is made, the airbrake system of the helper locomotive is coupled to the airbrake system of the train to be pushed, and the brakes are controlled by the engineer of the pushed train. When the helper locomotive uncouples from the pushed train at Gaithersburg, it returns to Rocks or Brunswick after receiving proper authority from the train dispatcher. The normal return route for the helper is for it to move over a crossover at Gaithersburg from No. 2 track to No. 1 track and then continue west to Rocks. Helper service is not required westbound. It is an accepted practice for the helper crew to report to the operator at QN Tower its arrival time at Gaithersburg, and the last westbound train it has met.

The maximum authorized speed on the Metro SD is 55 mph moving with the current of traffic and 35 mph moving against the current of traffic.

### **Meteorological Information**

The weather conditions reported by the National Weather Service, Washington, D.C. at 9:52 a.m. on February 9, 1981, at the Washington National Airport were:

Sky condition	Clear
Visibility	20 miles
Temperature	30° F
Dewpoint	12° F
Wind direction	300° (west-northwest)
Wind speed	13 knots, gusting to 23 knots

### **Survival Aspects**

The Brunswick Helper's crew escaped serious injury from impact by jumping from the locomotive. Their injuries were sustained when they landed on the ballast, cross ties, and rails of No. 1 track. The engineer suffered multiple fractures to his pelvic bone, but he had only cuts and abrasions on his head as a result of his being pinned by the locomotive unit. The brakeman also received cuts and abrasions when he landed on and rolled about on the rough track surface. He also was burned chemically by the fuel oil, but not by the fire. The engineer and brakeman were taken by ambulance to Germantown Hospital for emergency treatment. The brakeman was treated and released, but the engineer was transferred and admitted to the Suburban General Hospital in Bethesda, Maryland.

The engineer of No. 88 was not injured. During the collision, the fireman managed to hang onto the grab iron at the door of the locomotive operating compartment of unit 3815. The engineer saw him holding on at that point when the unit was rearing and pivoting on its west end. He apparently was able to remain outside the operating compartment and to maintain his grip until the locomotive unit toppled onto its side. He broke his left hip and the femur bone of his left leg in several places.

The brakeman remained in the bottom of the operating compartment of the lead unit as it lay on its side until he was removed by rescue workers. He had a severe concussion from a blow to the head. He also received cuts and abrasions.

The fireman and front brakeman of No. 88 were flown by Maryland State Police helicopter to University Hospital in Baltimore where they were admitted to the shock trauma unit. The conductor and flagman were not injured.

### **Tests and Research**

On February 19, tests were conducted to establish sight distances for the curve on which the trains collided. Locomotive units similar to the units involved in the collision were used and were oriented in the same position and direction as those of the accident trains. Tests simulated the view from each train to the other. (See figures 4 and 5.)

Since it was destroyed in the collision, the speed recorder on unit 3773 could not be calibrated. On February 14, the recorder on unit 3550 of No. 88 and the recorder on unit 7545 of the Brunswick Helper were tested to determine their accuracy. The results are shown below.

Table 1.--Speed Recorder Test Results

Recorder from Unit	Test Speed Generated (mph)	Speed Recorded (mph)
7545	7	7
	40	40
	55	56
3550	7	6.25
	40	40
	56	58

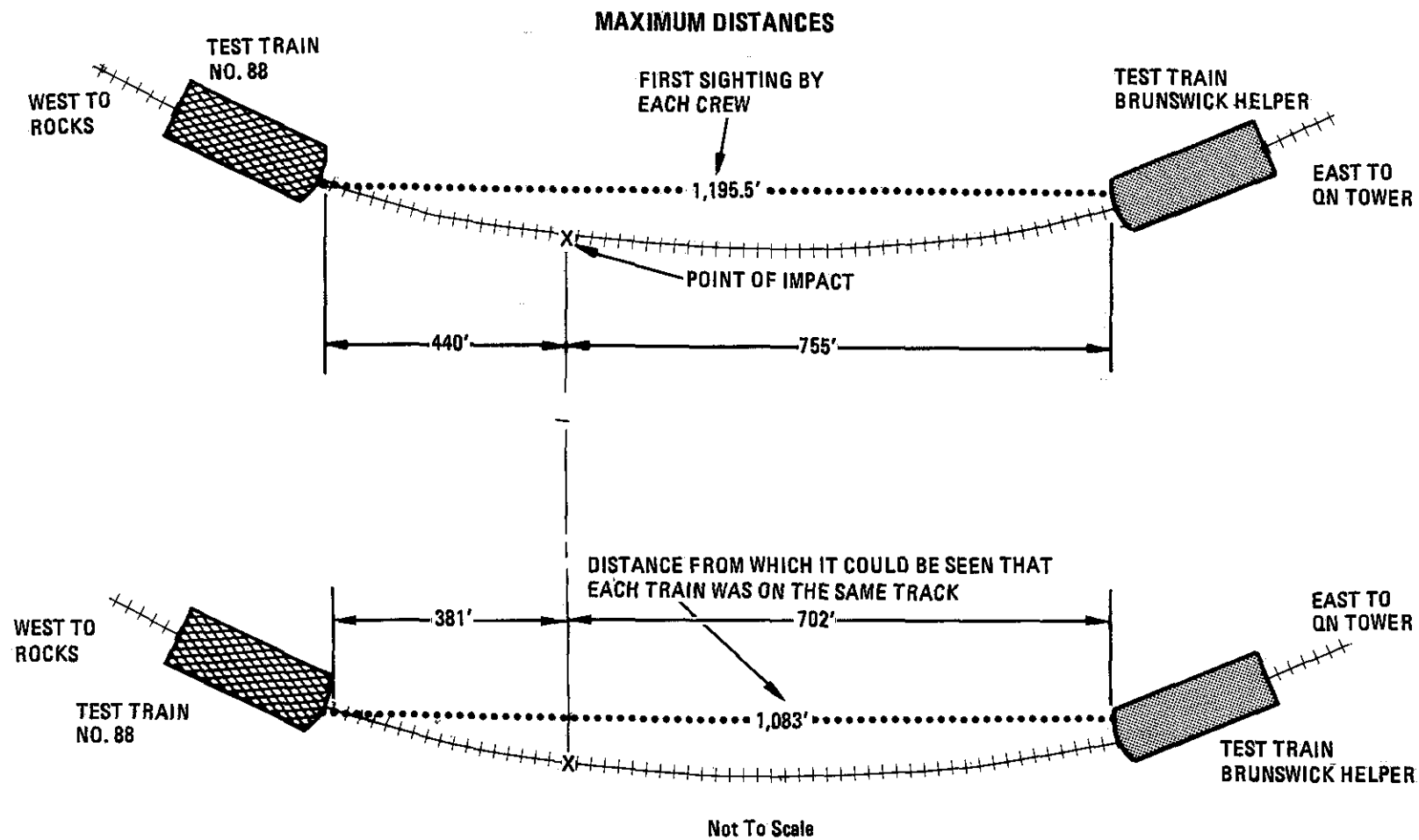


Figure 4.-- Sight distance as determined by test trains.

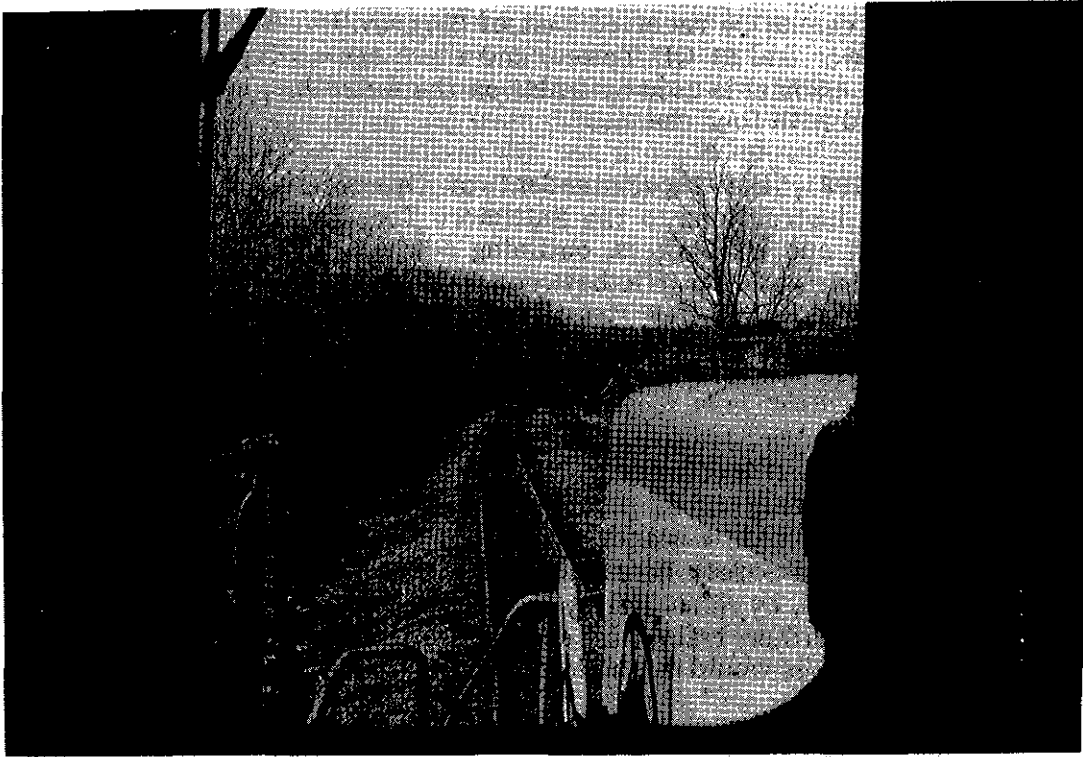


Figure 5.--View of train No. 88 from the Brunswick Helper (simulation).

#### Other Information

Following the accident, the OML and the Baltimore Terminal dispatchers expressed concern to the Safety Board about their working environments. According to the dispatchers, the office in which they work is poorly ventilated. The air conditioning is difficult to regulate during the warm months, and the heat is difficult to regulate during cool months. At times, the two systems must be run simultaneously to obtain a tolerable temperature. They also expressed concern about distraction. The two dispatchers are located in one end of a large room. A partition with no doors extends about two-thirds across the room and separates the dispatchers from a larger work area. Access to the two dispatchers is not restricted, and noise from the outer area is only slightly attenuated. A partial glass partition separates the two dispatchers. The Baltimore Terminal dispatcher faces this partition and looks through it to see the OML dispatcher. On occasion, he can see the annunciator light on the TCS console and knows when a train is passing Rocks. The OML dispatcher sits partially enclosed inside the wings of the TCS console. Both dispatchers have a dispatcher's telephone system with an open speaker through which amplified communications or line noises radiate continuously. The Baltimore Terminal dispatcher stated that at times his telephone system is extremely noisy and weak and that frequently a communication will be interrupted by another party because the party fails to detect that the line is being used.

The lavatories are located outside the working area down a hallway from the dispatcher's office, and the dispatchers have no one to take over their positions if they must use the lavatories. As a result they are forced to remain in the work area and often become quite uncomfortable. Both traincrews and operators stated that radio reception is poor between Barnesville and Gaithersburg. Transmissions from the operator at QN Tower usually cannot be received west of Gaithersburg, and transmissions from the



operator at WB Tower cannot be received east of Barnesville. Radio transmitter stations are located at WB Tower and at QN Tower, and there are no repeater stations between these points. Only one channel is used by trains on the main line, although the locomotive radio units are equipped with four channels.

On March 13, 1981, the Superintendent of Operations of the B&O's Maryland Division issued special instructions to the Baltimore Terminal and OML dispatchers, and to the operators at QN and WB Towers, outlining new procedures for moving trains past Rocks and against the current of traffic between QN Tower and Rocks. (See appendix E.)

## **ANALYSIS**

### **The Accident**

The two train crews involved in the accident were operating their trains in accordance with the operating rules. Both trains were being operated properly at or near the speed limit. Since the sight distance available to each engineer was minimal because of the track curvature, the Safety Board concludes that their attempts to stop when the opposing train was sighted, by immediately making an emergency brake application, were unavailing. Although neither train was equipped with an alertor or a safety control device, these safety devices would not have been of assistance in this situation.

The operator at WB Tower gave the Baltimore Terminal dispatcher the departure time for No. 88 from Brunswick. Therefore, he had been advised that the train was approaching his subdivision. However, just before No. 88 left Brunswick, the dispatcher had been busy issuing train orders to move trains around a broken rail near Georgetown Junction. Just after No. 88 left Brunswick, he became concerned with the problem of getting the Helper's crew back to Brunswick so they would not have to be relieved en route from Gaithersburg. In addition to this activity, he was simultaneously supervising train operations and giving train movement information to maintenance-of-way personnel on the Washington subdivision and the Baltimore Terminal. When he decided to allow the Brunswick Helper to return to Rocks on No. 2 track, he was concerned about the two westbound freight trains approaching Gaithersburg. He could not and did not want to risk stopping them because of delay to them and the inherent danger in an emergency stop. Therefore, he gave instructions to the operator at QN Tower to copy the train order for the Brunswick Helper. When the Baltimore Terminal dispatcher was preparing to issue the train order to the operator at QN Tower, he did not ask him about No. 88 and the operator did not question the dispatcher as to the train's location. Since the two dispatchers frequently divert trains from the Metro SD to the OML SD at Rocks and do not inform the operator at QN Tower of their actions, and since the dispatcher had not mentioned No. 88 to him, the operator assumed that the train had been diverted and he did not mention it. Before the train order was issued and made complete, the dispatcher did not comply with the rule addressing the train dispatcher's responsibility to determine the condition of the traffic block in which he was planning to move a train against the current of traffic. If the operator at QN Tower had been kept advised of a train's location, as a backup precaution, he may have raised questions to the dispatcher about the location of No. 88.

When the Baltimore Terminal dispatcher asked the OML dispatcher to hold all eastbound trains at Rocks, he did not ask for the identification of the last train past that point, or for the time it passed Rocks eastbound on No. 2 track onto the Metro SD. Neither he nor the OML dispatcher mentioned that the last train past Rocks eastbound was No. 88. Probably because of his involvement in other work situations, the Baltimore Terminal dispatcher overlooked No. 88. The Safety Board believes that the dispatcher

overlooked No. 88 because his area of responsibility was large. Also, the series of events the dispatcher had to deal with before the accident imposed temporary stress on him. However, this is not unusual because many times during a workday, situations develop that temporarily impose a workload on the train dispatcher that one person could not deal with continuously. The operating procedure did not provide adequate backup measures that would insure a system that would serve as an adjunct to the dispatcher's maintaining a knowledge of a train's location.

When the three dispatching districts were consolidated, the territories for which the two train dispatchers were responsible were increased. Both dispatchers are constantly having to shift their attention from one area of their subdivision to another, always having to keep in mind what is occurring at some other location. In order to control trains properly and safely, they must know the locations of each train, locomotive, or piece of track equipment at all times. Frequently, a train dispatcher is required to give traffic "line-ups" to maintenance-of-way personnel or construction workers working on or near the railroad right-of-way, so he must have a thorough knowledge of train movements and locations. The Safety Board believes that the tower operators who work under the supervision of each dispatcher could and should help dispatchers accomplish this task by reporting promptly the times trains pass their locations or by keeping the dispatchers advised of unusual circumstances or events. Also, the dispatchers should inform tower operators when a train is approaching their stations, if it has been delayed, diverted, or is emerging from a long block.

When the three dispatching districts were consolidated, the OML dispatcher was given a larger area to supervise and a TCS by which to control the movement of trains over his territory. The method by which he exercised control was changed, giving him greater flexibility and decreasing his dependence on coworkers to report train locations. Since he controls train movements almost completely from the TCS console, except for those subdivisions where operation by train orders is required and the segment of the OML SD where Manual Block Rules apply, his ability to keep himself aware of train movements is greatly enhanced.

After the consolidation, the Baltimore Terminal dispatcher was assigned considerably more territory over which he had to control train movements, but TCS was not installed. The subdivisions over which he was given responsibility required his close supervision because of the frequent need for the issuance of train orders. This situation made his task much more difficult than the OML dispatcher's because it required him to work constantly with tower operators. He also had the added responsibility of moving passenger and commuter trains on two subdivisions during the early morning and evening hours. When there are no unusual circumstances between QN Tower and Rocks, trains operate over the Metro SD by the indications of wayside signals on an assigned track in an assigned direction. However, the potential for problems is ever present, often created by the requirement for helper service between Rocks and Gaithersburg and commuter traffic. The traffic density on the Metro SD exacts heavy demands on the dispatcher and the job. Therefore, the Safety Board concludes that the dispatcher must be given all assistance possible to keep him informed, at all times, of the locations of the trains for which he is responsible.

The method of operation that was in effect between Rocks and QN Tower at the time of the accident was not conducive to a dispatcher's knowing the locations of all the trains for which he is responsible. When a train leaves Brunswick, the operator at WB Tower reports its departure to the Baltimore Terminal dispatcher. Through on-the-job

experience with locomotive engineers, the tonnage a train is hauling, the number and types of locomotive units in the train, and weather conditions, the dispatcher can closely estimate the time a train will take to move between two points. For example, the average running time between Brunswick and Gaithersburg is 1 hour. When a train is delayed, the running time is extended and the dispatcher must incorporate the events or circumstances into a new calculation of running time. Therefore, a dispatcher must know when each station has been passed. Since the OML dispatcher, at the time of the accident, did not report to the Baltimore Terminal dispatcher or to the operator at QN Tower the times trains passed Rocks onto the Metro SD, the trains were not accounted for again until they came onto the approach circuit of the interlocking installation at Georgetown Junction. Since the dispatcher was not normally advised of this event, he received only a passing report from QN Tower when a train passed QN Tower. If a train routed via the Metro SD was delayed between Brunswick and Rocks, the Baltimore Terminal dispatcher might not know of it. The Safety Board believes that B&O management should analyze the potential hazards inherent in this method of operation and take steps to correct unsafe operating procedures and conditions.

The maximum utilization of manpower would help to keep the Baltimore Terminal dispatcher better informed of train locations. During the daylight hours, an agent is on duty at Rockville and Silver Spring, and an agent is on duty part of the week at Gaithersburg. Although the agent at Rockville primarily works with the construction forces of the Washington Metropolitan Area Transit Authority, all these agents could be used to report the passing of trains at their stations. In addition, the Safety Board believes that the OML dispatcher should be required to report to the Baltimore Terminal Dispatcher the time a train passes Rocks eastbound or westbound, and one of the dispatchers should be required to report this same information to the operator at QN Tower or to whichever tower or station the train has or will pass.

If the OML dispatcher had given the passing time of No. 88 at Rocks to the Baltimore Terminal dispatcher or if the passing time had been routinely given by one dispatcher to the operator at QN Tower or to one of the intermediate agent-operators, the Baltimore Terminal dispatcher probably would not have overlooked No. 88. One other safeguard that may have prevented the accident would have been for the OML dispatcher to have received a copy of the 235 D-R train order issued to the Brunswick Helper. Concise operating rules or practices that are worded to afford guidance in dealing with usual or unusual problems are invaluable to any train dispatcher. The application of operating rules becomes second nature to a well trained, well disciplined dispatcher. Often a dispatcher is called upon to quickly extrapolate from two or more rules or operating practices to reach a decision as to the proper course of action in a given set of circumstances. When a train dispatcher is not provided with concise operating rules or practices, or if he is not provided with all the available information as to a train's location, he may be handicapped in the execution of his responsibilities, thereby increasing the already stressful task. Therefore, the Safety Board concludes that B&O management should insure against potentially confusing situations by providing clear guidance and continually instructing dispatchers and other operating employees on operating rules and procedures.

When the operator at QN Tower relayed train order No. 107 to the Brunswick Helper, the engineer did not question the operator as to the status of No. 88. The engineer stated after the accident that he thought No. 88 was ahead of the train he had assisted to Gaithersburg. When the train order was issued, No. 88 had not reached the signal at Seneca Fill and the fireman had not transmitted a radio message that would have identified No. 88 and its location. Thus, the crew of the Brunswick Helper was not alerted

to No. 88's presence. They apparently did not hear No. 88 make any radio broadcasts from points west of Seneca Fill even though the radio on unit 7545 was operable. The train order that gave the Brunswick Helper precedence over eastbound trains from Gaithersburg to Rocks and the verbal "clear block" message given the engineer by the operator, undoubtedly caused the engineer to dismiss any conflicting movements. A variation of the 235 D-R train order could have been used which would have specified that "after No. 88 engine 3773 arrives at Gaithersburg...." An order in this format may have prevented the accident if it had been used even when No. 88 was past Gaithersburg, because the Brunswick Helper would have had to know No. 88's location before it could move. No. 88's location could have been established either verbally or in the train order.

In summary, the accident could have been avoided if: a more inclusive and positive train reporting system had been in effect; the workers involved in the incident had assumed more responsibility in making crosschecks on train locations; rules had been concise and clear and more specific in regard to this type of operation; the dispatcher had complied with the operating rule addressed to the dispatchers relative to determining that the section of track between Rocks and Gaithersburg was clear of opposing trains; and the radio equipment on Helper unit 7603 has been fully operable.

The B&O management in Baltimore, which is responsible for train operations on the Maryland Division, was found to be responsive to ineffective operating practices involved in an accident. If an operating practice or rule is either found to be or believed to be involved as a causal factor in an accident or if it is one that failed to prevent an accident, B&O management has immediately taken action to correct the practice or rule, as evidenced by the procedural change made after this accident. (See appendix E.) B&O demonstrated this same responsiveness after an accident at Orleans Road, West Virginia. 6/ After that accident, the B&O began requiring the engineer to radio the conductor on the rear and inform him of the signal aspect his train was approaching and identify the train, its direction, the track it was using, and the signal location. The Safety Board commends such responsive actions but suggests that a comprehensive analysis of operating practices and procedures might reveal operating inadequacies and lead to the correction of currently unidentified ones.

### **Ineffective Rules and Practices**

The definition of a clear block, as set forth in the operating rules, does not specify that the block must be clear of opposing trains, only clear of trains moving in the same direction. Awareness of implications of opposing traffic is so fundamental to safe dispatching and train movements that it should be self evident; however, as an additional safety margin, clear and unambiguous rules are essential. If the rule had clearly included opposing trains, it might have triggered a response from either the dispatcher, operator, or engineer, especially if it had been required of them that they recite the last eastbound and westbound trains past the limits of the train order authorization. The Safety Board addressed the problem of inconsistent and ambiguous operating rules in its Special Study, "Signals and Operating Rules as Causal Factors in Train Accidents, NTSB-RSS-71-3." The Safety Board believes that when ambiguities in operating rules are revealed during operations, they should be revised to remove the inconsistency.

6/ Railroad Accident Report--"Head-on Collision of Baltimore & Ohio Freight Trains Extra 6474 East and Extra 4367 West, Orleans Road, West Virginia, February 12, 1980." (NTSB-RAR-80-9.)

When the fireman of No. 88, in compliance with the operating rules, radioed his conductor that No. 88 had an approach signal aspect at Seneca Fill, he gave the train's identification, the train's direction, and the track number upon which it was operating. If the radio speaker on the Brunswick Helper's unit 7603 had been operable, the Brunswick Helper's crew could have heard the message and initiated action which could have prevented the accident. As the result of other accident investigations, 7/ the Safety Board has cited instances where train radios have been or could have been crucial in either preventing an accident or reducing its severity. Railroad management should not allow a train to leave a terminal with an inoperable radio or an inoperable radio component. The radio speaker is a vital part of the on-board system because it provides a monitoring capability for the enginecrew. In this accident, the volume of radio message traffic would have been relatively light in the area between Barnesville and Gaithersburg because of the limitations in the area of radio coverage. Also, since the Brunswick Helper was used locally to give assistance to heavy tonnage trains, these two factors would have made it likely that the operable speaker would have been instrumental in preventing the accident because the helper crew probably would have heard the radio broadcast made by No. 88.

### **Survivability**

The crushing of the locomotive operating compartment of the Brunswick Helper's unit 7603 in the collision resulted in an unsurvivable environment. If the two-man crew had not jumped they would not have survived the crash. Fire erupted explosively from the spilled fuel oil from the punctured fuel tanks, probably as a result of electrical arcing when the unit was overridden. The operating compartment of No. 88's units 3773 and 3815, though badly crushed, were survivable environments. Crushing and destruction damage was probably not as great as it would have been if the Brunswick Helper had been pulling a train. The lighter locomotive, compared with the freight train, was stopped by the energy-absorbing deformation of the equipment and the deflecting lead unit of No. 88. The mass of the freight train shoved the helper locomotive eastward a considerable distance which accounts for the reduced damage.

### **Other Safety-Related Aspects**

The dispatcher's telephone network is a vital part of his control system. It remains "on" at all times so that the dispatcher can be contacted by an audible page by anyone having access to the telephone. A noisy telephone system can be irritating and distracting. To aid him in the performance of his duties, the train dispatcher should be provided with a quiet, dependable communications network which will not be a distraction or produce fatigue by causing him to strain to hear the communication.

7/ Railroad Accident Report--"Head-on Collision of Louisville and Nashville Railroad Local Freight Train and Yard Train at Florence, Alabama, September 18, 1978." (NTSB-RAR-79-2.)

Railroad Accident Report--"Rear End Collision of Two Union Pacific Freight Trains, Ramsey, Wyoming, March 29, 1979." (NTSB-RAR-79-9.)

Railroad Accident Report--"Head-on Collision Between Amtrak Train No. 82 and Seaboard Coast Line Extra 2771 South, Lakeview, North Carolina, April 2, 1980." (NTSB-RAR-80-8.)

## CONCLUSIONS

### Findings

1. Train No. 88 and the Brunswick Helper were being operated in compliance with the operating rules.
2. The Brunswick Helper had a proper train order and clearance to move westward on No. 2 track between the crossover at Gaithersburg and WAS Rocks.
3. Train No. 88's crew was not aware that the Brunswick Helper was being operated westbound on No. 2 track, and the Brunswick Helper's crew was not aware that train No. 88 was moving eastward between Rocks and Gaithersburg on No. 2 track.
4. The Baltimore Terminal Dispatcher failed to ascertain the location of train No. 88 when he authorized the Brunswick Helper to return to Rocks on No. 2 track.
5. The number and complexity of activities in which the Baltimore Terminal dispatcher was engaged before the train order was issued to the Brunswick Helper probably caused him to overlook train No. 88.
6. B&O operating procedures did not require the Baltimore Terminal dispatcher's coworkers to remind the dispatcher of, or question him about, the status of trains such as No. 88.
7. The operating procedure, which allowed trains to pass Rocks without the OML dispatcher giving the passing time to the Baltimore Terminal dispatcher and the next tower ahead of the train, was inadequate.
8. Had No. 88's passage at Rocks been communicated between the two dispatchers or between the Baltimore Terminal dispatcher and the operator at QN Tower, the collision probably would have been avoided.
9. If the radio speaker on the Brunswick Helper's unit 7603 had been operable, the accident probably would have been avoided.
10. The environmental conditions in which the two dispatchers were working were distracting and could be detrimental to the performance of their duties.
11. The crushing of the locomotive operating compartment of the Brunswick Helper's unit 7603 resulted in an unsurvivable environment.

### Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the train dispatcher's oversight in authorizing the Brunswick Helper to operate westward on the No. 2 eastward main track between Gaithersburg and Rocks, while opposing train No. 88 was en route eastward on the same track. Contributing to the accident was an inadequate Baltimore & Ohio Railroad Company operating procedure which did not provide means for the train dispatcher and the tower operator to positively verify the location of all trains between Rocks and QN Tower, and did not provide for a backup system that would require coworkers to verify train locations when train orders are being used.

## RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board made the following recommendations to:

--The Baltimore & Ohio Railroad Company:

Establish a train reporting procedure at Rocks and similar locations, that will enable each train dispatcher and the tower operator, in advance and to the rear of the train, to have a record of the times trains pass the reporting point. (Class II, Priority Action) (R-81-70)

Evaluate the workloads carried by the Old Main Line and the Baltimore Terminal dispatchers to determine if they are manageable. If either is not, adjust the workloads so that each dispatcher has a manageable assignment. (Class II, Priority Action) (R-81-71)

Redesign the Baltimore train dispatcher's office to provide facilities based on good human engineering principles and to eliminate the current distractions and uncomfortable environment. (Class II, Priority Action) (R-81-72)

Upgrade the radio system to eliminate the marginal coverage area between Barnesville and Gaithersburg. (Class II, Priority Action) (R-81-73)

The Safety Board believes that an operable radio speaker on Brunswick Helper unit 7303 would have provided information to the enginecrew that might have led to action having been taken to have avoided the accident. Therefore, NTSB Safety Recommendations R-79-73, issued on November 1, 1979, to the Federal Railroad Administration and which is now classified by the National Transportation Safety Board as still open, is reiterated to the Federal Railroad Administration:

"Establish regulations that would require all trains operating on main track to be equipped with an operable radio."

### BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JAMES B. KING  
Chairman

/s/ FRANCIS H. McADAMS  
Member

/s/ PATRICIA A. GOLDMAN  
Member

/s/ G. H. PATRICK BURSLEY  
Member

ELWOOD T. DRIVER, Vice Chairman, did not participate.

May 27, 1981

**APPENDIXES**

**APPENDIX A**

**INVESTIGATION**

The National Transportation Safety Board was notified of the accident about 10:30 a.m. by the Baltimore & Ohio Railroad Company through the National Response Center at Washington, D. C. It was declared a major accident and an Investigator-in-Charge and a Field Investigator from the Safety Board's Washington Headquarters were dispatched to the scene.



**APPENDIX B**  
**TRAIN ORDER NO. 107**

**TRAIN ORDER NO. 107**

**February 9, 1981**

**TO: C&E EXTRA 7603**  
**West Gaithersburg via QN Tower**

**At: QN Tower**

**EXTRA 7603 WEST HAS RIGHT OVER OPPOSING TRAINS ON NUMBER 2 TRACK**  
**GAITHERSBURG TO WAS ROCKS.**

**VGR**

**OK By Eng. R.H. Rouzee**

**2/9/81 At 9:43 a.m.**

**JRC**

**Retyped from**  
**Certified True Copy**

## APPENDIX C

### EXCERPTS FROM OPERATING RULES

**Block—(Automatic Block Signal System)—**The length of track between two automatic signals in the same direction, the use of which by trains is governed by an automatic block or interlocking signal.

**Block—(Manual Block System)—**The length of track between the points specified on Clearance Form A, Part 2.

**Clear Block—**A term used in connection with Manual Block System Rules indicating the block is clear of trains authorized to move in the same direction as the train addressed.

**Occupied Block—**A term used in connection with Manual Block System Rules indicating there are one or more trains (as listed on Clearance Form A, Part 2) occupying or authorized to occupy the block and move in the same direction as the train addressed.

## MANUAL BLOCK SYSTEM RULES

300. Manual Block System Rules will be in effect in territory specified in special instructions or when trains are moved against the current of traffic.

### Exception:

Manual Block System Rules will not be in effect when movements are made as prescribed by Rules 89, 93, 235 D-H, 515-A, D-545-B, D-515-C or emergency or switching movements as provided in Rules D-151 and 605-A.

301. The term "clear block" or "occupied block" as used in these rules refer only to trains moving in the same direction. Opposing trains will be governed by timetable schedule or by train order with respect to each other.

302. The Train Dispatcher will specify the condition of the block "clear" or "occupied". The block must be specified between train order offices or specific locations such as crossovers, junctions, ends of passing sidings, ends of two or more tracks, absolute signals, or controlled points.

304. The train order signal will not be used to indicate the condition of the block. The condition of the block must be given by Clearance Form A, Part 2 at open train order offices or orally at intermediate points.

305. Clearance Form A, Part 2 will be issued at each open train order office. The condition of the block must be shown "clear" or "occupied" between the points shown on Clearance Form A, Part 2 but not beyond the next open train order office. Trains must approach and pass open train order offices at "Stop Short of Train Ahead" speed and be governed by the condition of block shown on Clearance Form A.

### Exception:

If the next open office is due to close before a train arrives, the condition of the block may be given beyond the office due to close. If the train arrives before the office is closed, the Operator must deliver a Clearance Form A showing the condition of the block. In such case, the condition of the block received at the previous open office would not apply beyond the office due to close.

If a train order office in the block opens after a train has entered the block and the block was given beyond the office that opened, the Operator must deliver a Clearance Form A showing the condition of the block. In such case, the condition of the block received at the previous open office would not apply beyond the office that opened.

306. When the condition of the block is to be received at a closed train order office or at an intermediate point, the condition of the block will be given orally to the Conductor or Engineer.

307. When the block is clear, train will proceed at the speed designated by special instructions or train order. When the block is occupied, the Clearance Form A must identify the train or trains ahead. Trains receiving an occupied block must proceed within that block prepared to stop short of train ahead.

308. When a train operating on a clear block is passed by a train moving in the same direction, or reverses movement and follows a train, movement from that point must be made prepared to stop short of train ahead.

309. When a train is moving on an occupied block and the train(s) ahead have cleared the block, the Train Dispatcher will notify the Conductor and Engineer, if communication is available, that the block is clear.

310. When a train moving on an occupied block passes all trains listed on the Clearance Form A, the condition of the block will be clear to the point listed on the Clearance Form A.

317. To admit a train to a block, the Train Dispatcher must examine the train sheet and if block is clear of preceding trains, he may specify a clear block. If there are preceding trains, the Train Dispatcher must specify an occupied block, identifying trains ahead.

After a train has entered a block, another train must not be authorized to enter that block and move in the same direction ahead of the first named train until the first named train has been stopped and the Engineer informed of the train movement to be made.

317-A. The Train Dispatcher will record the condition of the block in the Train Order Book.

326. When a train reports clear of the main track, it must not again foul the main track without permission of the Train Dispatcher. A train must not reverse direction without permission of the Train Dispatcher. The Train Dispatcher must have control of following movements or movement must be protected by Flagman before permission is given to reverse direction.

327. A train must not foul a main track or cross over from one main track to another without permission of the Train Dispatcher.

235 D-R. Providing for a Movement Against  
The Current of Traffic

Example (1) of Train Order

No 1 Eng 4219 has right over opposing trains  
(Train)  
on ----- (Track) ----- C to  
(Specific Location)  
----- F -----  
(Specific Location)

Explanation:

The designated train must use the track specified between the points named and has right over opposing trains on that track between those points. Opposing trains must not leave the point last named or any intermediate point until the designated train arrives.

This order may be modified as follows:

Example (2) of Train Order

After No 4 Eng 8254 arrives at C  
(Train) (Specific Location)  
No 1 Eng 8260 has right over opposing trains on  
(Train)  
----- (Track) ----- C to F  
(Specific Location) (Specific Location)

Explanation:

The train to be moved against the current of traffic must not leave the first named point until the arrival of the first named train.

.....  
The order must name the specific point to which the train is authorized to run.

A train must not be moved against the current of traffic until the track on which it is to run has been cleared, and is maintained clear of all opposing train movements and track cars within the designated limits, until the diverted train or trains have arrived.

Following movements may be permitted complying with Rule 307.

Where Rule 93 is in effect and Rules 501-D-515-C are not in effect, a copy of the order must be given to the Yardmaster on duty or to all trains within yard limits. Such trains must not occupy the track on which the designated train or trains are to run until the diverted train or trains have arrived.

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

D-251. On portions of the railroad and on tracks designated in special instructions, trains will run with the current of traffic, being governed by block signals, the indications of which will supersede timetable superiority.

When trains are moved against the current of traffic, Manual Block System Rules are in effect except as provided in Rules 89, 93, 235 D-H, 515-A, 515-B, 515-C or emergency or switching movements as provided in Rules D-151 and 605-A.

D-252. Trains must not enter, cross over or in any way foul a main track through hand-operated or spring switches when operated by hand, until Conductor or Engineer has secured permission of the Train Dispatcher. Neither switches nor derails may be hand-operated until permission has been secured. Such permission does not relieve employees of waiting for signal protection as prescribed by Rule 513.

At locations where Switchtenders or Operators handle the switches, train may accept hand signal to cross over or enter the main track. This will not relieve Switchtenders or Operators of securing permission of the Train Dispatcher for such movement, nor will such employees be relieved of waiting for signal protection in accordance with Rule 513 except when controlled absolute signals protecting main track movements over the switches involved have displayed STOP aspect at least five (5) minutes before switch or switches are operated.

D-254. Where these rules are in effect, Rules 501-515-C are also in effect.

### **RULES GOVERNING OPPOSING AND FOLLOWING MOVEMENT OF TRAINS BY BLOCK SIGNALS**

261. On portions of the railroad and on tracks designated in special instructions, trains will be governed by block signals, the indications of which will supersede timetable superiority of trains for both opposing and following movements on the same track.

262. Except as provided in Rule 271 or 274, a train must not reverse direction within a block without the authority of the Train Dispatcher who must first protect the movement. Movement must be made at restricted speed to the next signal. Flag protection will not be required.

264. Where these rules are in effect, Rules 501-515 are also in effect.

### TRAFFIC CONTROL SYSTEM (TCS) RULES

265. Traffic Control System Rules will be used only in territory specified in special instructions.

Where TCS Rules are in effect, Rules 261-264 and Rules 501-515 are also in effect.

267. Trains must not enter or foul the main track or other signalled track where these rules are in effect, nor cross over from one such track to another, except as governed by signal indication or by permission of the Train Dispatcher obtained by the Conductor or Engineer.

When trains clear on any track not provided with an absolute block signal to govern the movement from such track, the Conductor or Engineer must report clear to the Train Dispatcher.

267-A. At non-electrically-locked hand-operated switches where the speed of trains is not permanently limited to twenty (20) MPH, trains must not clear or enter the main track unless the track is so designated in special instructions. Trains using tracks on which they are not permitted to clear must leave part of train on signalled track or leave switch open until work is completed.

267-B. Permission of the Train Dispatcher must be secured to hand-operate a switch to enter main track or other signalled track. This does not relieve employee of compliance with Rule 513 unless absolute block signal is provided to govern movement.

271. Trains may occupy specific absolute block sections to work in both directions without flag protection when authorized by the Train Dispatcher. Conductor must make record of time, track and work limits, advising the Engineer accordingly.

Conductor must report clear before time limit expires unless extension of time limit has been secured. Train which has been reported clear must not again occupy the work limits without securing new authorization.

The authorization to work does not relieve crew of compliance with block signal indications.

When more than one train is authorized to work in the same limits, the authorization must include the requirement for such trains to protect against each

other, Engineers advised and movements made at a speed that will permit stopping within one-half the range of vision regardless of signal aspect displayed.

271-A. When a reverse movement is made under the provisions of Rule 262, 271 or 274, and rear of movement is standing between the absolute block signals governing movement over power-operated switches, such switches must be protected in accordance with Rule 509-A(3).

272. When employee call light on the instrument house is illuminated, any employee observing it, except those on moving trains, must immediately communicate with the Train Dispatcher or Operator.

274. Where designated by special instructions that this rule is in effect, trains may move or work in both directions within an absolute block section without flag protection. Movement must be made at a speed that will permit compliance with signal aspect displayed.

When more than one train is authorized to occupy the same absolute block section, the authorization must include the requirement for such trains to protect against each other, Engineers advised and the movements made at a speed that will permit stopping within one-half the range of vision.

## APPENDIX D

### CREWMEMBER, TRAIN DISPATCHERS, AND OPERATOR INFORMATION

#### Russell Harrison Rouzee, Engineer Extra 7603 West

Mr. Rouzee, 43, was employed by the B&O Railroad Company on June 3, 1950, as a fireman. He was promoted to his current standing as an engineer on December 24, 1967. He attended his last operating rule class on February 4, 1980, and he passed his last medical examination on August 18, 1980.

#### Donald Elwood Greenfield, Brakeman Extra 7603 West

Mr. Greenfield, 35, was employed by the B&O Railroad Company on February 22, 1974, as a brakeman. He attended his last operating rules class on February 5, 1980, and he passed his last medical examination on June 21, 1977.

#### Raymond D. Dow, Engineer Extra 3773 East (No. 88)

Mr. Dow, 56, was employed by the B&O Railroad Company on May 10, 1950, as a fireman. He was promoted to engineer on December 24, 1967. He attended his last operating rules examination on February 11, 1980, and he passed his last medical examination on November 13, 1978.

#### Roy Leon Poole, Fireman Extra 3773 East

Mr. Poole, 38, was employed by the B&O Railroad Company in April 1977 as a brakeman. He transferred to engine service on June 10, 1977 as a fireman. He was promoted to engineer on April 14, 1980. He attended his last operating rules class on February 11, 1980, and he passed his last medical examination in June 1977.

#### Calvin M. Hooker, Conductor Extra 3773 East

Mr. Hooker, 59, was employed by the B&O Railroad Company in September 1945 as a laborer at a grain elevator. He transferred to train service on August 25, 1972 as a brakeman. He was promoted to conductor on September 16, 1974. He attended his last operating rules class on February 5, 1980 and he passed his last medical examination on March 7, 1979.

#### James E. Wilson, Flagman Extra 3773 East

Mr. Wilson, 29, was employed by the B&O Railroad Company on June 6, 1972 as a brakeman. He was promoted to flagman on May 22, 1973. He attended his last operating rules examination on February 6, 1980, and he passed his last medical examination on November 11, 1979.

#### Larry V. Sauerwein, Brakeman, Extra 3773 East

Mr. Sauerwein, 26, was employed by the B&O Railroad Company on June 24, 1973, as a brakeman. He attended his last operating rules class on February 22, 1980, and he passed his last medical examination on May 30, 1978.

Vernon Glenn Ray, Sr. Train Dispatcher Baltimore Terminal

Mr. Ray, 36, was employed by the B&O Railroad Company on November 20, 1966, as an operator. He was promoted to extra train dispatcher on December 27, 1970, and was appointed to a regular position during 1976. He attended his last operating rules examination in 1980.

Homer Emanuel Bair, Train Dispatcher Old Main Line

Mr. Bair, 36, was employed by the B&O Railroad Company on January 15, 1964, as an Operator Trainee. He was promoted to the position of operator on April 8, 1964, and he was promoted to extra train dispatcher in March of 1970. He was appointed as a regular dispatcher on January 28, 1976. He is current on the operating rules examinations.

James Byran Carpenter, Operator QN Tower

Mr. Carpenter, 29, was employed by the B&O Railroad Company on May 27, 1970, as an operator. He has worked as an agent and regularly as an operator at JD Tower, Hyattsville, Maryland before he became assigned regularly to the 7:00 a.m. to 3:00 p.m. shift at QN Tower in January 1980. He is current on both the operating rules and medical requirements.



**APPENDIX E**  
**B&O SPECIAL INSTRUCTIONS**

Baltimore, Md.  
March 13, 1981

TERMINAL DISPATCHERS  
TCS DISPATCHERS  
OPERATORS WB TOWER  
OPERATORS QN TOWER

**SUBJECT:** Procedure when providing for movement against current of traffic westward on No. 2 track between Georgetown Junction and Rocks on the Metropolitan Subdivision.

In addition to complying with existing Rules the following procedure must be complied with in sequential order:

1. When the Terminal Train Dispatcher requests the TCS Dispatcher to hold east at Rocks, the TCS Dispatcher must apply blocking before responding. In addition to blocking the eastward absolute signals on No. 1 and No. 2 tracks at Rocks and eastward absolute signal on No. 2 track at High Rock, the TCS Dispatcher must also instruct the Operator at WB Tower to apply blocking to eastward absolute signals governing movements to No. 1 track at East Brunswick.
2. When all blocking is in place the TCS Dispatcher will then respond, "Blocking East at Rocks", giving the last eastward train to the Metropolitan Subdivision and the time it passed Rocks.
3. The Terminal Dispatcher must examine his train sheet to be certain that the section of track on which the train is to run against the current of traffic has been CLEARED of all opposing train movements and/or track car movements.
4. The Terminal Train Dispatcher will then include the "TCS Dispatcher", in the address of the 235 D-R train order example (1) or (2).
5. The TCS Train Dispatcher must copy the 235 D-R train order on the prescribed train order Form CDT-40. These instructions apply even if an Operator is on duty at Rocks.
6. The Terminal Train Dispatcher's territory begins and ends at Rocks therefore the TCS Train Dispatcher must "OS" both eastward and westward trains by Rocks to the Terminal Train Dispatcher.

**Instructions to the Operators at QN Tower:**

The Operators at QN Tower before copying a 235 D-R train order from the Terminal Train Dispatcher for a westward movement on No. 2 track between Georgetown Junction and Rocks must:

1. Give the Dispatcher the last train east and time by QN Tower.
2. Must remind the Train Dispatcher of any train(s) reported east by WB Tower that has not yet passed QN Tower.

E. Q. Snyder  
Superintendent of Operations