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✓ RAILROAD ACCIDENT INVESTIGATION,

REPORT NO.

4175,

DEPARTMENT OF  
TRANSPORTATION

OCT 18 1970

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NORFOLK AND WESTERN RAILWAY COMPANY

FINNEY, VA.

AUGUST 25, 1970



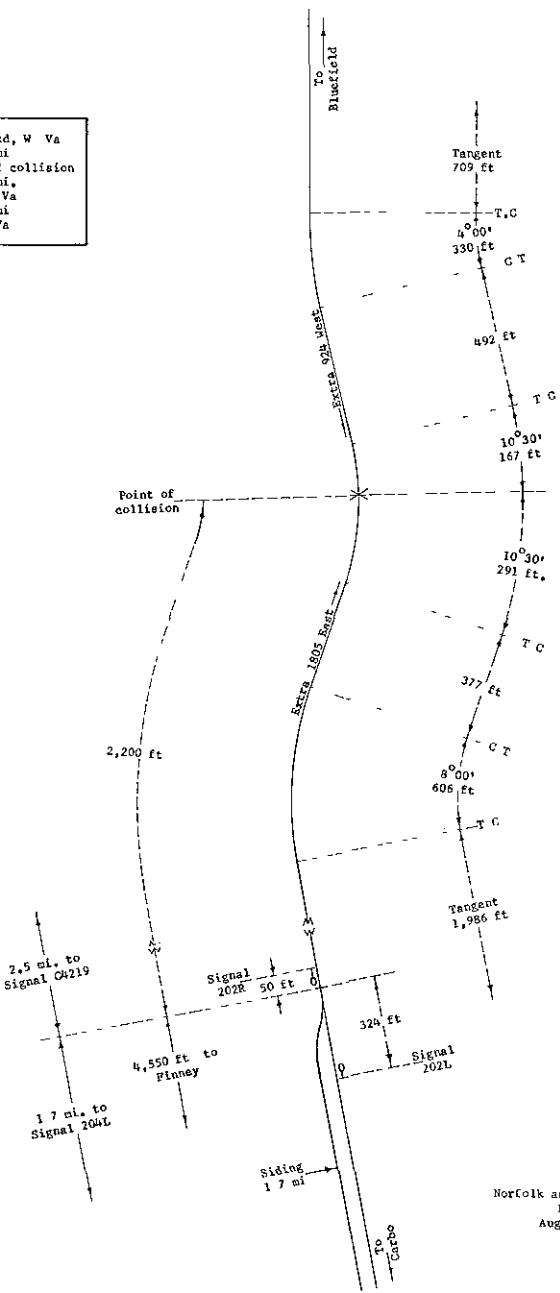
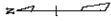
FEDERAL RAILROAD ADMINISTRATION

11/11 2 BUREAU OF RAILROAD SAFETY,  
14 Washington, D C 20590



PLATE NO. 1

- Bluefield, W Va
- 82.9 mi
- X Point of collision
- 1.3 mi.
- Pinney, Va
- 9.2 mi
- Carbo, Va



Norfolk and Western Railway  
 Finney, Va  
 August 25, 1970

DEPARTMENT OF TRANSPORTATION  
FEDERAL RAILROAD ADMINISTRATION  
BUREAU OF RAILROAD SAFETY

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RAILROAD ACCIDENT INVESTIGATION  
REPORT NO. 4175

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NORFOLK AND WESTERN RAILWAY COMPANY  
AUGUST 25, 1970

Synopsis

On August 25, 1970, a head-end collision occurred between a freight train and a helper locomotive on the Norfolk and Western Railway near Finney, Va. It resulted in death to two and in injury to one train-service employees.

The accident was caused by failure of engineer, for some undetermined reason, to stop the eastbound train short of a stop-signal and a remote-controlled siding-switch in reverse position, resulting in the eastbound train colliding with a westbound helper locomotive approaching the siding-switch.

Location and Method of Operation

The accident occurred on that part of the railroad extending westward from Bluefield, W Va to Carbo, Va, a distance of 73.4 miles. This is a single-track line over which trains operate by signal indications of a traffic control system. At Finney, Va, 9.2 miles east of Carbo, a siding 1.7 miles in length parallels the main track on the north. Its east switch is 4550 feet east of the Finney station point.

The collision occurred on the main track, 2200 feet east of the east switch of the Finney siding.

Track

From the east on the main track there are, successively, a tangent 709 feet in length, a 4°00' curve to the left 330

feet, a tangent 492 feet, and a 10°30' curve to the right 167 feet to the collision point and 291 feet westward. From the west on the main track there are, successively, a tangent 1986 feet long, an 8°00' curve to the right 606 feet, a tangent 377 feet, and the curve on which the collision occurred.

The average grade for eastbound trains in this area is 1.52% ascending.

#### Time and Weather

The collision took place at 1:20 a m, under slightly foggy or hazy weather conditions which did not materially restrict visibility.

#### Authorized Speed

The maximum authorized speed for all trains in the collision area is 30 m p h.

#### Signals

Controlled signals 204L and 202L, governing eastbound movements on the main track, are 1.7 miles and 324 feet west of the east switch of the Finney siding, respectively.

Automatic signal C4219 and controlled signal 202R, governing westbound movements on the main track, are 2.5 miles and 50 feet east of the aforesaid switch, respectively.

The signals are of the color-position light type and are continuously lighted. The controlled signals and the switches of the Finney siding are controlled from the train dispatcher's office. The applicable signal aspects, indications and names are as follows:

<u>Signal</u>	<u>Aspect</u>	<u>Indication</u>	<u>Name</u>
204L	2 yellow lights in diagonal position to right	Proceed preparing to stop at next signal ***	Approach
202L	2 red lights in horizontal position	Stop-and-Stay	Stop-and-Stay
C4219	2 yellow lights in diagonal position over 2 yellow lights in vertical position	Proceed preparing to take diverging route beyond next signal at prescribed speed	Approach Diverging
202R	2 red lights in horizontal position over 2 yellow lights in diagonal position to right	Proceed through turnout *** at prescribed speed preparing to stop at next signal ***	Diverging Approach

The circuits are so arranged that when the route has been established for a westbound train to enter the Finney siding at the east switch and for an eastbound train to proceed on the main track to signal 202L, signals C4219 and 202R display Approach-Diverging and Diverging-Approach aspects, respectively, for the westbound train. Signals 204L and 202L display Approach and Stop-and-Stay aspects, respectively, for the eastbound train.

#### Sight Distances

Because of track curvature, a hillside and a house on the hillside, signal 202L cannot be seen from an approaching eastbound train at a distance greater than 1072 feet.

In the immediate vicinity of the collision point, the main track is laid in a hillside cut. Because of the hillside and track curvature, the maximum range of vision between opposing trains approaching the collision point is restricted to a distance of approximately 150 feet.

The above-mentioned views are shown in Plate No. 2.

#### Carrier's Operating Rules

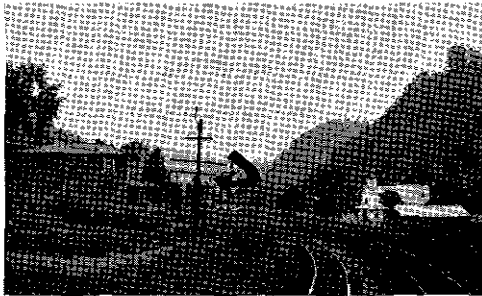
Restricted Speed - A speed that will permit stopping short of train \*\*\* but not exceeding 15 miles per hour.

353 When a train or engine has passed a signal permitting it to proceed and is delayed in the block, it must proceed at restricted speed to the next signal.

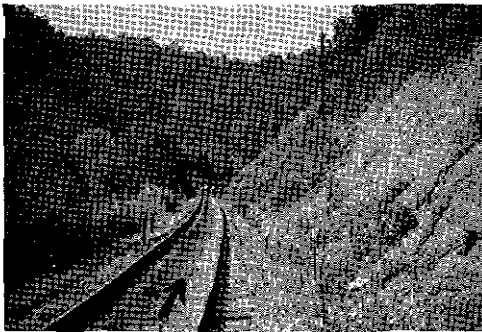
#### Circumstances Prior to Accident

##### Train Dispatcher

Some time prior to 11:00 p. m. the day before the accident, the second-trick train dispatcher established the route for a helper locomotive consisting of diesel-electric units 1531, 1732 and 1594 to enter the Finney siding at the east switch, and for Extra 1805 East to proceed eastward on the main track to signal 202L. Some time later, after the third-trick dispatcher came on duty at 11:00 p. m., the aforesaid helper locomotive entered the Finney siding at the east switch and stopped on the west end of the siding, where it waited to assist in the movement of Extra 1805 East on the ascending grade extending eastward from Finney. The third-trick dispatcher left the east switch of the siding in reverse position, lined for movement from the main track to the siding, and pre-coded the traffic control machine so that it would establish the route for Extra 924 West to enter the Finney siding at the east switch after the 3-unit helper locomotive left the siding at the west switch to help Extra 1805 East. Under these circumstances, signal 202L would continue to display a Stop-and-Stay aspect until Extra 924 West had entered the Finney siding and the dispatcher had restored the east siding-switch to normal position and cleared the signal for Extra 1805 East.

PLATE NO. 2

Eastward signal 202L (arrow) from distance of 1072 feet.



Collision point (top arrow) from distance of about 1000 feet. Bottom arrow shows direction of westbound helper locomotive involved.

Extra 924 West

This was a westbound helper locomotive consisting of three road-switcher type diesel-electric units and operating as Extra 924 West. It left Bluefield at 10:36 p m the day before the accident. About 2 hours 40 minutes later, it approached the east switch of the siding at Finney while moving westward on the main track.

The engineer was the only crew member. He was in the cab at the rear of the first locomotive unit.

Extra 1805 East

This was an eastbound freight train consisting of 4 road-switcher type diesel-electric units, 115 cars loaded with coal, a scale-test car, and a caboose, in that order. After having a brake test, Extra 1805 East left Carbo at 12:15 a m the day of the accident and proceeded toward Finney, where it was required to stop for the purpose of picking up the helper locomotive occupying the west end of the Finney siding.

About 30 minutes after leaving Carbo, Extra 1805 East neared Finney and began to pass signal 204L, which apparently displayed an Approach aspect. Immediately afterward, it also began to pass the west switch of the Finney siding. When most of the train had passed the aforesaid signal and switch, the conductor radioed the engineer and instructed him to stop. The engineer acknowledged that instruction and promptly stopped the train with the front end in the block of signal 204L and apparently at a point about three-fourths mile short of signal 202L. The rear end stopped a short distance west of signal 204L and the west switch of the siding. The flagman then uncoupled the 115th car from the scale-test car, after which the locomotive moved the 115 cars eastward on the main track a sufficient distance to clear the west switch of the siding. The three-unit helper locomotive on the siding then entered the main track via the west siding-switch; coupled to the scale-test car attached to the front of the caboose, and moved forward on the main track to a coupling with the 115th car of the train. Thus, the train was reassembled for departure from Finney with the three-unit helper locomotive between the 115 and 116th cars. Its front and rear air hoses were coupled to those cars, respectively.

The AccidentExtra 924 West

As it approached the east switch of the Finney siding at a distance of 2.5 miles, the helper locomotive operating as Extra 924 West passed signal C4219. The engineer said the signal displayed an Approach-Diverging aspect, and that it indicated to him the route had been established for his locomotive to enter the Finney siding at the east switch. The speed tape shows, after corrected in accordance with calibrations of the speed-recording device, the helper locomotive passed signal C4219 at a speed of about 35 m p h and increased



speed to 39 m p h , or 9 m p h in excess of the maximum authorized speed, as it moved eastward in the block of signal C4219. It further shows the engineer then reduced the speed to slightly under 30 m p h in approach to the 10°30' restricted-view curve on which the collision occurred.

As the helper locomotive neared the east end of the curve, the engineer saw the beam of the headlight of an east-bound locomotive reflecting on trees opposite the curve. Realizing the curve was occupied by an opposing locomotive, he promptly applied the automatic brakes of the helper locomotive in emergency. A few seconds later, at 1:20 a m., the helper locomotive collided head-on with Extra 1805 East, 167 feet west of the east end of the curve and 2200 feet east of the east switch of the Finney siding. The speed of the helper locomotive was reduced to 25 m p h at the time of the impact, as indicated by the speed tape.

#### Extra 1805 East

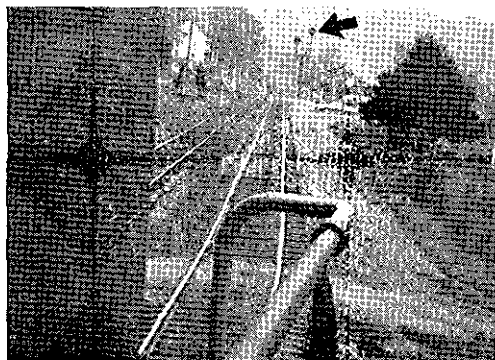
After its front end passed the west switch of the Finney siding, Extra 1805 East stopped in the block of signal 204L and was delayed in that block for approximately 30 minutes while the 3-unit helper locomotive on the west end of the siding was placed in the train between the 115th and 116th cars. During this interval, neither the engineer nor the front brakeman could see the next signal ahead, signal 202L, because of his view being obstructed by track curvature and a hillside.

After the 3-unit helper locomotive was placed in the train and its air hoses were connected to the adjoining cars, the helper engineer cut-out his automatic brake valve as required and notified the road engineer of this action by radio. He also informed the road engineer that the air gage of the helper locomotive was indicating 55 pounds brake pipe pressure at the rear of the train, and the road engineer responded to this information by initiating a reduction of brake pipe pressure. The helper engineer said that soon thereafter, when his air gage indicated the brake pipe pressure had been reduced to 50 pounds, he notified the road engineer by radio that the brakes at the rear of the train had been applied, and the road engineer released the brake application. He further said that when his air gage indicated the brake pipe pressure had been restored to 61 pounds, he informed the road engineer of this by radio, but received no reply. A few seconds later, according to the helper engineer, the train started to move forward in the block of signal 204L and alongside the Finney siding without the road engineer having radioed that he was about to start the train.

As Extra 1805 East moved eastward in the block of signal 204L, apparently both the road engineer and front brakeman were seated, respectively, on the right and left sides of the cab at the front of the first unit of the road locomotive. The helper engineer was alone in the cab of the first unit of the helper locomotive. The conductor and flagman were in the caboose.

According to his statements, the helper engineer moved his throttle to Run 3 or 4 position when the train started to move eastward and returned it to idle position when he judged the front of the train was nearing signal 202L at the east end of the Finney siding. He said the train continued eastward at slow speed and after proceeding some distance, when he judged the front end had passed signal 202L, he assumed this signal had displayed a proceed aspect for the train and re-opened the throttle of the helper locomotive.

The speed tape, after corrected in accordance with calibrations of the speed-recording device, indicates Extra 1805 East was about three-fourths mile from signal 202L when it began to move eastward at Finney. It further indicates the train increased speed to 10 m p h rather quickly, then slowly increased speed to 12 m p h as it neared signal 202L, which apparently displayed a Stop-and-Stay aspect. The road locomotive was moving on a curve to the left when this signal came into view, at a distance of 1072 feet, from the left or front brakeman's side of the cab of the first unit. Because of track curvature to the left, the short hood compartment in front of the cab, and his position on the right side of the cab, the road engineer was unable to see signal 202L before his locomotive reached a point 773 feet distance (see photo below)



Signal 202L (arrow) from distance of 773 feet.

Although it was required to stop short of signal 202L, Extra 1805 East continued eastward beyond that signal and the east switch of the Finney siding while moving at a speed of about 12 m p h. Soon afterward, while moving at unreduced speed, it entered the 10°30' curve involved and collided with the westbound helper locomotive operating as Extra 924 West.

The helper engineer, conductor and flagman at the rear of Extra 1805 East were the only surviving crew members of that train. They were unaware of anything being wrong before

the brakes of their train applied in emergency immediately before or at the time of the impact. According to their statements, they heard no radio call by the road engineer between the time their train started forward at Finney and the time of the collision.

#### Casualties

The engineer of the helper locomotive operating as Extra 924 West was injured. The road engineer and front brakeman of Extra 1805 East were killed.

#### Damages

##### Extra 924 West

The first and second units of the helper locomotive operating as Extra 924 West were derailed. The first unit overrode the underframe of the leading locomotive unit of Extra 1805 East; struck the short hood compartment and cab of that unit; fell to the south side of the track structure, slid down an embankment, and stopped on one side in a roadway at the foot of the embankment and about opposite the collision point. The second unit stopped upright on and in line with the track structure. The first unit was heavily damaged, the second unit moderately damaged, and the third unit slightly damaged.

##### Extra 1805 East

This train stopped with the front end 104 feet east of the collision point. All four locomotive units and the first five cars were derailed. The derailed equipment stopped upright on and in line with the track structure. The short hood compartment and cab at the front of the first unit was sheared off and knocked to the ground on the south side of the track structure as a result of being struck by the first unit of the westbound helper locomotive. The first locomotive unit of Extra 1805 East was heavily damaged and the other three units were moderately damaged. The derailed cars were slightly damaged.

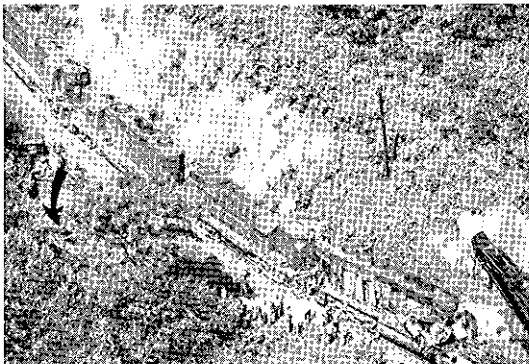
#### Cost of Damages

According to the carrier's estimate, the monetary cost of damages to the equipment of both trains and track structure was \$181,575 (see photo on the following page).

#### Train Crews' Hours of Service

##### Extra 924 West

At the time of the accident, the engineer, the only crew member of this train, had been continuously on duty 3 hours 20 minutes after having been off duty over 24 hours.



Locomotive units of Extra 1805 East at center. Arrow points to first unit of helper locomotive operating as Extra 924 West

### Extra 1805 East

All the crew members of this train had been continuously on duty seven hours at the time of the accident, after having been off duty eight hours

#### Engineer and Front Brakeman - Extra 1805 East

The engineer, age 54, was first employed by the carrier as a fireman in January 1946. He was promoted to engineer in July 1955. His service record indicates he was subjected to disciplinary action by the carrier in 1959, for responsibility in connection with damage to a locomotive; in 1960, for violation of speed restrictions; in 1962, for damage to equipment resulting from violation of rules, and in 1964, for inattention to duty while working as the engineer of a helper locomotive. The record further indicates he had taken and passed a physical examination in November 1969.

The brakeman, age 32, was first employed by the carrier in November 1963. His record was clear. The investigation revealed nothing which would indicate the engineer and front brakeman were in other than normal condition when they went on duty.

#### Post-Mortem Examination

An autopsy of the engineer's body revealed no evidence of a heart seizure. No blood could be taken for a blood test, because of the condition of his body.

No autopsy of the front brakeman's body was made.

## Post-Accident Examinations and Tests

### Traffic Control System

Examination of the east switch of the Finney siding revealed that the operating and lock rods were bent, indicating that the switch had been lined for Extra 924 West to enter the siding and had been run through by the road locomotive of Extra 1805 East

The portion of the signal system involved was examined and tested extensively to discover any condition which would have caused signal 202L to display other than a Stop-and-Stay aspect when the east switch of the Finney siding was in reverse position, lined for a westbound movement on the main track to enter the siding. No defective condition was disclosed.

### Road Locomotive - Extra 1805 East

Examination of this locomotive found all valves and switches of the three trailing units in proper positions for operation of the locomotive in multiple-unit control. Much of the brake equipment of the first unit was heavily damaged or destroyed. Controls still in place were found in proper positions. The brake valve handle was found partially broken off, bent and twisted, in service position.

### Cars - Extra 1805 East

The brakes of the cars were tested after the accident and found to be functioning properly, with the exception of six that had excessive piston travel, one that had its brake cut out, and two on which the brakes apparently leaked off after being applied.

### Stopping Distance Test

A test train was assembled to determine the stopping distance for Extra 1805 East. Except for the road locomotive units and the first five cars, the equipment of the test train was the same as Extra 1805 East. The tonnage was about the same also.

The test train approached signal 202L at a speed of about 13 m p h, and the engineer applied the brakes in emergency when the signal first came into view from the road locomotive. The train stopped within a distance of 353 feet on the ascending grade, and with the front end 719 feet short of the signal.

### Findings

1 The route had been established for Extra 924 West to enter the Finney siding at the east switch and for Extra 1805 East to proceed eastward on the main track to signal 202L.

2. At the time of the accident, the helper locomotive operating as Extra 924 West was approaching Finney in accordance with applicable rules

3 Tests revealed that the portion of the signal system involved was functioning properly Hence, signals 204L and 202L evidently displayed Approach and Stop-and-Stay aspects, respectively, for Extra 1805 East

4 After passing signal 204L, Extra 1805 East stopped in the block of that signal for about 30 minutes, to permit the helper locomotive on the west end of the siding to be inserted in the train between the 115th and 116th cars While delayed in the block of signal 204L, the engineer and front brakeman were unable to see the next signal, 202L, because of track curvature and a hillside

5 When Extra 1805 East started forward at Finney after the helper locomotive was placed in the train, it was required to proceed to signal 202L at Restricted Speed, not exceeding 15 m p h

6 Extra 1805 East approached signal 202L while moving at a speed of 12 m p h and apparently in accordance with applicable rules The train brake system was apparently in good operating condition, except for the brakes of a few cars The defective condition of brakes on those few cars affected the total braking capability of the train to a slight degree, but not sufficiently to have been a causal factor in the accident

7 Assuming that the front brakeman was seated on the left side of the cab of the first locomotive unit, the Stop-and-Stay aspect displayed by signal 202L came into that crew member's view at a distance of 1072 feet The signal aspect came into the engineer's view from the right side of the locomotive cab at a distance of 773 feet Tests revealed that in either case, the train then had sufficient braking distance to stop short of signal 202L as required

8 The evidence is that neither the engineer nor the front brakeman took any action to apply the brakes and stop the train short of signal 202L as required Consequently, Extra 1805 East continued eastward on the main track at 12 m p h and passed both signal 202L and the east switch of the Finney siding It ran through the east siding-switch, which was in reverse position, lined for entry of Extra 924 West to the siding

9 Extra 1805 East proceeded in the block of signal 202L at unreduced speed, entered the restricted-view curve involved at 12 m p h, and collided with Extra 924 West on the curve at a point 2200 feet east of the switch of the Finney siding It is not known whether the engineer or front brakeman of Extra 1805 East saw Extra 924 West and applied the brakes of his train in emergency before the collision

10 The investigation revealed no evidence which would tend to indicate that Extra 1805 East failed to stop at signal 202L due to physical incapacitation of the engineer and front brakeman. Considering that the engineer had been active at the locomotive controls shortly before the accident occurred, it does not seem likely the train failed to stop at signal 202L due to the engineer having fallen asleep at the locomotive controls. Thus, the possibility exists that the engineer and front brakemen did not see the Stop-and-Stay aspect displayed by signal 202L due to failure to maintain a lookout ahead, and thereby took no action to stop the train short of that signal, as required. However, because of death to the engineer and front brakeman, the reason why Extra 1805 East failed to stop at signal 202L could not be determined.

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

Mac E Rogers, Director  
Bureau of Railroad Safety