

RAILROAD ACCIDENT INVESTIGATION

Report No 3957

THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY

SYRACUSE, KANS

JULY 6, 1962

INTERSTATE COMMERCE COMMISSION

Washington

S U M M A R Y

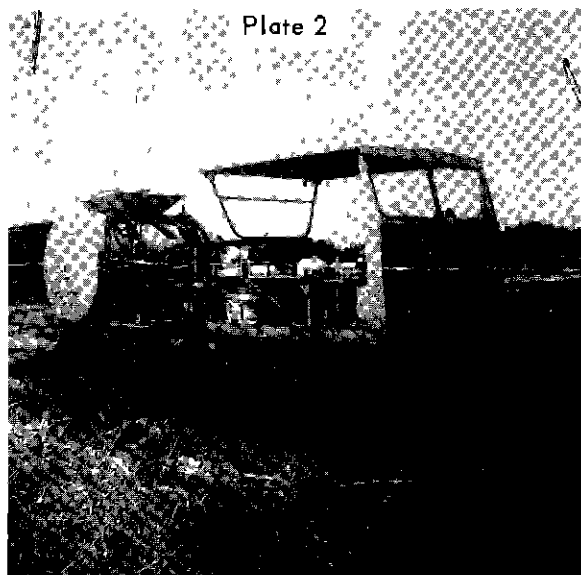
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DATE	July 6, 1962	
RAILROAD	Atchison, Topeka and Santa Fe	
LOCATION	Syracuse, Kans	
KIND OF ACCIDENT	Collision	
EQUIPMENT INVOLVED	Maintenance-of-way train	Passenger train
TRAIN NUMBERS	Work Extra 238	Second 8
LOCOMOTIVE NUMBERS		Diesel-electric units 22C, 21B, 305B, 18B, 22L
CONSISTS	3 units of on-track equipment	19 cars
SPEEDS	Standing or slow	71 m p h
OPERATION	Timetable, train orders, automatic block-signal system	
TRACK	Single, tangent, level	
WEATHER	Clear	
TIME	2 21 p m	
CASUALTIES	2 injured	
CAUSE	Failure of the block signal system properly to indicate track occupancy by a weed-burner unit, and by an inferior train (weed-burner and work equipment) occupying the main track on the time of a superior train without adequate protection	
RECOMMENDATION	That the Atchison, Topeka and Santa Fe Railway Company provide adequate protection for the movement of weed-burner or similar equipment on its line	

Plate 1



Plate 2



Track motorcar and extinguisher push car similar to those involved

INTERSTATE COMMERCE COMMISSION

REPORT NO 3957

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

THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY

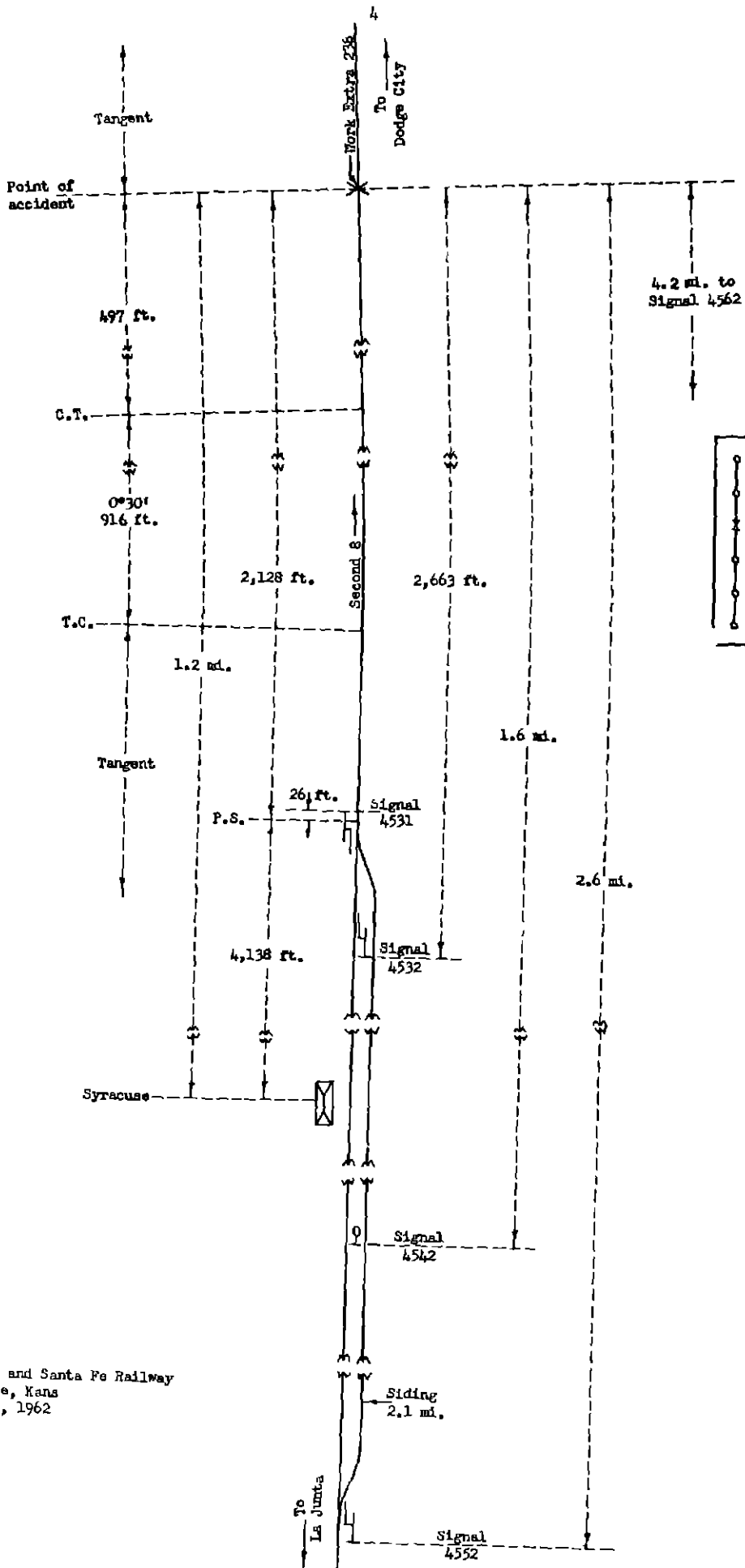
January 22, 1963

Accident near Syracuse, Kansas, on July 6, 1962, caused by failure of the block signal system properly to indicate track occupancy by a weed-burner unit, and by an inferior train (weed-burner and work equipment) occupying the main track on the time of a superior train without adequate protection.

REPORT OF THE COMMISSION¹*SAFETY AND SERVICE BOARD NO 1*

On July 6, 1962, near Syracuse, Kansas, there was a collision between a passenger train and a maintenance-of-way train on the Atchison, Topeka and Santa Fe Railway which resulted in the injury of 2 train-service employees

¹Under authority of section 17 (2) of the *Interstate Commerce Act* the above-entitled proceeding was referred by the Commission to Safety and Service Board No 1 for consideration and disposition



- | | | |
|---|-------------------|----------|
| o | Dodge City, Kans. | 89.7 mi. |
| o | Kendall | 10.5 mi. |
| x | Point of accident | 1.2 mi. |
| o | Syracuse | 7.5 mi. |
| o | Medway, Kans. | 93.5 mi. |
| o | La Junta, Colo. | |

The Atchison, Topeka and Santa Fe Railway
 Syracuse, Kans
 July 6, 1962

Location of Accident and Method of Operation

This accident occurred on that part of the Colorado Division extending between La Junta, Colo , and Dodge City, Kans , 202 4 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, supplemented by an automatic train-stop system . At Syracuse, Kans , 101 miles east of La Junta, a siding 2 1 miles in length parallels the main track on the south . The east switch of this siding is 4,138 feet east of the station .

The accident occurred on the main track at a point 1 2 miles east of the station at Syracuse and 2,128 feet east of the east siding-switch . From the west on the main track there are, in succession, a tangent of considerable length, a 0°30' curve to the left 916 feet, and a tangent 497 feet to the point of accident and a considerable distance eastward . In this vicinity the grade is practically level .

Automatic signals 4562, 4552, 4542 and 4532, governing eastbound movements on the main track, are located 4 2 miles, 2 6 miles, 1 6 miles, and 2,663 feet west of the point of accident, respectively . Signals 4562, 4552 and 4532 are of the upper-quadrant semaphore type and signal 4542 is of the color-light type . Signals 4562 and 4552 are approach lighted, and signals 4542 and 4532 are continuously lighted . The aspects applicable to this investigation and the corresponding names and indications are as follows :

Signal	Aspect	Indication	Name
4542	Green	Proceed	Clear
4562	Green with semaphore arm in vertical position		
4552			
4562	Yellow with semaphore arm in diagonal position	Proceed preparing to stop at next signal, * * *	Approach
4552			
4542	Red	Stop, then proceed as prescribed by Rule 320	Stop and Proceed
4532	Red with semaphore arm in horizontal position		

The circuits are so arranged that when the block of signal 4532 is occupied and the blocks of signals 4562, 4552 and 4542 are unoccupied, signals 4532 and 4542 display Stop and Proceed aspects, and signals 4562 and 4552 display Approach aspects .

Automatic signal 4531, governing westbound movements on the main track, is located 26 feet east of the east siding-switch .

A wayside inductor is located on the ties at a point a short distance in approach to each block signal . When a locomotive equipped with automatic train-stop (A T S) apparatus passes over a wayside inductor associated with a signal displaying a restrictive aspect, the brakes of the train will apply automatically unless the engineman has operated the acknowledging lever of the A T S apparatus of the locomotive to forestall the A T S brake application . A wayside inductor associated with a signal displaying a Clear aspect will not actuate the A T S apparatus of a passing locomotive . The locomotive of the passenger train involved in this accident was equipped with A T S apparatus .

This carrier's operating rules read in part as follows

Regular Train - A train authorized by a time table schedule

Extra Train - A train not authorized by a time table schedule It may be designated as - -

* * *

Work Extra - for work train extra

Restricted Speed - A speed that will permit stopping short of another train, * * * but not exceeding 20 miles per hour

73 Extra trains are inferior to regular trains

S-87 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

Unless otherwise provided, extra trains must clear the time of opposing regular trains not less than five minutes, * * *

99 * * *

When a train or engine 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, placing two torpedoes and, when necessary, in addition, displaying lighted fuses. When train or engines are under the protection of an automatic block system, * * * a sufficient distance to insure full protection is the distance necessary to insure full protection against a following train or engine approaching at restricted speed

* * *

The front of the train or engine must be protected in the same manner, when necessary

320 At a "stop and proceed" signal, a train will be governed as follows

(A) On single track, * * * where block can be seen to be clear of opposing movement, stop, then proceed at once at restricted speed

FORMS OF TRAIN ORDERS

E

Time Orders

* * *

(2) No 1 Eng 25 and No 3 Eng 21 wait at
 J until nine fifty nine 9 59 AM
 K ten thirty 10 30 AM
 M ten fifty five 10 55 AM
 etc

The train or trains, named must not pass the designated points before the time given. Other trains receiving the order are required to run with respect to the time specified at the designated points or any intermediate station where schedule time is earlier than the time specified in the order, as before required to run with respect to the schedule time of the train, or trains, named

The Interstate Commerce Commission's Rules, Standards and Instructions (Ex Parte 171), governing signal systems, read in part as follows

§ 136 51 Track circuit requirements - Track relay shall be in deenergized position whenever any of the following conditions exists, and the track circuit of an automatic train-stop * * * system shall be deenergized in the rear of the point where any of the following conditions exists

* * *

(b) When a train, locomotive, or car occupies any part of a track circuit, * * *

The maximum authorized speed for passenger trains in the vicinity of the point of accident is 90 miles per hour

Description of Accident

Work Extra 238, a maintenance-of-way train, consisting of self-propelled weed-burner unit 238, a track motorcar and an extinguisher push car, departed eastward from Syracuse about 1 15 p m and performed weed-burning operations in the block of signal 4532. Before departure from Syracuse the conductor-pilot assigned to this train received, among others, copies of train orders Nos 59 and No 117, which read in part as follows

Train Order No 59

Eng weed burner 238 works extra
seven ten 710 AM until seven ten
710 PM between Kendall and Medway
* * *

Train Order No 117

Second 8 Eng 22C wait at
Medway until Two Thirteen 213 PM
Syracuse Two Eighteen 218 PM
* * *

Kendall and Medway are, respectively, 11.7 miles east and 7.5 miles west of Syracuse. About 2 21 p m, while Work Extra 238 was stopping on the main track in the block of signal 4532, the extinguisher push car and the track motorcar of this train were struck by Second 8 at a point 1.2 miles east of the station at Syracuse and 2,128 feet east of the east siding-switch, and immediately thereafter the weed-burner unit was struck by No 8 at a point a short distance farther eastward.

Second 8, an eastbound first-class passenger train, consisted of car-body type diesel electric units 22C, 21B, 305B, 18B and 22L, coupled in multiple-unit control, 1 sleeper-dormitory car, 7 sleeping cars, 1 lounge car, 2 dining cars, 1 lounge car and 7 sleeping cars, in the order named. The cars were of all-steel construction and were equipped with tightlock couplers. This train departed from La Junta at 12 55 p m, 6 hours 15 minutes late, passed Medway, passed signals 4562, 4552 and 4542, which were displaying Clear aspects, passed the station at Syracuse at 2 20 p m, 5 hours 57 minutes late and 2 minutes after the time shown for this point in train Order No 117, and as it was about to pass signal 4532 the aspect of this signal changed from Clear to Stop-and-Proceed. The train then passed signal 4532, passed the east switch of the siding at Syracuse,

and a few seconds later, while moving eastward on the main track at a speed of 71 miles per hour, as indicated by the tape of the speed-recording device, struck the equipment of Work Extra 238.

The 3 units of Work Extra 238 were derailed and stopped in various positions on both sides of the track structure. Gasoline from the track motorcar and propane from the weed-burner became ignited as a result of the collision and flames spread over the first 2 diesel-electric units and the 4th and 5th cars of Second 8. The track motorcar, the extinguisher push car, and the weed-burner unit were destroyed as a result of the collision and the subsequent fire.

Second 8 stopped with the front end 2,725 feet east of the point of accident. None of its equipment was derailed, and no separations occurred. The 1st diesel-electric unit was somewhat damaged by the collision and the subsequent fire. The 2nd unit was somewhat damaged, and the 4th and 5th cars were slightly damaged, by fire.

Both enginemen of Second 8 were injured.

The weather was clear at the time of the accident, which occurred about 2:21 p. m.

During the 30-day period immediately preceding the day of the accident, the average daily movement in the vicinity of Syracuse was 15.2 trains.

Because of the curvature of the track a short distance west of the point of accident, and a highway billboard and a few trees on the north side of the track structure, the range of vision between the point of accident and an approaching eastbound train is somewhat restricted.

Weed-burner unit 238 (Plate 1) was 23 feet in length and 8 feet in width. It was provided with weed-burning apparatus and a top. It was mounted on four wheels on axles spaced 10 feet 9 inches between centers. It was equipped with air brakes, a 6-cylinder 126-horsepower propane gas engine, another propane gas engine for operating a hydraulic pump, and a 1,000-gallon fuel tank. The weed-burning apparatus consisted of 12 burner heads mounted on two manifolds, each of which was mounted on a boom 14 feet in length. The booms were attached to the unit in such manner as to permit burning of weeds throughout a distance of 24 feet in either direction from the centerline of the track. At the time of the accident the fuel tank contained about 600 gallons of propane, and the total weight of the unit was approximately 20,000 pounds. This unit was not insulated to prevent shunting of track circuits, which indicated it was intended to actuate the signal system.

The track motorcar was of the heavy-duty gear type and was provided with a 17.4-horsepower gasoline engine, 4-wheel brakes, a headlight, a windshield, and an aluminum top. It was 8 feet 10 inches in length, weighed about 1,500 pounds, and was insulated to prevent shunting of track circuits. It had a seating capacity for 8 persons.

The extinguisher push car was 10 feet 5 inches in length and 6 feet in width. It was equipped with a 500-gallon circular tank, a water pump, and a 4-cycle air cooled gasoline engine for pumping water from the tank. At the time of the accident, the tank contained about 425 gallons of water and the total weight of the car was approximately 6,000 pounds. This car was also insulated to prevent the shunting of track circuits.

Discussion

Work Extra 238 originated at Syracuse on the day of the accident. The conductor-pilot and the members of the track force assigned to this train reported on duty about 7:00 a. m. and about this time the conductor-pilot proceeded to the operator's office at Syracuse and received, among

others, copies of train order No 59, which authorized Work Extra 238 to operate between Medway and Kendall. Soon thereafter, this train commenced weed-burning operations at Syracuse, after which it proceeded westward toward Medway and then returned to Syracuse for a lunch period. About 1 00 p m, after the lunch period, the members of the track force were prepared to burn weeds alongside the main track eastward toward Kendall and the conductor-pilot again proceeded to the office of the operator at Syracuse, where he received, among others, copies of train order No 117. Under the provisions of this order, Second 8 was restricted from passing the east siding-switch at Syracuse before 2 18 p m. If Work Extra 238 returned to Syracuse it was required to clear the main track for Second 8 by 2 13 p m, five minutes before Second 8 was authorized to pass the east siding-switch at that point and failing to do so it was required to protect against Second 8 as prescribed by Rule 99. Second 8 was the first regular train due to pass Syracuse or Kendall after 1 00 p m.

Work Extra 238 departed eastward from Syracuse about 1 15 p m and while it was engaged in weed-burning operations along the main track in the block of signal 4532, the weed-burner moved at slow speed a short distance ahead of the track motorcar, which was pulling the extinguisher car. The conductor-pilot was riding with the operator of the weed-burner unit, the track foreman was operating the track motorcar, and trackmen were operating the equipment of the weed-burner unit and the extinguisher car. The conductor-pilot said that at various times while working during the morning he had observed signals displaying Stop-and-Proceed aspects when their respective blocks were occupied by the maintenance-of-way train, and that as this train departed eastward from Syracuse in the block of signal 4532 he observed that the semaphore arm of this signal was in Stop-and-Proceed position, indicating that the weed-burner had shunted the track circuits at this time. About 1 45 p m, after the weed-burner reached a point on the main track approximately 2 2 miles east of the east switch of the siding at Syracuse the conductor-pilot discussed the provisions of train order No 117 with the operator of the unit. He then decided that there was sufficient time to burn weeds throughout a distance of about one-half mile farther eastward before it would be necessary for the maintenance-of-way train to return to the siding at Syracuse and clear the main track for Second 8 at the east siding-switch. The weed-burner continued moving eastward and about 1 55 p m, after reaching a point on the main track approximately 2 7 miles east of the east siding-switch at Syracuse, it stopped and waited for the trackmen with the track motorcar and the extinguisher push car to extinguish the fires that had been ignited. The conductor-pilot boarded the track motorcar when it reached the weed-burner, and he said that he looked at his watch at this time and observed it was 2 00 p m. He said he then informed the track foreman that the maintenance-of-way train had 18 minutes to return to the siding at Syracuse and clear the main track for Second 8. At this time, however, Work Extra 238 had only 13 minutes remaining to clear the main track as required by rule and the provisions of train order No 117.

As Work Extra 238 proceeded westward in the block of signal 4532 en route to the Syracuse siding, the track motorcar with the extinguisher car at the west end moved at a distance of several hundred feet ahead of the weed-burner unit. The conductor-pilot said that the track motorcar was stopped at various points en route to the siding to extinguish small fires still burning at the ends of ties and on the shoulders of the track structure. He said that these stops apparently consumed more time than he realized, and that when the track motorcar with the push car reached a point in the vicinity of the east end of the 0°30' curve, a point approximately 1 600 feet east of the siding-switch at Syracuse, he and the track foreman observed the aspect of westward signal 4531 change from Clear to Approach, which indicated to them that Second 8 was closely approaching Syracuse. The conductor-pilot said that he then looked at his watch and observed it was then 2 19 or 2 20 p m, and that about the same time he also observed that the semaphore arm of signal 4532 was in vertical position, indicating that although this block was occupied by Work Extra 238 signal 4532 was displaying a Clear aspect, instead of a Stop-and-Proceed aspect, during the approach of Second 8.

The track motorcar immediately stopped in the vicinity of the east end of the curve, and after stopping it was reversed and proceeded eastward with the extinguisher car toward the weed-burner unit. The conductor-pilot said that he obtained fuses and alighted from the track motorcar as it was stopping, and that he immediately lighted a fuse and ran westward on the curve to provide protection against Second 8. He said that while running on the curve he first observed Second 8 approaching, apparently as this train was in close approach to signal 4532, and that he immediately gave stop signals with the lighted fuse. He said that the engineer of the approaching train acknowledged these stop signals by sounding the locomotive horn, and that he then observed a cloud of dust or sand being emitted from under the approaching locomotive, which indicated to him that the brakes of the train had been applied. About this time the conductor-pilot realized that Second 8 was moving at a speed which would prevent it from being stopped short of a collision. He said that the locomotive of Second 8 then passed him on the curve and the collision occurred immediately thereafter.

The track foreman and the other members of the track force first observed Second 8 as it was approaching on the curve, and they alighted from the equipment of Work Extra 238 immediately before the collision occurred. The track foreman said that he had not read train order No. 117, and that he had no knowledge of the provisions of this order before the conductor boarded the track motorcar to proceed westward to the siding at Syracuse. He said that at this time the conductor informed him the maintenance-of-way train had 18 minutes to return to Syracuse and clear the main track for Second 8.

As Second 8 was approaching Syracuse its speed was 81 miles per hour as indicated by the tape of the speed-recording device. The enginemen were in the control compartment at the front of the locomotive, and the other members of the crew were at various locations in the cars. The brakes had been tested and had functioned properly when used en route. The headlight was lighted. Both enginemen said that signals 4562, 4552, and 4542 were displaying Clear aspects as the locomotive approached and passed them, and that after the locomotive passed signal 4542 they observed signal 4532 also displaying a Clear aspect. The engineer said, however, that as the train was closely approaching signal 4532 he observed its semaphore arm start descending toward a restrictive position, and that he immediately initiated a service application of the brakes. As the locomotive was about to pass signal 4532 the engineer observed the semaphore arm of this signal descend to Stop-and-Proceed position and he immediately moved the handle of the automatic brake valve from service to emergency position and about the same time he first observed the conductor-pilot of Work Extra 238 giving stop signals with a lighted fuse. The speed of the train was reduced to 71 miles per hour before the collision occurred. The members of the crew in the cars of Second 8 were unaware of anything being wrong before the brakes of the train were applied in emergency.

Examination of the signals and the track circuits involved disclosed nothing to indicate a defective condition.

Examination of the weed-burner unit after the accident occurred disclosed that the tread of the wheels on one axle bore an oily foreign substance from 1 to 1½ inches in width throughout the circumference of the wheels. The other wheels of the weed-burner apparently had moved through ballast which cleaned their treads. Apparently the oily foreign substance found on the treads of the wheels was sufficient to prevent these wheels from shunting track circuits. From statements made by the conductor-pilot, the signal supervisor and the division superintendent involved, it was common knowledge that although weed-burner unit 238 was designed to shunt track circuits, it frequently failed to shunt track circuits or shunted them only intermittently.

The investigation disclosed that when Work Extra 238 departed eastward from Syracuse in the block of signal 4532, it apparently shunted the track circuit and actuated the signals. While this train was moving in the block of signal 4532, apparently foreign substances accumulated on the treads of the wheels of the weed-burner and was sufficient to prevent the weed-burner from shunting the track circuit. This resulted in loss to Work Extra 238 of protection of the automatic block system. The conductor-pilot of Work Extra 238 was unaware that the weed-burner had failed to keep the track circuit shunted before his train reached the 0°30' curve while en route to the siding at Syracuse. At this time he observed that westward signal 4531 was displaying a restrictive aspect which indicated to him that Second 8 was closely approaching Syracuse, and about the same time he observed that the semaphore arm of signal 4532 was in vertical position, indicating that this signal was displaying a Clear aspect although its block was occupied by the maintenance-of-way train.

The rules of this carrier provide that work extras must clear the time of regular trains. Under Rule 99, when trains or engines are under protection of an automatic block signal system, a sufficient distance to insure full protection, as prescribed for the flagman, is the distance necessary to insure protection against a train or engine approaching at restricted speed. The investigation disclosed that in the instant case that although Work Extra 238 was occupying the main track in the block of signal 4532, the signal at the entrance of that block indicated Proceed as Second 8 was approaching and until immediately before the locomotive of this train passed when the aspect changed to indicate Stop-and-Proceed, and that signal 4542 which also should have indicated Stop-and-Proceed under existing conditions of track occupancy, instead indicated Proceed for Second 8. In addition, signals 4552 and 4562 each of which under these conditions of track occupancy should have displayed an Approach aspect, instead displayed a Proceed aspect at the time Second 8 entered the respective blocks over which these signals governed. As a result, Second 8 was moving at a speed of 81 miles per hour in territory where the maximum authorized speed is 90 miles per hour as it was approaching Syracuse, although the main track in the block immediately east of the siding was occupied by Work Extra 238. Work Extra 238 which was delayed while maintenance-of-way employees extinguished several small fires that had been ignited by the weed-burner, failed to clear Second 8 at Syracuse by 2:13 p.m. and continued to move westward toward the siding at that point until the conductor-pilot became aware that the superior train was closely approaching. He then alighted with flagman's signals and ran westward giving stop signals with a lighted fusee in the direction of the approaching train. The brakes of Second 8 were applied in emergency when the indication of signal 4532 changed from Proceed to a more restrictive indication and about the same time that the conductor-pilot came into view of the members of the crew on the locomotive of the approaching train but the train could not be stopped short of the point of collision. If the weed-burner unit had properly shunted the track circuits to actuate the signals Second 8 would have received restrictive signal indications at signal locations, respectively, 4.2 miles, 2.6 miles, 1.6 miles, and 2,663 feet west of the point of accident. The signals located 1.6 miles and 2,663 feet west of the point of collision each would have indicated Stop-and-Proceed and Second 8 would have been required to stop at each of these signals and then proceed at restricted speed and be operated in such manner that it could be stopped short of another train. If the signal system had functioned as intended this accident would have been averted.

The investigation further disclosed that on several previous occasions it had been reported to carrier officials that the weed-burner unit involved had failed properly to shunt track circuits, as a result of which signals did not display proper aspects. It was common knowledge that operation of this unit often was accompanied by irregular or intermittent operation or actuation of signals and crossing warning devices. However, no action was taken to modify applicable provisions of

Rule 99 nor to provide greater protection by other means for this type of equipment, which because of its comparative light weight, short wheel base and operational characteristics cannot be depended upon to shunt track circuits and actuate signal apparatus in the same manner as a locomotive or heavier car equipment. The operating rules of this carrier contain instructions Providing for Establishing Absolute Block within automatic train stop territory which could readily be adapted to insure adequate protection for equipment of the type here involved while operating in automatic block signal territory. In the instant case when Work Extra 238 failed to clear the main track as required by rule flag protection was required to be provided only against trains or engines moving at restricted speed. The flag protection which was provided probably would have prevented the accident if Second 8 had been moving at restricted speed.

Cause

This accident was caused by failure of the block signal system properly to indicate track occupancy by a weed-burner unit, and by an inferior train (weed-burner and work equipment) occupying the main track on the time of a superior train without adequate protection.

Recommendation

It is recommended that the Atchison, Topeka and Santa Fe Railway Company provide adequate protection for the movement of weed-burner or similar equipment on its line.

Dated at Washington, D C , this twenty-second
day of January, 1963

By the Commission, Safety and Service Board No 1

(SEAL)

HAROLD D McCOY,

Secretary