

INTERSTATE COMMERCE COMMISSION
WASHINGTON

REPORT NO. 3437
SOUTHERN RAILWAY COMPANY
IN RE ACCIDENT
AT WOODSTOCK, ALA., ON
NOVEMBER 25, 1951

SUMMARY

Date: November 25, 1951

Railroad: Southern

Location: Woodstock, Ala.

Kind of accident: Head-end collision

Trains involved: Passenger : Passenger

Train numbers: 48 : Second 47

Engine numbers: Diesel-electric : Diesel-electric
unit 2923 units 2915 and
2801

Consist: 8 cars : 13 cars

Speeds: Standing : 45 m. p. h.

Operation: Signal indications

Track: Single; tangent; level

Weather: Clear

Time: 2:35 p. m.

Casualties: 17 killed; 68 injured

Cause: Failure to operate north-bound train
in accordance with signal indication

INTERSTATE COMMERCE COMMISSION

REPORT NO. 3437

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS
UNDER THE ACCIDENT REPORTS ACT OF MAY 6, 1910.

SOUTHERN RAILWAY COMPANY

January 16, 1952.

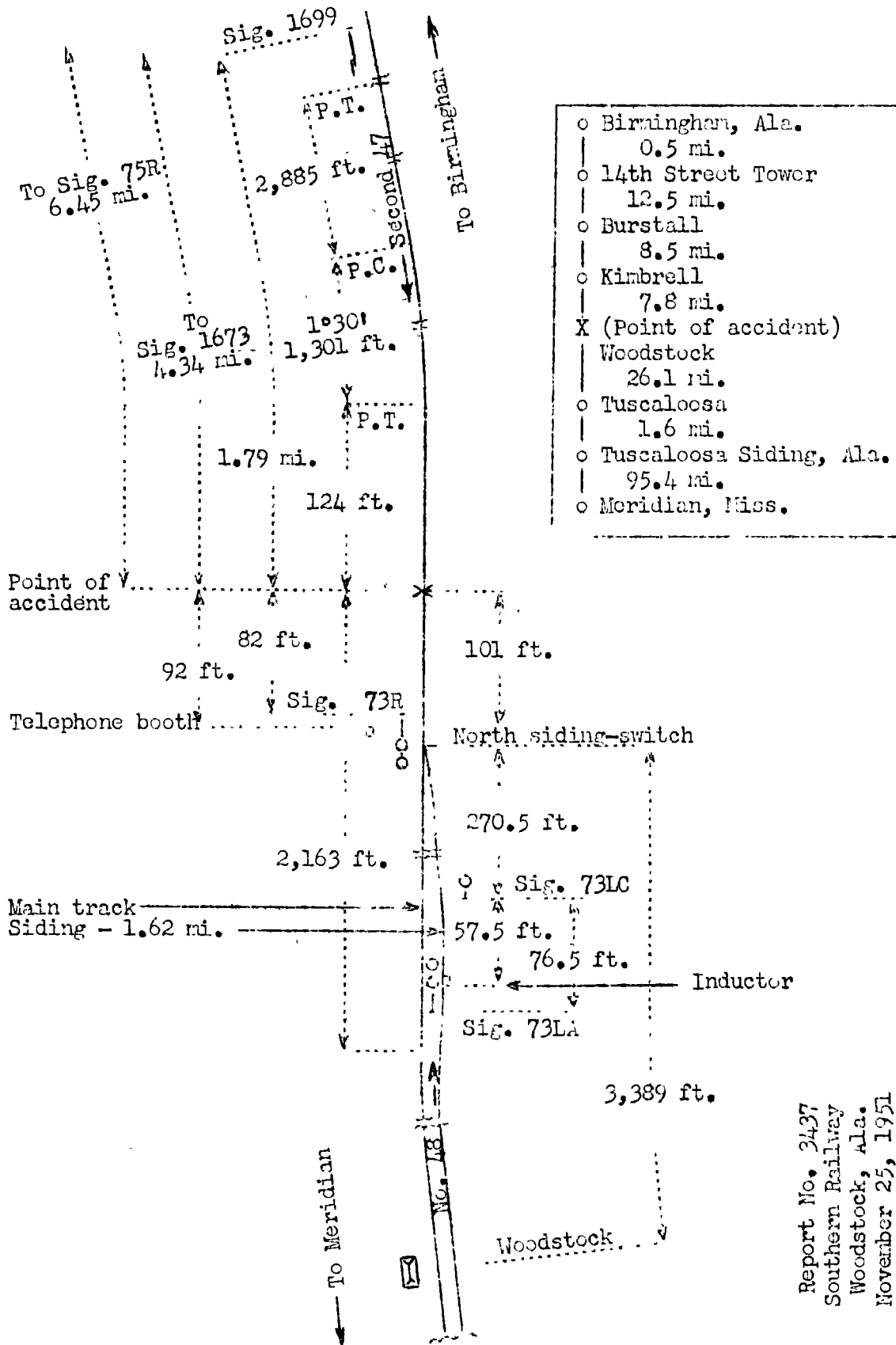
Accident at Woodstock, Ala., on November 25, 1951, caused
by failure to operate the north-bound train in
accordance with a signal indication.

REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On November 25, 1951, there was a head-end collision between two passenger trains on the Southern Railway at Woodstock, Ala., which resulted in the death of 15 passengers, 1 road foreman of engines and 1 train-service employee, and the injury of 52 passengers, 10 dining-car employees, 1 passenger-traffic employee, and 5 train-service employees. This accident was investigated in conjunction with representatives of the Alabama Public Service Commission.

¹ Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.



Report No. 3437
 Southern Railway
 Woodstock, Ala.
 November 25, 1951

Location of Accident and Method of Operation

This accident occurred on that part of the Alabama Great Southern Division extending between Meridian, Miss., and Birmingham, Ala., 152.4 miles. In the vicinity of the point of accident this is a single-track line, over which trains are operated by signal indications supplemented by an intermittent inductive automatic train-stop system. At Woodstock, Ala., 123.1 miles north of Meridian, a siding 1.62 miles in length parallels the main track on the east. The north switch of this siding is 3,389 feet north of the station. The accident occurred on the main track at a point 101 feet north of the north siding-switch. From the north there are, in succession, a tangent 2,885 feet in length, a 1°30' curve to the right 1,301 feet, and a tangent 124 feet to the point of accident and 2,163 feet southward. From the north the grade is 0.71 percent descending 4,609 feet, then there is a vertical curve 800 feet followed by practically level track 410 feet to the point of accident.

Controlled signal 75R at Kimbrell, the first station north of Woodstock, automatic signals 1673 and 1699, and controlled signal 73R at Woodstock, governing south-bound movements, are located, respectively, 6.45 miles, 4.34 miles, 1.79 miles north and 82 feet south of the point of accident. Controlled signals 75R and 73R are of the two-unit searchlight type. Automatic signals 1673 and 1699 are of the one arm semaphore type. Controlled signal 73LC, governing north-bound movements from the siding at Woodstock, is located east of the siding and 270.5 feet south of the north siding-switch. This signal is a one-unit dwarf searchlight type. All controlled signals are continuously lighted and all automatic signals are approach lighted. The aspects involved in this investigation and their corresponding indications and names are as follows:

<u>Signal</u>	<u>Aspect</u>	<u>Indication</u>	<u>Name</u>
75R	Green-over-Red	PROCEED	CLEAR SIGNAL
1673 1699	Vertical	PROCEED	CLEAR SIGNAL

73R	Yellow-over- Red	PROCEED, PREPARING TO STOP AT NEXT SIGNAL. TRAIN EXCEEDING MEDIUM SPEED MUST AT ONCE REDUCE TO THAT SPEED	APPROACH SIGNAL
73LC	Red	STOP	STOP SIGNAL

These signals form a part of a traffic-control system extending between Burstall and Tuscaloosa, Ala., located, respectively, 16.3 miles north and 26.1 miles south of Woodstock. This system was placed in service on October 10, 1951. The control machine is located in the train dispatcher's office at Birmingham. It is equipped with levers to control the power-operated switches and controlled signals and to establish the direction of traffic. It also is equipped with miniature lamps on the control panel to indicate when a siding, an OS section or the track between adjacent OS sections is occupied, when a controlled signal displays an aspect to proceed, when the position of a power-operated switch does not correspond with the position of its controlling lever, when a control or indication code is being transmitted, and when a route is locked. A single-stroke bell is provided for audible indication of OS track occupancy. The OS sections extend between the controlled entering and leaving signals at the end of a siding. Time, signal indication, switch indication, and route locking are provided. The automatic train-stop system is arranged to initiate an automatic brake application at the full service rate at a signal displaying a restrictive aspect. Each locomotive is equipped with a device by means of which an automatic application of the brakes may be forestalled by the engineer. When a brake application is initiated by the train-stop system, the brakes cannot be released until a time interval of about 1 minute 10 seconds has elapsed. If the brake valve is placed in lap position immediately after an automatic application has occurred, the brake-pipe reduction is limited to 20 pounds. The train-stop inductor for signal 73LC is located 57.5 feet south of that signal.

This carrier's operating rules read in part as follows:

DEFINITIONS

Yard Speed--A speed that will permit stopping within one-half the range of vision.

Medium Speed.--One-half authorized speed, at point involved, but not exceeding 30 miles per hour.

Slow Speed.--A speed not exceeding fifteen miles per hour.

33. All members of engine and train crews must, when practicable, communicate to each other by its name the indication of each signal affecting the movement of their train or engine.

34. The following signals will be used by flagmen:

Day signals (A red flag,
(Torpedoes and
(Fusees.

* * *

99. When a train stops under circumstances in which it may be overtaken by another train, the flagman must go back immediately with flagman's signals a sufficient distance to insure full protection, * * *

The front of the train must be protected immediately in the same way when necessary by the forward trainman, fireman, or other competent employe.

* * *

105. Unless otherwise provided, trains or engines using a siding or yard track must proceed at yard speed.

* * *

RULES GOVERNING OPPOSING AND FOLLOWING MOVEMENT OF TRAINS BY BLOCK SIGNALS

261. On portions of the railway, and on designated tracks so specified on the time-table, trains will be governed by block signals whose indications will supersede the superiority of trains for both opposing and following movements on the same track.

Timetable special instructions read in part as follows:

12. TRAIN MOVEMENTS

* * *

(Rules 261 to 264)

Between Burstall and the south end of Tuscaloosa Siding, Mile 200.4, trains or engines will be governed by block and interlocking signals whose indications will supersede the superiority of trains for both opposing and following movements on the same track.

* * *

The maximum authorized speed for passenger trains was 80 miles per hour.

Description of Accident

No. 48, a north-bound first-class passenger train, consisted of Diesel-electric unit 2923, one passenger-baggage car, one coach, one lounge coach, three coaches, one dining car and one tavern car, in the order named. All cars were of lightweight steel construction and were equipped with tightlock couplers. This train departed from Tuscaloosa, the last open office, at 2:01 p. m., 6 minutes late, passed signal 1756, which indicated Approach, passed signal 71L, at the south siding-switch at Woodstock, which indicated Restricting, entered the siding at Woodstock at the south switch and met First 47, passed signal 73LC, which indicated Stop, trailed through the north siding-switch at Woodstock while it was lined for main track movement, and stopped on the main track with the front of the Diesel-electric unit 101 feet north of the switch. About 1 minute later it was struck by Second 47.

Second 47, a south-bound first-class passenger train of the Louisville and Nashville Railroad, consisted of Diesel-electric units 2915 and 2801, coupled in multiple-unit control, one mail car, one baggage-dormitory car, three coaches, one dining car, and seven sleeping cars, in the order named. All cars were of lightweight steel construction, and were equipped with tightlock couplers. Because of a damaged bridge on the line of the Louisville and Nashville Railroad this train was being detoured over the Southern Railway, was being hauled by a Southern Railway locomotive, and was being operated by a Southern Railway crew. This

train departed from Birmingham at 1:55 p. m., 20 minutes late, passed 14th Street Tower, Birmingham, the last open office, at 2:05 p. m., 25 minutes late, passed signals 75R, 1373, and 1699, each of which indicated Proceed, and while moving at an estimated speed of 45 miles per hour it collided with No. 48.

The Diesel-electric unit of No. 48 was moved southward on the main track a distance of 194 feet and stopped upright, with all wheels derailed. The control compartment at the front of the unit was crushed inward and demolished, and the unit was otherwise badly damaged. The first car was derailed and stopped upright 108 feet south of the rear end of the Diesel-electric unit, with the front end on the main track and the rear end on the siding. The south end of this car was telescoped the full length of the passenger compartment by the second car. The second car and the front truck of the third car were derailed. The second car was badly damaged. The Diesel-electric units of Second 47 stopped upright and 115 feet south of the point of collision, with the front end of the first unit 8 feet west of the track and the rear end of the second unit 17 feet east of the track. The control compartment of the first unit was crushed inward and both units were otherwise badly damaged. The first car stopped on its left side and about 7 feet north of the point of collision, with the front end 19 feet and the rear end 32 feet east of the track. The second car stopped upright and 126 feet south of the point of collision, with the front end against the south embankment of an underpass and 70 feet west of the track and the rear end 13 feet west of the track. The second and the third cars remained coupled. The third car leaned to the west at an angle of about 30 degrees, with the rear end 29 feet west of the track. The fourth, fifth and the sixth cars remained coupled and stopped upright, with the front end of the fourth car against the rear end of the second car and the front end of the third car. The fifth and the sixth cars were derailed and stopped on the roadbed. The first four cars were demolished, the next four cars were badly damaged, and the other cars were slightly damaged.

The engineer of No. 48 and a road foreman of engines on Second 47 were killed. The conductor of No. 48 and the engineer, the fireman, the flagman and the baggageman of Second 47 were injured.

The weather was clear and the sun was shining brightly at the time of the accident, which occurred at 2:35 p. m.

Discussion

It was intended by the dispatcher that No. 48 would take the siding at Woodstock to meet both First and Second 47, the routes were lined for these movements, and the lights on the traffic-control machine indicated that the system functioned properly. No. 48 entered the siding at Woodstock at the south siding-switch and met First 47, which was standing on the main track. Although not required by the rules in traffic-control territory, First 47 was displaying signals for a following section and the engineer sounded the proper engine whistle signal while No. 48 was entering the siding. This signal was acknowledged by the engineer of No. 48 by two short blasts of the pneumatic horn. The engineer of No. 48 therefore knew that there was a second section of No. 47, although under the method of operation here in effect he had no means of knowing where he would meet the second section. No. 48 proceeded northward on the siding at a speed estimated by the members of the crew as about 15 miles per hour. The engine was equipped with a speed indicating and recording device but a tape for recording the speed was not provided. The engineer and the fireman were in the control compartment of the Diesel-electric unit, the baggageman was in the first car, the conductor was in the third car and the flagman was in the rear car. According to the fireman's statement, there was some conversation between the fireman and the engineer as to the probability of meeting the second section at Woodstock. When the engine was about 1,300 feet south of the dwarf signal governing north-bound movements from the siding, the engineer remarked to the fireman that he believed the signal was clear. The fireman then looked at the signal and said he also thought it was clear. There was no further conversation between the engineer and the fireman with respect to the aspect displayed by the signal. Both lights of signal 75LA, governing north-bound main-track movements, were red. The fireman said that so far as he knew the engineer did not operate the forestalling device of the automatic train stop system when passing over the inductor for the dwarf signal. When the engine was in the vicinity of the turnout frog, he observed that the north siding-switch was not in position for movement to the main track and he called a warning to the engineer. The engineer immediately made a brake application in first service position. When the fireman realized that the train would not be stopped short of the switch he again warned the engineer, who moved the brake valve to full service position. The brakes were not applied in emergency. The train stopped after the engine and the front truck of the first car had trailed through the siding switch.

After the train stopped, the fireman immediately alighted from the west side of the engine and proceeded northward to provide flag protection, using an orange-colored wiping cloth which he had in his hand. When he had gone only a short distance he saw Second 47 approaching at a speed which he realized was too high for that train to be stopped short of No. 48. He gave stop signals to Second 47, which were promptly acknowledged by the engineer of that train. The engineer of No. 48 alighted from the engine immediately behind the fireman and proceeded southward toward a telephone booth, which was located west of the track and 92 feet south of the front end of the engine. He was in the immediate vicinity of the telephone booth when the collision occurred, and he was killed by the derailed equipment. The baggageman alighted from the first car when he saw the engineer proceeding toward the telephone booth. When the train stopped, the flagman opened the vestibule door to determine the reason for the stop and alighted from the train when he observed Second 47 approaching.

As Second 47 approached the point where the accident occurred the speed was about 65 miles per hour. The engineer, the fireman and a road foreman of engines were in the control compartment of the first Diesel-electric unit, the baggageman was in the control compartment of the second Diesel-electric unit and the other members of the crew were in various locations in the cars of the train. Southward controlled signal 75R at Kimbrell and southward automatic signals 1673 and 1699 each indicated Proceed. When the engine was about 1,200 feet north of the north siding-switch at Woodstock, the engineer and the road foreman of engines observed No. 48 and soon afterward they realized that it was occupying the main track. The engineer then moved the brake valve to the emergency position. About the same time, the engineer observed the fireman of No. 48 giving stop signals, which he acknowledged by two short blasts on the pneumatic horn. The speed was reduced to about 45 miles per hour when the collision occurred. The road foreman of engines and the fireman jumped from the engine before the collision occurred.

The device on the traffic-control machine to record the time of track occupancy of OS sections had not been placed in service because only 44 miles of the traffic-control system had been installed. This system, when completed, will extend between Burstall and Meridian, Miss., 139 miles. However, both the dispatcher on duty and the chief train dispatcher were observing the control machine before and when the accident occurred, and a record of the

movements was made, which showed that No. 48 occupied the OS section at the south siding-switch at 2:31 p. m. and occupied the OS section at the north siding-switch at 2:35 p. m. The siding between the two OS sections is 8,303 feet and the OS section at the south siding-switch is 332 feet; based on this record an average speed of approximately 25 miles per hour was maintained. The dispatcher did not attempt to change any route after it had been lined. The dispatcher and the chief dispatcher stated that the fireman, in reporting the accident by telephone, said both he and the engineer thought the dwarf signal was clear, but when they got near the switch they saw that it was not lined for their train to enter the main track.

About 2 hours after the accident occurred the signal maintainer found that the north siding-switch at Woodstock had been trailed through while locked in position for main-track movement and that the switch machine was not damaged. He found that the southward controlled signal was struck during the accident and torn from its foundation, that both northward controlled signals at the north siding-switch at Woodstock and southward automatic signal 1699 were displaying their most restrictive aspects, that track relays of all occupied track circuits were deenergized, and that the directional stick relay at signal 1699 was energized. The latter condition indicates that Second 47 passed signal 1699 before No. 48 entered the OS section of the north siding-switch at Woodstock and that signal 1699 indicated either Approach or Proceed. About 4 hours after the accident occurred officials of the carrier's signal department, accompanied by representatives of the Commission, opened the instrument housings at Woodstock and inspected the traffic-control apparatus. This inspection disclosed that the controlling relays were in position for northward signals to indicate Stop, that the north siding-switch last was operated to the position for main track movement, that the route had been established for a south-bound movement on the main track, and that the traffic-control system had functioned and had transmitted an indication code to the control machine that the route was lined for a south-bound movement when last operated by the dispatcher.

After the southward controlled signal at Woodstock was replaced complete functional tests of the traffic-control and automatic train-stop systems were made by forces of the carrier's signal department and were observed by representatives of the Commission. These tests disclosed that a controlled signal would not display an aspect to proceed when any opposing or conflicting controlled or automatic signal was displaying other than its most restrictive

aspect, or when the block between Kimbrell and Woodstock was occupied by an opposing train, or when the block between a signal and the next signal in advance governing movements in the same direction was occupied by a preceding train, or when a switch over which a signal governed train movements was not in proper position and locked. A power-operated switch could not be operated when a controlled signal governing movements over such switch was displaying an aspect to proceed, or when the approach signal to such controlled signal was displaying an aspect more favorable than Approach, or when the track circuit in which the switch was located was occupied. An established direction of traffic between adjacent controlled stations could not be changed when the track between such stations was occupied, an established route could not be changed while occupied, and an established route, not occupied, could not be changed until all controlled signals governing movements over that route were caused to display their most restrictive aspects and then could not be changed until a time interval of about 3-1/2 minutes had elapsed. In these tests this system operated in all respects as intended. The mechanism of the dwarf signal at the north siding-switch at Woodstock was tested and no defective condition was found. All circuits which could produce a false-proceed indication of the dwarf signal as a result of grounding were tested and each tested a resistance both to ground and to other circuits well within the requirements of the Commission for such tests. The roadway equipment of the automatic train-stop system was in condition to initiate an automatic brake application at any signal displaying an aspect other than Proceed. The automatic train-stop apparatus on the engine of No. 48 was damaged as a result of the accident to the extent that it could not be tested. However, it was found sealed when first inspected after the accident occurred. It had been tested and had functioned properly before the beginning of the trip, and the warning whistle sounded when the acknowledging lever was operated at several points en route and at each of two restrictive signals immediately before the train entered the siding at Woodstock.

The controlled signal governing north-bound movements from the siding at Woodstock is of the dwarf searchlight type. The mechanism consists of two relays with horizontal tractive armatures which operate contacts below them, and a vertical beam carrying the spectacle into which three colored discs, red, yellow and green, are mounted. The movement of the spectacle follows the movement of the armature, thus controlling

the aspect of the signal. The optical system consists of a 5-watt, 10-volt lamp, a reflector into which the lamp is positioned, the colored discs on the spectacle, a truncated cone lying in a horizontal plane, an inner lens, an outer lens, and an outer roundel. The outer roundel is 8-3/8 inches in diameter with a smooth convex outer and a serrated inner surface. The serrations are for the purpose of deflecting the light beam through a vertical angle of 20 degrees from the horizontal. The outer lens is 8-3/8 inches in diameter and is mounted in a parallel plane and directly behind the roundel. It has smooth convex outer and concave inner surfaces. The inner lens is 4-1/2 inches in diameter, has a convex outer and a plane inner surface and is mounted in a parallel plane and about 7-3/4 inches behind the outer lens. The truncated cone has a flat-black, serrated inner surface. The base rests against the inner surface of the inner lens. The angle of truncation is about 55 degrees from the vertical and corresponds to the angle of the spectacle, and the aperture formed by the truncation corresponds to the area of one of the colored discs, which move in a plane parallel to that of the cone aperture. This design causes light from an external source to be reflected upward where it is absorbed by the flat-black serrated surface of the cone. In addition, only the colored disc corresponding to the position of the armature can be in place at the cone aperture. As a result, a phantom aspect conveying an indication to proceed cannot be produced by light from an external source.

About 24 hours after the accident occurred and with the sun shining brightly, it was observed by representatives of the Commission and by officials of the carrier that sunlight was reflected by the outer roundel of the dwarf signal. This reflected light was white and crossed the siding at an angle; it was not visible from the siding at distances greater than about 300 feet south of the signal. It was considerably more pronounced from the west side of the siding than from the east, and more pronounced from the ground than from the cab of an approaching engine. From the cab of an approaching engine, the reflected light disappeared at a point about 400 feet south of the signal, where the intended aspect could be clearly seen. On December 2, with weather conditions similar to those which prevailed when the accident occurred, a train of the same number and kind of cars and with a Diesel-electric unit of the same class as the unit of No. 48 on the day of the accident was operated through the siding at a speed of 15 miles per hour. The dwarf signal at the north end of the siding was arranged to

indicate Stop. From the cab, the dwarf signal light could be seen at a distance of more than 2,000 feet but no perceptible red appeared until the engine was within 800 feet of the signal. The red in the aspect became more pronounced as the engine progressed northward. The automatic train-stop system initiated a brake application at the dwarf signal which stopped the train in a distance of 242 feet. During these observations and tests there was nothing developed which would indicate that the red aspect might have appeared to be either yellow or green.

The light beam of the dwarf signal is deflected upward through an angle of 20 degrees. As a result, in bright sunlight the light is so diffused and dim at distances of more than about 800 feet that when the signal indicates Stop the red in the aspect is not perceptible. While the dwarf signal governs movements on the siding where speed was restricted and the aspect is adjusted for a short range view, there was a striking contrast at distances greater than about 800 feet when the aspect of this signal was compared with the two lights of northward signal 73LA, governing movements on the main track, located between the siding and the main track and 76.5 feet south of the dwarf signal. The lights of this signal were not diffused and appeared bright, with distinct color, at a distance of more than 2,000 feet. The lamps in all three units were identical. According to the statement of the fireman of No. 48, the enginemen first called the indication of the dwarf signal at a sufficient distance from the signal that the red did not appear in the aspect. Apparently, after accepting the aspect as proceed the enginemen did not observe the signal after the red in the aspect became clearly distinguishable, and the train was stopped by an application of the brakes initiated by the automatic train-stop system. From the fact that the engine overran the switch a distance of 101 feet it is apparent that the speed was considerably in excess of 15 miles per hour.

Cause

It is found that this accident was caused by failure to operate the north-bound train in accordance with a signal indication.

Dated at Washington, D. C., this sixteenth day of January, 1952.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.