RAILROAD ACCIDENT INVESTIGATION

REPORT NO. 4160

SOUTHERN RAILWAY COMPANY

LEADVALE JCT., TENN

OCTOBER 26, 1969

FEDERAL RAILROAD ADMINISTRATION
BUREAU OF RAILROAD SAFETY
Washington, D C 20591

4160

DEPARTMENT OF TRANSPORTATION

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Synopsis

On October 26, 1969, a rear-end collision occurred between two Southern Railway freight trains near Leadvale Jct , Tenn It resulted in death to one, and in serious injury to one, crew members of the following train

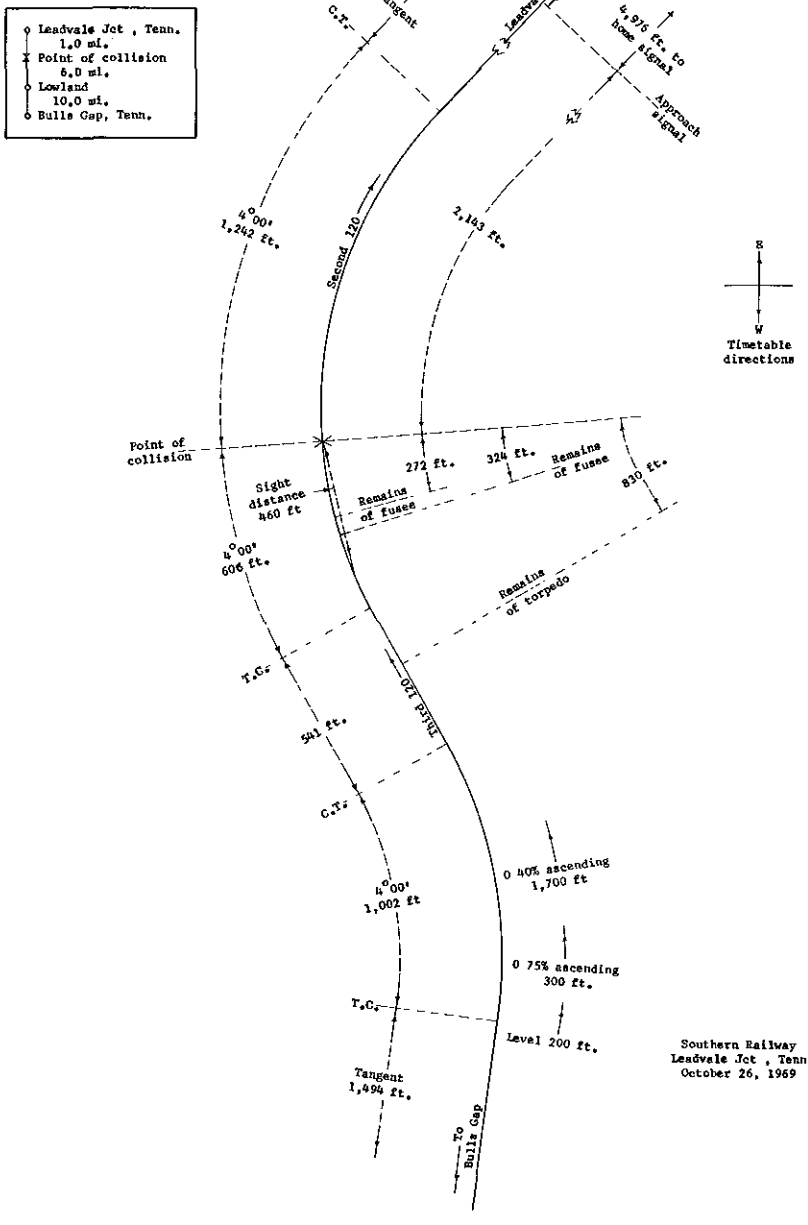
The accident was caused by failure of flagman of preceding train to provide adequate protection against the following train; failure of engineer to operate the following train in accordance with flagging signals placed on the track structure; improper use of the radio by crew members of both trains, and failure of the carrier to adequately enforce its radio rules

Location and Method of Operation

The accident occurred on that part of the railroad extending eastward from Bulls Gap to Leadvale Jct., Tenn , a distance of 17 0 miles This is a single-track line over which trains operate by timetable and train orders There is no block-signal system in use At Leadvale Jct , this line converges with another extending from New Line, Tenn to Asheville, N C The junction point is within an interlocking that is remotely controlled by the operator at Leadvale, 1 7 miles east of Leadvale Jct An interlocking home signal, governing eastbound movements through the

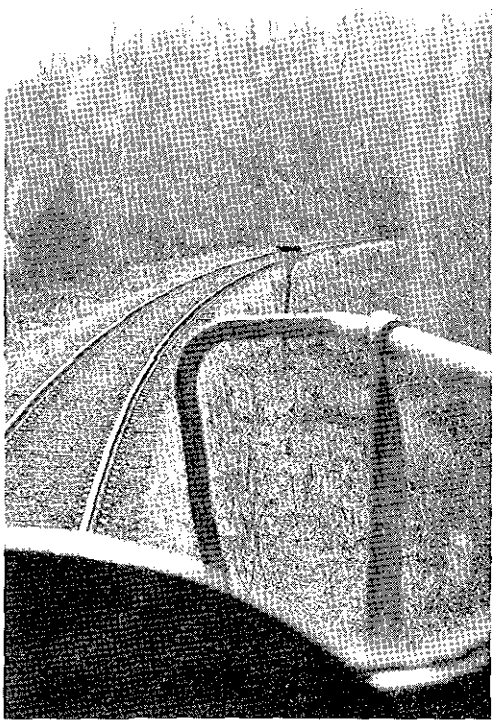
Summary

DATE:	October 26, 1969	
RAILROAD:	Southern	
LOCATION:	Leadvale Jct , Tenn	
ACCIDENT TYPE:	Rear-end Collision	
TRAINS INVOLVED	Freight	Freight
TRAIN NUMBERS:	Second 120	Third 120
LOCOMOTIVE NUMBERS:	3050, 3081, 6321, 6320, 3090, 3077 3094	3120, 3089, 3137, 3053
CONSISTS:	97 cars, caboose	61 cars, caboose
SPEEDS:	Standing	6-13 m p h
OPERATION:	Timetable, train orders	
TRACK:	Single; $4^{o}00'$ curve; 0 40% ascending grade eastward	
WEATHER:	Misty	
TIME:	12:15 a m	
CASUALTIES:	1 killed; 1 injured	
CAUSE:	Failure of flagman of preceding train to provide adequate protection against the following train; failure of engineer to operate the following train in accordance with flagging signals placed on the track structure; improper use of the radio by crew members of both trains, and failure of the carrier to adequately enforce its radio rules	



Southern Railway
Leadvale Jct , Tenn.
October 26, 1969

PLATE NO. 2



View eastward 460 feet to collision point (caboose).

Leadvale Jct interlocking, is 427 feet west of the junction point An approach signal is 4976 feet west of the home signal

The collision occurred on the main track, 2143 feet west of the approach signal for the Leadvale Jct interlocking

Track

From the west on the main track there are, successively, a tangent 1494 feet; a 4°00' curve to the left 1002 feet; a tangent 541 feet, and a 4°00' curve to the right 606 feet to the collision point and 1242 feet eastward The grade for eastbound trains is, successively, 0 46% ascending 2500 feet; practically level 200 feet; 0 75% ascending 300 feet, and 0 40% ascending 1700 feet to the collision point

View

Because of track curvature and trees along both sides of the railroad, the maximum range of vision between a caboose standing at the collision point and an approaching eastbound locomotive is 460 feet (see Plate No 2)

Time and Weather

The collision took place at 12:15 a.m , under misty weather conditions which did not materially restrict visibility

Authorized Train Speed

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

Carrier's Operating Rules

Reduced Speed - Proceed prepared to stop short of train or obstruction

Restricted Speed - Proceed prepared to stop short of another train *** but at a speed not exceeding 15 miles per hour

11 A train finding a burning fusee unattended on or near its track may pass and proceed at restricted speed for one mile

15 The explosion of two torpedoes is a signal to proceed at reduced speed until the way is seen to be clear

99 ***

When a train stops under circumstances in which it may be overtaken by another train, conductor or trainman must go back immediately with flagman's signals a sufficient distance to insure full protection, placing 2 torpedoes on rail 100 feet apart and, when necessary, display lighted fusees

Radio Equipment

The locomotive and caboose of both trains had radio telephones

Circumstances Prior to Accident

Train Second 120

This was an eastbound first-class freight train consisting of 4 diesel-electric units, 48 cars, 1 radio-equipment car, 3 diesel-electric units remotely controlled by radio from the engineer's station, 48 cars, and a caboose, in that order It left Bulls Gap at 11:10 p m the day before the accident The engineer and front brakeman were on the first locomotive unit; the conductor and flagman were in the caboose All the crew members were aware that Third 120 would follow their train eastward from Bulls Gap

Train Third 120

This was an eastbound first-class freight train consisting of 2 road-switcher type diesel-electric units, 30 cars, a radio-equipment car, 2 diesel-electric units remotely controlled by radio from the engineer's station, 30 cars, and a caboose (8022 tons), in that order It left Bulls Gap at 11:30 p m , 20 minutes after Second 120 The engineer and front brakeman were in the control compartment at the front of the first locomotive unit, with the engineer at the controls on the left, or north, side of the compartment The conductor and flagman were in the caboose

The Accident

Second 120

While this train was moving in the vicinity of Lowland, 7 0 miles west of Leadvale Jct , the operator at Leadvale advised the crew members by radio that they would not be permitted to proceed through the Leadvale Jct interlocking before No 19, a freight train operating from Asheville to New Line, passed the junction point within the interlocking

At 11:55 p m , Second 120 stopped with the front end a considerable distance short of the Leadvale Jct interlocking home signal, which indicated Stop The rear end stopped on a 4°00' curve to the right, 2143 feet short of the interlocking's approach signal Immediately after the train stopped, the conductor radioed the engineer of Third 120 and learned Third 120 was approaching Lowland at that time He then informed the engineer as to the location where the rear end of Second 120 was stopped and inquired "Are you going to come up behind my train, or are you going to stop back on the hill?" but heard no response

The flagman heard the conductor describing the location of the rear of their train to the following engineer, but heard no response before leaving the caboose to provide flag protection against Third 120 According to his statements he

walked back on the 4°00' curve to a point on tangent track 830 feet from the rear of his train and remained there after placing two torpedoes on the south rail He stated that he did not go farther back to provide flag protection, because he was at a location which would be visible to Third 120 at a considerable distance, due to track curvature At the time, he could see a faint reflection of the headlight of Third 120 farther westward After remaining in the vicinity of the two torpedoes for several minutes and not seeing a change in the headlight reflection, the flagman assumed Third 120 had stopped on a descending grade and that it would remain there until its engineer was advised by radio Second 120 had begun to move through the Leadvale Jct interlocking About the same time, he heard a train moving in the distance and assumed (1) it was No 19 passing Leadvale Jct (2) his train would soon be permitted to proceed through the interlocking Consequently, he began to return to his train While doing so, he placed a 10-minute lighted fusee on the track structure at a point either 272 or 324 feet from his caboose This fusee was on a 4°00' curve and could first be seen from an approaching eastbound locomotive at 567 or 1095 feet, depending on whether it had been placed 272 or 324 feet from the caboose, respectively

As the flagman neared the rear of his train, the conductor heard Third 120 moving in the distance and went to the platform at the rear of the caboose The flagman saw the conductor there and told him that Third 120 apparently was stopped on the descending grade to the rear of the ascending grade on which their train was standing Immediately afterward, the conductor saw the headlight of Third 120 come into view as that train neared or entered a 4°00' curve to the left beginning 2149 feet to the rear of his train He immediately called this to the attention of the flagman, then hurriedly called the engineer of the approaching train by radio and told him "If you can see my fusee, my cab is just the other side of it," but heard no response

Meanwhile, the flagman lighted another fusee and ran toward the approaching train while giving stop signals with the fusee According to his statements, he was near the fusee burning on the track structure when the locomotive of Third 120 passed him, and struck the rear of his train a few moments later The flagman stated that he (1) heard Third 120 explode the two torpedoes placed on the south rail (2) neither saw nor heard any acknowledgement of the torpedo explosions or his stop signals (3) neither saw nor heard any indication of the air brakes of Third 120 having been applied before the collision and, (4) thought Third 120 maintained a speed of 10 to 12 m p h as it passed him and collided with the caboose of his train

The conductor of Second 120 alighted from the caboose moments before the collision and escaped injury

Third 120

While this train was moving in the vicinity of Lowland the engineer heard, according to his statements, an unidenti-

fied person call over the radio that the caboose of Second 120 was stopped 15 or 16 car lengths (about 700 feet) west of the approach signal for the Leadvale Jct interlocking The conductor of Third 120 also heard that call and understood it was from the conductor of Second 120 He further understood the caboose had been described as being 10 to 15 car lengths west of the interlocking's approach signal

Several minutes later, the engineer initiated a service application of the brakes to control the speed of his train on a descending grade He subsequently elected not to attempt a running release of the brake application, resulting in the train stopping one to two miles to the rear of Second 120 Approximately five minutes later, when all the brakes released, the conductor called the engineer by radio and said, "Brakes released on the caboose " The engineer then started the train forward, and the conductor radioed "Cab moving, Bob " At that time, according to his statements, the engineer heard an unidentified voice on the radio call, "We are out of the way; come on over, Bob," The investigation revealed no support for that allegation, indicating it was not factual or that the engineer had misunderstood the last radio transmission from his conductor

The allegation indicates the engineer assumed Second 120 had moved through the Leadvale Jct interlocking and that he intended to move his train forward to the interlocking's home signal

Soon after it started forward on the descending grade, Third 120 entered the generally ascending grade involved while moving at 10 to 12 m p h , according to the conductor and flagman The engineer stated the train maintained a speed of 13 m p h on the ascending grade He further stated that he did not hear the explosion of any torpedo and that he was unaware of anything being wrong before he and the front brakeman simultaneously saw a lighted fusee on the track structure come into view About the same time, according to his statements, he heard an unidentified voice call over the radio "Do you see my caboose?" He stated that he immediately applied the train brakes in emergency upon hearing this inquiry and called to the front brakeman "Jump if you want to, we are going to hit them," but both he and the brakemen elected to remain in the locomotive control compartment He further stated he then saw the flagman giving stop signals with a lighted fusee from a point two to five cars lengths from the caboose of Second 120, and estimated that the speed of Third 120 had been reduced to 6 or 7 m p h when the collision took place

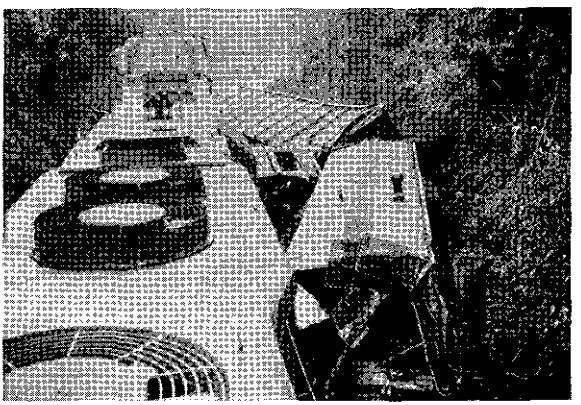
Damages

Second 120

The caboose and last two cars of this train were derailed The caboose overrode the underframe at the front of the first locomotive unit of Third 120 and dropped to the ground along the south side of the track, stopping upright between locomotive units of Third 120 and a wall of a cut (see Photo

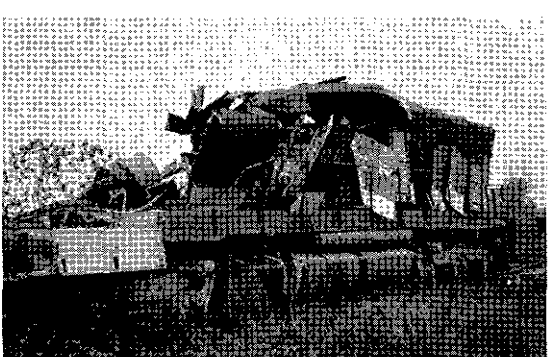
PLATE NO. 3

Photo No. 1



Caboose and last car of Second 120 alongside locomotive of Third 120.

Photo No. 2



First locomotive unit of Third 120.

No 1, Plate 3) It was destroyed The last car overturned and stopped immediately in front of the caboose It was heavily damaged The next-to-last car stopped on and in line with the track structure ahead of the last car It was slightly damaged

Third 120

This train stopped with its front end 86 feet east of the collision point Only the first locomotive unit derailed It stopped on and in line with the track structure The control compartment at the front of that unit was destroyed as a result of being struck by the caboose of Second 120 after the initial impact (see Photo No 2, Plate 3) The first locomotive unit was destroyed The second unit was damaged considerably

Cost of Damages

The carrier estimated the cost of damages to the equipment of both trains as being $206,900

Casualties

The front brakeman of Third 120 was killed The engineer of that train was seriously injured, sustaining amputation of the right arm, a punctured lung, and multiple abrasions and contusions

Train Crews' Hours of Service

Second 120

All crew members of this train had been on duty 2 hours 5 minutes at the time of the accident, after having been off duty over 17 hours

Third 120

All the crew members of this train had been on duty 55 minutes at the time of the accident The conductor had previously been off duty 10 hours 35 minutes, and the other crew members had been off duty over 17 hours

Post-Accident Examinations

Evidence of heavy sanding was found on the rails throughout a distance of 100 feet west of the collision point.

Fresh remains of burned-out fusees were found on the track structure 272 and 324 feet west of the collision point

The clip of an exploded torpedo was found adjacent to the south rail, 830 feet west of the collision point, at the location described by the flagman of Second 120

Crew Members Directly Involved

Flagman - Second 120

The flagman, age 69, was first employed by the carrier as a brakeman in December 1944 In 1961, he was dismissed from service for 30 days, for a rule and train-order violation Other than this, his service record was clear

Conductor - Second 120

The conductor, age 51, was first employed by the carrier as a brakeman in November 1940 and was promoted to conductor in September 1958 In 1965 and 1967, he was suspended from service for his responsibility in connection with damage to equipment Except for this, his service record was clear

Engineer - Third 120

The engineer, age 49, was first employed by the carrier in December 1941 and was promoted to engineer in December 1959 He had a clear service record

Front Brakeman - Third 120

The front brakeman, age 25, was first employed by the carrier two months before the accident His record was clear

Findings

1 After Second 120 stopped at Leadvale Jct , its flagman proceeded to a point 830 feet behind his caboose to provide protection against Third 120 Evidence indicates he placed two torpedoes on the south rail in the vicinity of that point

2 While having no knowledge as to whether an arrangement had been made by radio for the protection of his train against Third 120, the flagman apparently relied on radio communications between his conductor and the engineer of Third 120 for such protection

3 Although he saw the reflection of the headlight of Third 120 in the distance, the flagman returned to his train without having been recalled and after placing a lighted fusee on the track structure 324 or 272 feet from the caboose

4 The flagman was within a relatively few feet of his train when Third 120 was seen to be closely approaching He was not then providing full protection against Third 120, as required by the carrier Rule 99, and the lack of adequate flag protection against the following train was a significant causal factor in the accident

5 Third 120 approached the collision point at 10 to 13 m p h , while moving on an ascending grade Under these

circumstances, the stopping distances for the train under emergency and service brake applications were approximately 250 and 500 feet, respectively

6 The fusee left burning on the track structure by the flagman of Second 120 was first visible to the crew members on the locomotive of Third 120 at a distance of 1095 or 567 feet, when their locomotive was 1419 or 939 feet from the collision point Considering the stopping distances shown in Finding No 5, it is evident the engineer took no action to control the speed of Third 120, as required by the carrier's Rule 11, after the burning fusee came within his range of vision

7 When it was about 830 feet from the collision point, the locomotive apparently exploded two torpedoes placed on the south rail by the flagman of Second 120 Considering the stopping distances shown in Finding No 5, it is evident the engineer took no action at that time to operate his train at Reduced Speed, prepared to stop short of a train ahead, as required by the carrier's Rule 15

8 The engineer of Third 120 apparently did not apply the brakes in emergency before his train reached a point approximately 100 feet from the caboose of Second 120, as indicated by traces of heavy sanding found on the rails after the accident

9 Failure of the engineer of Third 120 to control the speed of his train properly in response to the fusee and torpedo signals placed on the track structure by the flagman of Second 120 was a significant causal factor in the accident

10 Shortly before the accident, crew members of both trains used the radio without identifying themselves, their trains, or persons called, as prescribed by the carrier's radio rules, and without acknowledging receipt and understanding of messages The loose manner in which the radio was used contributed significantly to the accident It led to no definite understanding or arrangement for the protection of Second 120 when the conductor of that train communicated by radio with the engineer of Third 120 several minutes before the accident, but led instead to the flagman of Second 120 relying unduly on that radio communication Lack of responses by the engineer to acknowledge receipt and understanding of radio communications apparently played an important role in the sequence of events culminating in the accident

11 The reason why the engineer of Third 120 did not respond properly to the lighted fusee and torpedoes placed on the track structure by the flagman of the preceding train appears to be that he felt no need to comply with these flagging signals, due to having gained the erroneous impression that Second 120 had moved through the Leadvale Jct interlocking and, therefore, the track ahead was clear to the interlocking's home signal This reason is supported by the engineer's allegation that at the time he started his train forward on the descending grade one to two miles from the collision point, he heard an unidentified voice call over the

radio, "We are out of the way; come on over, Bob " Inasmuch as the conductor of Third 120 used the radio about that time to call "Cab moving, Bob," it is probable the engineer misconstrued his conductor's radio communication to be one informing him that Second 120 had moved through the Leadvale Jct interlocking The danger inherent in loose use of the radio and acting upon inexplicit radio information from unidentified sources is well illustrated by what took place a few minutes later

12 The radio is used in the territory involved for trivial matters, as evidenced by disclosures that a train crew utilized the radio to complain about having been runaround by another crew, and that while en route from Bulls Gap the engineer of Third 120 was called by radio and informed he had won a football pool or lottery

13 The carrier's lack of adequate enforcement of its radio rules was also a contributing factor in the accident

14. The tragic consequences resulting from the Leadvale Jct collision and similar slow-speed collisions investigated by the FRA appear to be preventable Had the leading end of the first diesel-electric unit of Third 120 been provided with a crash bar device of sufficient size and strength to protect the control compartment by absorbing the impact of the overriding caboose and/or diverting the caboose to one side, there is a possibility the employees in the control compartment would have escaped the accident unharmed

Dated at Washington, D. C., this 9th
day of November 1970
By the Federal Railroad Administration

Mac E Rogers, Director
Bureau of Railroad Safety