INTERSTATE COMMERCE COMMISSION

WASHINGTON

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INVESTIGATION NO. 2632

THE ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY

REPORT IN RE ACCIDENT

AT MARIONVILLE, MO., ON

OCTOBER 9, 1942

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SUMMARY

| | | |
|---|---|---|
| Railroad: | St. Louis-San Francisco | |
| Date: | October 9, 1942 | |
| Location: | Marionville, Mo. | |
| Kind of accident: | Head-end collision | |
| Trains involved: | Freight | : Freight |
| Train numbers: | Fourth 33 | : First 32 |
| Engine numbers: | 4302 | : 4421 |
| Consist: | 74 cars, caboose | : 66 cars, caboose |
| Speed: | 5-10 m. p. h. | : 43 m. p. h. |
| Operation: | Timetable, train orders and automatic block-signal system | |
| Track: | Single; tangent; level | |
| Weather: | Clear | |
| Time: | About 4:06 p. m. | |
| Casualties: | 1 killed; 6 injured | |
| Cause: | Accident caused by an inferior train occupying main track on the time of an opposing superior train, and by an inadequate automatic block-signal system | |

INTERSTATE COMMERCE COMMISSION

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INVESTIGATION NO. 2632

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

THE ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY

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February 9, 1943.

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Accident at Marionville, Mo., on October 9, 1942, caused by an inferior train occupying the main track on the time of an opposing superior train, and by an inadequate automatic block-signal system.

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REPORT OF THE COMMISSION[1]

PATTERSON, Commissioner:

On October 9, 1942, there was a head-end collision between two freight trains on the St. Louis-San Francisco Railway at Marionville, Mo., which resulted in the death of one employee, and the injury of six employees.

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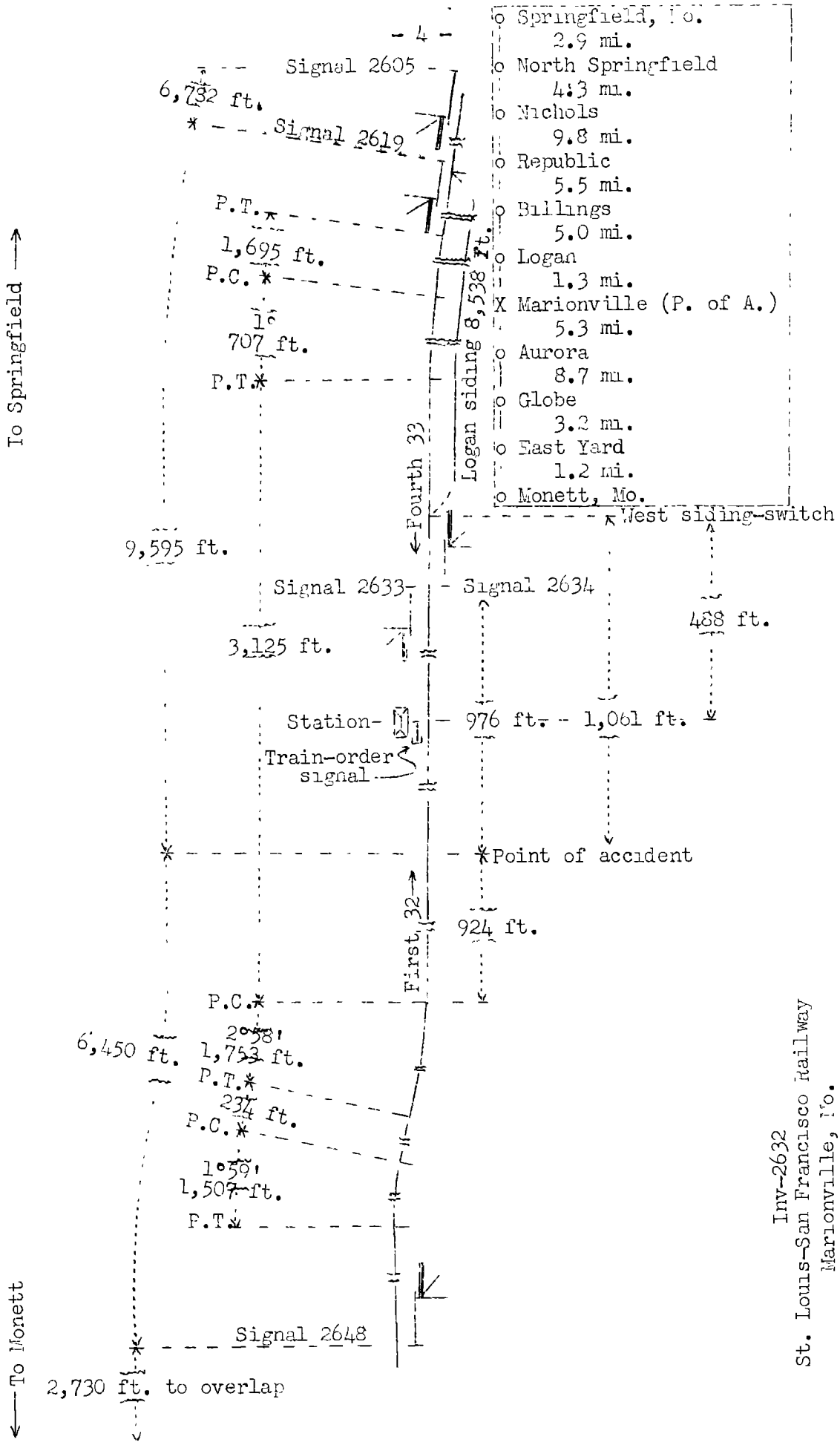
[1]Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.




Inv-2632
St. Louis-San Francisco Railway
Marionville, Mo.
October 9, 1942

## Location of Accident and Method of Operation

This accident occurred on that part of the Eastern Division designated as the Springfield Sub-Division and extending between Springfield and Monett, Mo., a distance of 42.9 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by timetable, train orders and an automatic block-signal system. Near Marionville a siding 8,538 feet in length parallels the main track on the south. The west switch of this siding is located 468 feet east of the station. The accident occurred at a point 1,061 feet west of the west siding-switch. Approaching from the east there is a tangent for a considerable distance, which is followed, in succession, by a 1° curve to the left 707 feet and a tangent 2,201 feet to the point of accident. Approaching from the west there are, in succession, a 1°59' curve to the right 1,507 feet in length, a tangent 234 feet, a 2°58' curve to the left 1,753 feet and a tangent 924 feet to the point involved. The grade for west-bound trains varies between 0.4 percent and 1.0 percent descending 1,800 feet, and then is level 1,000 feet to the point of accident. The grade for east-bound trains varies between 0.55 percent and 1.0 percent descending 4,700 feet and then is level 100 feet to the point involved.

The automatic block-signal system is arranged on the overlap principle and consists of double-location signals near the ends of sidings and intermediate signals between stations. The signals are of the one-arm, three-position, upper-quadrant, semaphore type, and are approach-lighted. The aspects and corresponding indications and names of these signals are as follows:

| Aspect | Indication | Name |
|---|---|---|
| Green | Proceed | Clear Signal |
| Yellow | Proceed at a speed reduced to not exceeding one-half the maximum authorized at point involved, prepared to stop at next signal | Approach Signal |
| Red | Stop | Stop Signal |

Signals 2605, 2619 and 2633, governing west-bound movements, are located, respectively, 16,377, 9,595 and 976 feet east of the point of accident. Signals 2648 and 2634, governing east-bound movements, are located, respectively, 6,450 feet west and 976 feet east of the point of accident. The controls of these signals are so arranged that when a west-bound train reaches a point 18,754 feet east of signal 2634, signals 2648 and 2634 display yellow, and when it reaches a point 10,959 feet east of signal 2634, that signal displays red. When an east-bound train reaches a point 19,008 feet west of signal 2619, signals 2605 and 2619 display yellow and signal 2633 displays red.

Operating rules read in part as follows:

14. Engine Whistle Signals

Note.--The signals prescribed are illustrated by "o" for short sounds, "___" for longer sounds. * * *

| SOUND | INDICATION |
|---|---|
| * * * | |
| (q) __ o o __ | Answer to yellow signal when displayed * * *. |
| * * * | |

83. A train must not * * * pass from double to single track, or leave a station where a train register is located, until it has been ascertained whether all trains due, which are superior, or of the same class, have arrived or departed.

87. On single track, an inferior train must keep out of the way of opposing superior trains and failing to clear the main track by the time required by rule must be protected as prescribed by Rule 99.

* * *

211 B. Enginemen must show train orders and Clearance Card "A" to fireman and when practicable to forward trainman. Conductors must show train orders and Clearance Card "A" to at least one trainman and when practicable to other trainmen. Trainmen and fireman must read the orders and return them and should there be occasion to do so remind conductor or engineman of their contents.

218. When a train is named in a train order, by its schedule number alone, all sections of that schedule are included, and each must have copies delivered to it.

FORMS OF TRAIN ORDERS

* * *

O

CHECK OF TRAINS

* * *

(2) First-class Trains due Pacific before 9:30 P. M. March 9th have arrived and departed except No. 5.

This form must be used as a separate order.

* * *

509. A train or engine on single track finding automatic block signal displaying stop indication, will stop before entering block and immediately send flagman in advance, wait five minutes after the flagman has preceded the train, then proceed at restricted speed, not exceeding ten miles per hour at any point, through the block. Flagman must precede train as far as possible in the five minutes before train starts through the block and continue preceding train until overtaken by his train.

* * *

DEFINITIONS

Restricted Speed. Proceed prepared to stop short of train, obstruction, or anything that may require the speed of a train to be reduced.

Special Instructions read in part as follows:

All trains will register by form 1339 Standard at * * * Nichols and Globe and operator will enter same on train register.

Time-table special instructions read in part as follows:

Eastward trains are superior to westward trains of the same class.

In the vicinity of the point of accident the maximum authorized speed for freight trains is 50 miles per hour.

Description of Accident

First 32, an east-bound second-class freight train, consisted of engine 4421, 66 loaded cars and a caboose. At East Yard, 17.2 miles west of Marionville, a terminal air-brake test was made, and the brakes functioned properly en route. This train departed from East Yard at 2:45 p. m., according to the dispatcher's record of movement of trains, 5 hours 15 minutes late. At Globe, 14 miles west of Marionville, the crew received a clearance, Form A, and, among others, train order No. 78, Form 19, reading as follows:

78.

First 32 Eng 4421 Wait At
Aurora until 355 Pm
Logan 405 Pm
Billings 413 Pm
Republic 420 Pm
Brookline 427 Pm for
Third and Fourth 33 Engs 4419 and
4302.

Third 33 has right over Second
32 and No 30 Nichols Globe.

First 32 departed from Globe at 3:33 p. m., 5 hours 48 minutes late, departed from Aurora, 5.3 miles west of Marionville and the last open office, at 3:56 p. m., passed signal 2648, which displayed approach, and while moving at a speed of 43 miles per hour, as indicated by the tape of the speed recorder with which engine 4421 was equipped, it collided with Fourth 33.

Fourth 33, a west-bound second-class freight train, consisted of engine 4302, 74 empty cars and a caboose. At North Springfield, 25.9 miles east of Marionville, a terminal air-brake test was made and the brakes functioned properly. This train departed from North Springfield at 3:25 p. m., according to the dispatcher's record of movement of trains, 5 hours 55 minutes late. At Nichols, 21.6 miles east of Marionville, the crew received a clearance, Form A, together with copies of train orders Nos. 81 and 82, Form 19, reading as follows:

81.

Regular Trains due Nichols
Before 322 pm Oct 9th have
Arrived And Departed Except
Fourth 33 No 32 No 46

82.

Fourth 33 Eng 4302 has right
Over Second 32 and No 30
Nichols to Globe

Fourth 33 departed from Nichols at 3:38 p. m., 5 hours 53 minutes late, passed Billings, 6.3 miles east of Marionville, at 4:01 p. m., 5 hours 46 minutes late, passed signal 2619, passed signal 2633, which displayed stop, passed the station at Marionville at 4:05 p. m., and while moving at an estimated speed of 5 to 10 miles per hour it collided with First 32 at a point 976 feet west of signal 2633.

The view of signal 2633 from the right side of a west-bound engine is unrestricted throughout a distance of 1,432 feet, and from the left side, 3,003 feet. The view of signal 2634 from the right side of an east-bound engine is unrestricted throughout a distance of 2,495 feet, and from the left side, 3,525 feet.

Engine 4302, of Fourth 33, stopped upright and in line with the track. The front end was telescoped, both cylinders were broken and the cab was demolished. The first 3 cars of Fourth 33 were derailed and stopped at various angles to the main tra Engine 4421, of First 32, stopped upright and in line with the track. The front end was telescoped and one cylinder was broken. The first 27 cars of First 32 were derailed and stopped at various angles to the track. The wreckage was contained within a distance of 500 feet. As a result of the derailment and fire which followed, 11 cars were destroyed.

It was clear at the time of the accident, which occurred about 4:06 p. m.

The employee killed was the engineer of First 32, and the employees injured were the fireman, a student fireman and the front brakeman of First 32, and the engineer, the fireman and the front brakeman of Fourth 33.

Data

During the 30-day period preceding the day of the accident, the average daily movement of trains in the vicinity of the point of accident was 36.1.

Tests made after the accident indicated that the signals involved functioned as intended.

After the accident a braking test of a west-bound freight train was conducted in the vicinity of the point of accident. This train consisted of an engine of the same class as the engine of Fourth 33, an air-brake test car, 74 empty tank cars and a caboose. This train was moving at a speed of 43 miles per hour at a point 3,000 feet east of signal 2633 where a 10-pound brake-pipe reduction was made. At this time the throttle remained open and the engine and tender brakes were released. Soon afterward another 10-pound reduction was made, the throttle was closed and the train stopped with the engine standing 25 feet east of the signal. Using the same engine, 67 loaded cars, the test car and a caboose, an east-bound braking test was conducted. This train was moving at a speed of 24 miles per hour as it passed signal 2648, and an 8-pound brake-pipe reduction was made. The speed remained constant on the 1-percent descending grade until the engine was about 3,500 feet west of signal 2634. At that point the brakes were applied in emergency and the train stopped with the engine standing 2,400 feet west of the point of accident.

Discussion

The rules governing operation on the line involved require an inferior train to keep out of the way of an opposing superior train. In addition, a train must not depart from the end of double track, or leave a station where a train register is located, until it has been ascertained whether all trains which are superior have arrived or departed.

No. 32, an east-bound second-class schedule, was due to leave Nichols, 21.6 miles east of Marionville and the end of double track, at 11:24 a. m.; however, train order No. 78, Form 19, required First 32 to wait at Logan, 1.3 miles west of Marionville, until 4:05 p. m., Billings, 5 miles east of Marionville, until 4:13 p. m., Republic, 10.5 miles east of Marionville, until 4:20 p. m., and Brookline, 16.4 miles east of Marionville, until 4:27 p. m. for Third and Fourth 33.

Fourth 33, a west-bound second-class train and inferior by direction, departed from Nichols at 3:38 p. m. where the crew of this train received copies of train order No. 81, which specified that regular trains due at Nichols before 3:22 p. m.,

October 9, had arrived and departed except Fourth 33, No. 32 and No. 46. The crew also received copies of train order No. 82, which specified that Fourth 33 had right over Second 32 and No. 30 between Nichols and Globe, respectively, 21.6 miles east and 14 miles west of Marionville. No copy of train order No. 78 was delivered to Fourth 33.

As First 32 was approaching Marionville, signal 2648 displayed approach and the engineer sounded the whistle in acknowledgment of that indication. The engineer, the front brakeman and a student fireman were maintaining a lookout ahead. The assigned fireman was on the deck of the engine. All members of the crew who were on the engine called the signal indication to each other. When First 32 passed signal 2648 the speed was about 47 miles per hour, and soon afterward the engineer made a service brake-pipe reduction. According to the statement of the front brakeman, as his train was moving on the curve to the left he observed that signal 2634 was displaying stop and that Fourth 33 was on the main track just beyond the signal. He called a warning to the engineer, who immediately placed the brake valve in emergency position, but First 32 collided with Fourth 33 at a point 976 feet west of signal 2634. The fireman was not aware of anything being wrong until after the brakes were applied in emergency. According to the speed-recorder tape, the speed of First 32 was 43 miles per hour at the time of the accident. The brakes of this train had been tested and had functioned properly en route. The engineer was killed in the accident. If the accident had not occurred, probably First 32 could not have been stopped short of signal 2634 as its speed was 43 miles per hour at a point 976 feet west of the signal.

As Fourth 33 was approaching Marionville, the speed was about 50 miles per hour and the enginemen and the front brakeman were maintaining a lookout ahead. According to their statements signal 2619 displayed proceed for their train. When this train was about 1,200 feet east of signal 2633 the fireman and the front brakeman observed that it was displaying stop and called that indication to the engineer, who made a service brake-pipe reduction. Soon afterward the engineer saw signal 2633 and First 32, and he moved the brake valve to emergency position, but the train passed signal 2633 and collided with First 32. Tests after the accident disclosed that in clear weather signal 2633 could be seen from the left side of a west-bound engine a distance of 3,000 feet. The engineer said that since signal 2619 had displayed proceed for his train he did not consider an emergency existed at signal 2633 and did not apply the brakes in emergency until he observed First 32. The speed was about 5 or 10 miles per hour at the time of the collision. The brakes had been tested and had functioned properly en route. In a test after the accident, a train similar to Fourth 33 was stopped 25 feet short of signal 2633 as a result of a service application of the brakes made 3,000 feet east of the signal.

The engineer and the conductor of Fourth 33 said that because of receiving a proceed indication at the home interlocking signal, which governed west-bound movements at the end of double

track at Nichols, together with the contents of train orders Nos. 81 and 82, they were confused. They understood that No. 32 was 4 hours 14 minutes overdue at Nichols, but, because their train was given right over Second 32 between Nichols and Globe, they erroneously assumed that First 32 had arrived at Nichols and that their train was authorized to proceed. The front brakeman questioned the engineer and the flagman questioned the conductor as to the authority of their train to proceed west of the end of double track; however, the engineer convinced the front brakeman and the conductor convinced the flagman that their train was authorized to proceed west of Nichols. If train order No. 78, which provided a series of waiting points for First 32, had been delivered to Fourth 33 the crew would have known that First 32 had not arrived at Nichols, the misunderstanding which existed in this case would not have occurred, and this accident would have been averted. It was the intention of the dispatcher to address order No. 78 to Fourth 33, but he said he forgot to do so. As a result, Fourth 33 had no authority to leave Nichols. If the members of the crew of Fourth 33 had had a correct understanding of train order No. 81, this accident would have been averted.

In the vicinity of the point of accident the signal system is arranged on the overlap principle. According to the statement of the signal engineer, in the vicinity of the point of accident the signal arrangement is such that two opposing trains should receive approach indications in advance of a stop signal; however, it is possible for signal 2619 to display proceed and signal 2633 to display stop for one of two opposing trains but the other will receive an approach and a stop indication. Since Fourth 33 received a clear indication at signal 2619, the crew of that train had no warning of the approach of an opposing train until the fireman saw signal 2633 displaying stop. After this observation was made the distance was not sufficient for Fourth 33 to stop short of signal 2633. First 32 received an approach indication at signal 2641 but the collision occurred before that train reached the next signal.

Section 207 of the rules, standards and instructions for the installation, inspection, maintenance and repair of automatic block-signal systems, prescribed by the Commission's order of April 13, 1939, which became effective September 1, 1939, provides as follows:

> 207. On track signaled for movements in both directions, signals shall be so arranged and controlled that proper restrictive indications will be provided to protect both following and opposing movements.

The automatic block-signal system at this location was in violation of section 207 of the Commission's order of April 13, 1939.

The investigation of this accident disclosed that the signal system involved was not in conformity with standards and

requirements prescribed by the Commission and currently in effect. This carrier has 1,328.2 miles of single-track line equipped with the automatic block system. On 1,292.8 miles the system in use is of the overlap type and requires modification to comply with the standards prescribed by the Commission as minimum safety requirements. To effect the required changes the carrier proposes to change the controls and convert the system to the APB type on 1,244.9 miles of line and to install a CTC system on 47.4 miles of line. During 1942, four applications covering respacing of automatic signals and changing the signal controls on the single-track lines of this carrier were denied by the War Production Board. Since the occurrence of the accident at Marionville the carrier has undertaken to provide double-approach indications for the protection of trains at meeting points, and this temporary arrangement has been placed in effect on a large percentage of its single-track automatic block-signal mileage. Had this arrangement been in effect at Marionville it is probable that this accident would have been averted.

The investigation disclosed also that Fourth 33 was made up entirely of privately owned tank cars, and only 2 of the 74 cars in this train were equipped with AB brakes conforming to present AAR standards. All other cars in this train were equipped with type K brakes. Had a major percentage of the cars in this train been equipped with AB brakes, an emergency application could have been obtained when First 32 came into view, and the consequences of the collision would have been considerably reduced. Neither the St. Louis-San Francisco Railway nor the private-car lines have kept pace with the program of equipping cars in service with AB brakes within a 10-year period beginning in 1935, as established by the Association of American Railroads. On June 30, 1942, after 75 percent of the 10-year period allotted for making this improvement had elapsed, private-car lines had equipped only 18.03 percent and the St. Louis-San Francisco Railway only 18.6 percent of their cars with the present standard air-brake apparatus. Progress in installing this equipment should be greatly accelerated. Under the stress of present wartime traffic conditions, it is particularly important that the advantages of this improved equipment be made fully available as rapidly as possible.

Cause

It is found that this accident was caused by an inferior train occupying the main track on the time of an opposing superior train, and by an inadequate automatic block-signal system.

Dated at Washington, D. C., this ninth day of February, 1943.

By the Commission, Commissioner Patterson.

W. P. BARTEL,
Secretary.

(SEAL)