

INTERSTATE COMMERCE COMMISSION
WASHINGTON

REPORT OF THE DIRECTOR
BUREAU OF SAFETY

ACCIDENT ON THE
UNION PACIFIC RAILROAD

EDSON, WYO.

OCTOBER 1, 1940

INVESTIGATION NO. 2450

SUMMARY

Inv-2450

Railroad: Union Pacific

Date: October 1, 1940

Location: Edson, Wyo.

Kind of accident: Rear-end collision

Trains involved: Freight : Passenger

Train numbers: Extra 9031 : 82

Engine numbers: 9051 : 826

Consist: 63 cars and : 16 cars
caboose

Speed: Standing : 35 m. p. h.

Operation: Timetable, train orders and
automatic block-signal system

Track: Double; tangent; 0.5 percent
ascending grade eastward

Weather: Light rain

Time: About 3:55 a. m.

Casualties: 1 killed; 28 injured

Cause: Failure to provide adequate flag
protection for first train and
by second train being operated
in accordance with signal dis-
playing false clear indication

Inv-2450

November 29, 1940.

To the Commission:

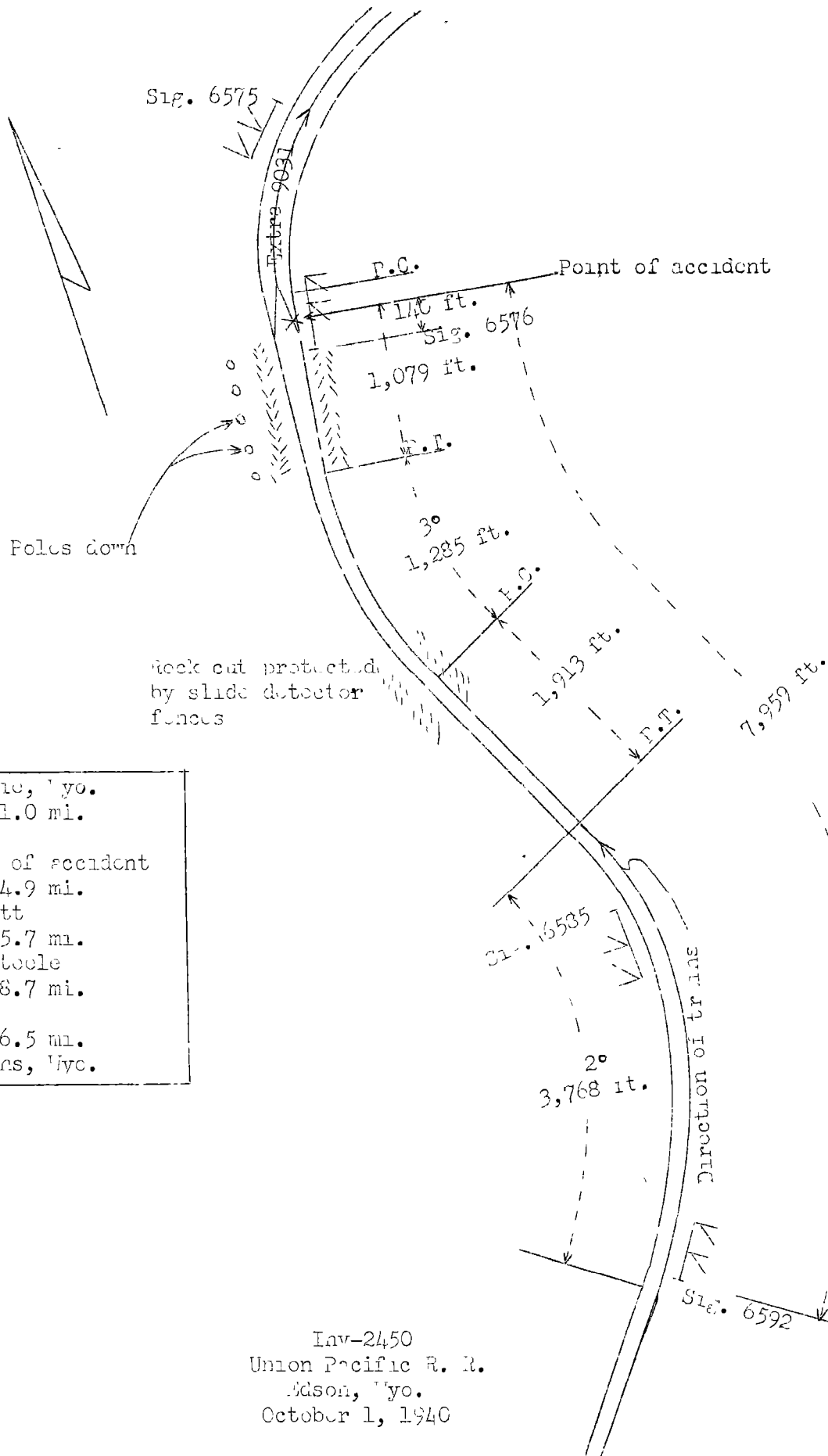
On October 1, 1940, there was a rear-end collision between a freight train and a passenger train on the Union Pacific Railroad at Edson, Wyo., which resulted in the death of 1 employee and the injury of 23 passengers, 4 railway-mail clerks, and 1 employee.

Location and Method of Operation

This accident occurred on that part of the Wyoming Division designated as the Sixth Subdivision which extends between Rawlins and Laramie, Wyo., a distance of 113.8 miles. In the vicinity of the point of accident this is a double-track line over which trains are operated by timetable, train orders and an automatic block-signal system. At Edson a siding 6,409 feet long lies between the main tracks; the west switch is connected to the eastward main track at a point 3,407 feet west of the station. The accident occurred on the turnout of the west switch at a point 40 feet east of the switch points. As the point of accident is approached from the west there are, in succession, a tangent 9,817 feet in length, a 2° curve to the left 3,768 feet in length, a tangent 1,913 feet in length, a 3° curve to the right 1,285 feet in length, and a tangent extending 1,079 feet to the point of accident and 95 feet beyond. The grade for east-bound trains is 0.5 percent ascending at the point of accident.

Automatic signals 6592 and 6576, which govern movements on the eastward track, are located, respectively, 7,959 feet and 140 feet west of the point of accident. These signals are of the two-arm, two-position, lower-quadrant, semaphore type, approach lighted. The aspects, indications, names, and rule numbers are as follows:

<u>Aspect</u>	<u>Indication</u>	<u>Name</u>	<u>Rule No.</u>
Green-over-green	Proceed	Clear signal	501 C
Green-over-yellow	Proceed preparing to stop at next signal. Train exceeding medium speed must at once reduce to that speed	Approach signal	501 B
Red-over-yellow	Stop	Stop signal	501 A



o	Laramie, Wyo.
	91.0 mi.
o	Eason
X	Point of accident
	4.9 mi.
o	Walcott
	5.7 mi.
o	Ft. Steele
	8.7 mi.
o	Parco
	6.5 mi.
o	Rawlins, Wyo.

Inv-2450
 Union Pacific R. R.
 Edson, Wyo.
 October 1, 1940

Medium speed is defined as a speed not exceeding thirty miles per hour.

Approximately a mile east of signal 6592 and about 2,000 feet west of the west siding-switch the track is laid in a rock cut 412 feet in length having a maximum depth of 69 feet. Rock-slide protection fences are provided on each side of this cut. When either of these fences is tripped, eastward signal 6592 and westward signal 6575 display stop indications.

The top arms of signals 6575 and 6592 are controlled by relayed track circuits and are clear when the track is unoccupied to the next signal in advance. The bottom arms are controlled by line circuits to the next signal and are clear when the top arm of the signal in advance is clear and the track is unoccupied to the second signal in advance. In addition, these signals are controlled by relays which are located at the signals and indicate the condition of the rock-slide protection fences. These relays, which are controlled over line circuits extending from the rock-slide protection fence to the signals, are energized from a battery located at the protection fence. All line circuits are carried on No. 9 non-insulated iron wires, spaced 12 inches apart on cross arms on white cedar poles, and have a common return wire. The pole line practically parallels the track on the north side at a distance of from 20 to 150 feet.

Rules and Instructions of the Transportation Department read in whole or in part as follows:

34. 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.

36. Unless otherwise provided, an inferior train must clear the time of a superior train, in the same direction, not less than ten minutes; but must be clear at the time a first-class train, in the same direction, is due to leave the next station in the rear where time is shown.

99. When a train stops, except when clear of the main track, the flagman must go back immediately with flagman's signals, a sufficient distance to insure full protection. One-half mile from the rear of his train he will place two torpedoes on the rail, continuing back one mile from the rear of his train he will place two torpedoes on the rail. He may then return to the two torpedoes one-half mile from rear of his train where he must remain until relieved by an-

other flagman or is recalled by the whistle of his engine.

* * *

Should a train be seen or heard approaching before the flagman has reached the required distance, he must at once place two torpedoes on the rail, and if it is by night or during foggy or stormy weather, he must display a lighted red fusce in addition, and continue in the direction of the approaching train and flag it with hand signals.

* * *

When a train is moving under circumstances in which it may be overtaken by another train, the flagman must take such action as may be necessary to insure full protection. By night, or by day when the view is obscured, lighted fuses must be thrown off at proper intervals.

* * *

The following signals will be used by flagmen:

* * *

Night signals. - A red light, a white light, not less than ten torpedoes, three red and three yellow fuses.

99 (A) When the train requires protection, the engineman must immediately sound the whistle signal for the flagman, and if necessary, repeat the signal until protection is assured.

99 (B) Other duties must not be permitted to interfere with the proper protection of the train.

In the vicinity of the point of accident the maximum authorized speed for passenger trains hauled by steam engines is 70 miles per hour.

Immediately west of signal 6576 the track is laid in a cut about 700 feet in length, having a maximum depth of 61 feet. Because of this cut the view of signal 6576 from an east-bound engine is restricted to about 1,500 feet.

It was dark and a light rain was falling at the time of the accident, which occurred about 3:55 a. m.

Description

Extra 9031, an east-bound freight train, with Conductor Estes and Engineman Wall in charge, consisted of engine 9031, 47 loaded and 16 empty cars, and a caboose. At Rawlins the crew received copies of a clearance card, and train orders Nos. 2 and 4, Form 19, which read in part as follows:

No. 2 -

* * *

No 88 wait at

Rawlins until	three seventeen	317 am
Parco "	three twenty six	326 am
Ft Steele "	three thirty four	334 am
Edson "	three forty five	345 am
Percy "	three fifty four	354 am
Hanna "	four five	405 am

No. 4 -

* * *

No. 88 run five 5 mins late on order No 2
Rawlins to Hanna and wait at Hanna until
four ten 410 am

This train departed from Rawlins at 3 a. m., according to the train sheet, and arrived at the west siding-switch at Edson at 3:36 a. m., and the crew found the siding occupied by Extra 9010 East, which consisted of 74 cars and a caboose. Extra 9031 moved into the siding as far as possible but was unable to clear the main track and stopped with its rear end standing on the turnout. After it stood at this point about 19 minutes the rear end was struck by No. 88.

No. 88, an east-bound passenger train, with Conductor Higgins and Engineman Davis in charge, consisted of engine 826, of the 1-8-4 type, four mail cars, one express car, one baggage car, four coaches, one lounge car, and five tourist Pullman sleeping cars, in the order named; all cars were of steel construction. At Rawlins the crew received copies of a clearance card and train orders Nos. 2 and 4, Form 19, previously quoted. No. 88 left Rawlins at 3:27 a. m., according to the train sheet, 20 minutes late, and, while moving at a speed estimated to have been about 35 miles per hour, collided with the rear end of Extra 9031.

The caboose and the rear car of Extra 9031 were demolished and overturned to the right of the eastward track; the second and third cars from the rear were overturned and stopped, badly damaged, on their sides on the westward main track; the front truck of the fourth car from the rear was derailed but the car remained upright. The engine, the tender and the first two cars of No. 88 were derailed to the left but remained in general line with the track. The engine stopped with its front end about 300 feet east of the west siding-switch and leaned at a slight angle to the left; the left side was badly damaged and the cab was crushed; the tender was badly damaged. The first two cars remained upright; the front truck of the first car was badly damaged and the brake rigging was torn from the second car.

The employee killed was the fireman of No. 88 and the employee injured was the flagman of No. 88.

Summary of Evidence

Engineman Wall, of Extra 9031, stated that at Rawlins he received train orders Nos. 2 and 4 and understood their provisions. His train departed from Rawlins at 3:02 a. m. En route to Edson all signals displayed proceed indications for his train. The normal running time between Rawlins and Edson for a train of the type and weight of his train is 35 minutes; therefore since No. 88 would not pass Ft. Steele, 10.6 miles west of Edson and the last station in the rear where time was shown by orders Nos. 2 and 4, before 3:39 a. m., he thought sufficient time was available to move into clear on the siding at Edson. When his train was approaching the west siding-switch at Edson he reduced speed sufficiently for the front brakeman to open the switch without stopping the train. His train started to enter the siding at 3:36 a. m. After it proceeded on the siding some distance the engineman could see that another train was on the siding. He sounded the whistle signal for the other train to proceed; however, the train ahead did not move. He could see proceed lantern signals at the rear of his train and, realizing that his train was longer than the remaining space of the siding and that his train would be unable to clear for No. 88, he sounded the whistle signal for the flagman to protect the rear of the train. Then, at intervals, he sounded numerous proceed whistle signals for the train ahead to move. About 2 or 3 minutes after his train stopped, he saw his flagman, with red and white lanterns in his possession, leave the rear of his train. Because of the cut west of the west switch the flagman soon disappeared as he proceeded to the rear. The engineman said that the accident occurred from 6 to 10 minutes after the flagman started back. Although a light rain was falling at the time of the accident, signals could be seen clearly. After the accident occurred he talked with the engineman of No. 88, who told him that signal 6592 displayed a pro-

ceed indication for that train. The engineman of Extra 9031 said that the rock cut just west of Edson restricted the view of signal 6576 to 300 or 350 feet.

The statement of Fireman Otterman, of Extra 9031, practically corroborated that of the engineman. Sometime after his train stopped he looked back from the right side of the cab and saw the reflection of the headlight of No. 88; he did not see the flagman at any time nor did he see a lighted red fusee. The front brakeman had remained at the switch and was giving proceed signals. The fireman thought his train stood on the siding about 10 or 11 minutes before the accident occurred.

Front Brakeman Michaud, of Extra 9031, stated that as the train rounded the curve just west of Edson he saw a yellow fusee displayed at the rear. The engineman remarked that they would take siding at Edson. The brakeman opened the west switch and locked it and, as he had seen fire flying from the vicinity of the tenth car from the rear, he remained there to inspect the train as it moved by him; later he found a brake beam down. As soon as the train stopped the flagman proceeded back to provide flag protection. Brakeman Michaud continued to give proceed signals to his engineman and when he saw No. 88 as it rounded the curve he gave that train stop signals with his lantern.

Conductor Estes, of Extra 9031, stated that it was 3:30 a. m. when his train passed Walcott, 4.9 miles west of Edson, and he instructed the flagman to light a yellow fusee as a signal for the engineman to take siding at Edson. His train started to enter the siding at 3:36 a. m. When the caboose was 2 or 3 car lengths from the switch he could see that another train was on the siding. He heard a whistle signal sounded for the train ahead to proceed, and a whistle signal for the flagman to protect the rear of his train. His train stopped at 3:44 a. m. with the rear steps of the caboose near the switch stand. The flagman, who had flagging equipment in his possession, was then 1 car length west of the caboose, and the conductor called to him to protect the rear of the train. Having been told by the front brakeman that a brake beam on one of the rear cars was defective, the conductor proceeded along the train and found a defective brake beam on the tenth car from the rear. As he proceeded along the train he continued to give his engineman proceed signals. The conductor returned to the caboose to obtain material with which to repair the brake beam, and, as he started to leave the caboose the second time, he saw the headlight of No. 88; it appeared as if that train was stopping. The flagman had been gone for some time and the conductor was unable to see him, nor did he see a lighted red fusee. He said that the flagman should have been able to proceed more than 1/4 mile to the rear of his train. The front brakeman warned him to leave the

caboose as No. 88 was not stopping. The conductor gave stop signals with his white lantern. He thought about 6 or 7 minutes elapsed between the time his train stopped and the time the accident occurred. The conductor said that if a lighted fusee had been thrown off when his train was approaching Edson it would have burned out prior to the arrival of No. 88. Ordinarily a train consisting of 63 cars could have pulled into clear in 3 minutes.

Flagman Moody, of Extra 9031, stated that he read train orders Nos. 2 and 4 at Rawlins and understood their provisions. His train started to enter the siding at Edson at 3:36 a. m.; however, it was impossible to get into clear and the caboose stopped on the turnout east of the switch. As he proceeded back from the rear of his train he heard the engineman sound the whistle signal for him to provide flag protection. He proceeded as fast as he could and had reached the east end of the curve, about 1/4 mile west of the rear of his train, when he saw the reflection of the headlight of No. 88 around the curve. He lighted a red fusee and crossed over to the westward track in order that the engine crew of No. 88 could see his signals a greater distance. The engineman answered his signals when the train was about 12 or 13 car lengths distant. Flagman Moody said he understood that his train should have been in the clear at Edson not later than 3:39 a. m. He said that because he expected his train to clear he did not proceed back until 3:44 a. m. and that the accident occurred at 3:50 a. m. He understood the requirements of Rule 99; however, he did not place any torpedoes. He did not think that when his train reduced speed to enter the siding he was required to alight from the caboose and provide flag protection. He said that he was depending to some extent on block signals for protection. He said also that he was able to walk 1/2 mile in 10 minutes. He had last been examined on operating rules in August, 1940.

Engineman Davis, of No. 88, stated that an air-brake test was made at Rawlins, a running test was made soon after the train left that point, and the brakes functioned properly en route. At Rawlins he received train orders Nos. 2 and 4. No. 88 left Rawlins 5 minutes later than the time specified by order No. 4 and did not gain any time to the point where the accident occurred. As his train passed the first signal west of signal 6592, he saw signal 6592 become lighted in advance and the aspect was green-over-green. At that time a freight train passed on the westward track and after his engine passed through the trailing smoke the fireman, who was on the left seatbox maintaining a lookout ahead, called, "Both clear," and raised his right hand as a signal. The engineman was in his usual position maintaining a lookout ahead and there was no condition of the engine that distracted his attention. Near signal 6592 the engineman could see by the head-

light beam that the semaphore arms displayed a proceed indication. When his train was approaching the rock cut west of the point where the accident occurred the speed was about 50 miles per hour and the engineman could see over the edge of the cut just east of the west switch that the top light of signal 6576 was red. The sighting distance of this signal is about 1,480 feet. He immediately applied the brakes in emergency and closed the throttle; at the same time he saw the reflection of a lighted red fusee and answered the flagman's signal. The speed of his train was reduced to about 35 miles per hour at the time of the accident. He said that a train moving at a speed of 50 miles per hour could not be stopped by an emergency application of the brakes within the sighting distance of signal 6576. At first he stated that the flagman was in the east end of the cut west of the west switch at Edson and later placed the approximate location of the flagman as being 6-1/2 rail lengths or 253 feet west of signal 6576. A drizzling rain was falling but visibility was unrestricted. He said that it is customary for a fireman to call signal indications to an engineman. Subsequent to the accident he observed that the switch was lined and locked for the siding.

Conductor Higgins, of No. 28, stated that as his train approached Edson at a speed of about 50 miles per hour he felt an emergency application of the air brakes; soon afterward, at 3:56 a. m., the collision occurred. He did not see the flagman of the freight train.

The statement of Front Brakeman Wright, of No. 88, added nothing of importance.

Flagman Fraker, of No. 88, stated that as his train approached Edson he was in the rear end of the rear car. When he felt the brakes being applied just prior to the accident he saw the reflection of a lighted red fusee. After the accident occurred he observed that the lighted fusee was about 16 coach lengths to the rear of his train.

Engineman Weick, of No. 28, corroborated by Fireman Calli-cote, stated that No. 28 followed No. 88 closely between Rawlins and Edson. As his train approached Edson the third signal west of the switch at Edson was displaying an approach indication and signal 6592 a stop indication.

Engineman Wares, of Extra 9010 East, stated that his train was occupying the siding at Edson when Extra 9031 started to take siding. All signals between Walcott and Edson displayed proceed indications for his train. When he heard the whistle signal sounded by Extra 9031 he moved his engine about 1-1/2 car lengths ahead.

Conductor Byrne, of Extra 9010, stated that his engineman attempted to move the train forward but only stretched the slack; the twenty-fifth car from the engine moved about 6 feet; he did not think the rear end moved at all.

Engineman Hansen, of Extra 9001 West, stated that when his train passed Edson one east-bound freight train was on the siding and another was pulling in but had not cleared the west switch. As Extra 9001 rounded the curve east of signal 6592 the headlight beam illuminated the semaphore arms of that signal and they displayed a proceed indication. The engineman remarked to the fireman and the front brakeman that the second train must have cleared the main track at Edson.

Fireman Piepergerdes, of Extra 9001, corroborated the statement of Engineman Hansen

Front Brakeman Preston, of Extra 9001, corroborated the statement of his engineman and added that when his train passed Edson the flagman of Extra 9001 East was standing about 2 or 3 car lengths to the rear of his caboose and was giving proceed lantern signals.

Conductor Callison, of Extra 9001 West, stated that between 3:45 and 3:55 a. m. he was in the caboose when his train passed through Edson. At that time Extra 9031 was not in the clear on the siding. He saw two men on the ground with lanterns; one was giving proceed signals east of the caboose and the other was at the caboose. His train met No. 88 on the tangent track west of signal 6592 and he observed that signal 6592 displayed a red-over-yellow aspect after No. 88 passed that signal.

Flagman Harvey, of Extra 9001 West, stated that when his train met No. 88 he observed that signal 6592 displayed a proceed indication and it changed to stop when No. 88 passed it.

Assistant Signal Supervisor Jackson stated that he arrived at the scene of accident about 9 a. m. The engineman of No. 88 told him that he had received a clear indication at signal 6592. Assistant Supervisor Jackson then inspected the signals and circuits involved but found nothing wrong. He examined the pole line and found that the third and fourth poles west of signal 6576 were lying on the ground. The poles had fallen toward the track; the cross-arms were resting on the ground; the wires were intact, the pins were in place and the wires were not crossed. Electrical measurements indicated no battery flow. He said that apparently a high wind during the night resulted in the poles being broken. During the process of falling it was possible that wires becoming entangled resulted in a cross which would cause

signal 6592 to display a false clear indication. When he examined the wires and poles there was no condition which would cause signal 6592 to display a false indication; however, there were indications of wires having been entangled in sage brush; the wires could have been held together for some time until stress finally freed them. Later tests disclosed that when the control wire to the approach arm of signal 6592 was crossed with the rock-slide fence wire, signal 6592 displayed a false clear indication. After the broken poles had been replaced, the new poles were dropped four times in an attempt to produce a condition which could cause signal 6592 to display a false clear indication. During the third test two wires met, and then separated; however, during the fourth test two wires became crossed and a reading of the control wires disclosed a battery flow which, in his opinion, would cause a false clear indication.

Signal Supervisor Hayes, who arrived at the scene of accident about 4:30 p. m., stated that it was impossible for signal 6592 to display a false clear indication when the two poles were lying on the ground in the position found. By dropping the poles several times he tried to create a condition to cause a false clear indication, but at no time could he get the wires to stay crossed. Later, Supervisor Hayes said that at one time during these tests there was a line-wrap between the rock-slide-fence-relay control wire and the distant-signal control wire; he did not think these wires would unwrap themselves, but he said that it was possible for the poles to have fallen in such manner that two wires could touch and later become separated.

Signal Engineer Pfleging stated that on October 4 all line relays were tested and met the drop-away requirements. The circuit-breaker springs on signal 6576 were inspected for proper opening to cut out the battery from the control wire to approach signal 6592. Four tests consisting of shunting the track ahead of signal 6576 were made and in each case signal 6592 functioned properly. He said that four tests were conducted to determine the possibility of wires becoming entangled and producing a cross when two adjacent line poles were felled. During the first two tests no results were obtained; during the third test a slight reading was obtained, and during the fourth test the wires became wrapped in such manner that it necessitated a man at each end to unwrap the wires. He stated that if this condition had existed at the time of the accident he did not think the wires would have become unwrapped normally, but there might have been some temporary condition which could result in these wires touching and producing a false clear indication at signal 6592 for No. 88.

Observations of the Commission's Inspectors

The Commission's inspectors were present subsequent to the accident when tests were made by dropping the two poles involved to determine if a condition could be created which would cause signal 6592 to display a false clear indication. Voltmeter leads were clipped to the slide-detector-fence relay wire and the distant-relay control wire for signal 6592. At first the poles were dropped simultaneously but they did not lie flat on the ground. The poles then were laid in the approximate positions in which the fallen poles were found; the eastward pole was raised and dropped twice and the meter indicated a slight fluctuation at the second drop. Then the westward pole was raised and dropped and the slide-detector-fence relay wire and the distant-relay control wire of signal 6592 became wrapped around each other; approximately 9 volts of the detector-fence battery were put on the distant-signal control wire. On October 7, five tests were made by shunting the track ahead of signal 6576, and also by placing a cross between the slide-detector-fence relay wire and the de-energized distant-relay control wire of signal 6592 at the location where the two fallen poles were found; signal 6592 displayed a false clear indication during each of these tests.

Discussion

According to the evidence, Extra 9031 started to enter the siding at Edson at 3:36 a. m., 3 minutes prior to the time that No. 88 was due to leave Ft. Steele, the last station in the rear at which time was shown in orders Nos. 2 and 4. Because the siding was occupied by another freight train, Extra 9031 was unable to clear the main track and stopped about 3:44 a. m. with its caboose standing on the turnout about 40 feet east of the west switch. The rear end was struck by No. 88 about 3:55 a. m.

Under the rules, Extra 9031 was required to furnish flag protection after 3:39 a. m. against No. 88; the flagman did not begin to furnish protection until the rear of his train stopped just east of the west siding-switch, at least 5 minutes after protection was required. The engineman of Extra 9031 said that the flagman did not start to the rear until 2 or 3 minutes after the train stopped. Under the rules the flagman was required to provide flag protection when his train was moving under circumstances wherein it might be overtaken by another train. During the period from 3:39 a. m. to 3:44 a. m., Extra 9031 was proceeding on the time of No. 88 and was proceeding in a manner that it might be overtaken not only by No. 88 but also by another train; however, the flagman said that he did not consider it incumbent on him to alight from the caboose to provide protection while his train was entering the siding. The flagman's reason for not

dropping lighted fusees when his train was reducing speed to enter the siding was that they would have burned out before the approach of No. 88. The rules require that torpedoes be placed $1\frac{1}{2}$ mile to the rear of a train. Since Extra 9031 consisted of 63 cars and a caboose, had torpedoes been placed near the rear end when this train started to enter the siding, the torpedoes would have been about $1\frac{1}{2}$ mile west of the switch.

There was considerable discrepancy in the testimony concerning the location from which the flagman flagged No. 88. The engineman of No. 88 said that the flagman was about 300 feet to the rear of Extra 9031, but the flagman involved said he was about 1,320 feet to the rear, and the flagman of No. 88 estimated the distance to be about 2,000 feet. The flagman of Extra 9031 stated that the accident occurred at 3:50 a. m. but the preponderance of evidence was that it occurred about 3:55 a. m. A period of 16 minutes, from the time No. 88 was due to leave Ft. Steele to the time of the accident, was available to the flagman to furnish flag protection, but, according to his statement, he used only about 3 minutes for this purpose; nevertheless, he had ample time in which to afford adequate protection. Since the flagman said that he depended to some extent on the automatic block signals to furnish protection for the rear of his train, this probably accounts for his failure to proceed far enough to the rear of his train to furnish adequate protection. As soon as the caboose stopped near the switch the conductor warned the flagman to protect the rear of the train; then the conductor proceeded to repair a defective brake beam and a few minutes later when he first saw the headlight of No. 88 he observed that the flagman had disappeared around the curve.

The engineman of No. 88 was positive that signal 6592 displayed a proceed indication and that his fireman, who was killed in the accident, had called the indication as proceed. The engineman's statement was substantiated by the engineman, the fireman, the front brakeman, and the flagman of a west-bound freight train which passed the point where the accident occurred when Extra 9031 was moving into the siding: these employees said they observed that signal 6592 was displaying a proceed indication. Because of track curvature and the deep cut immediately west of signal 6573, the engineman of No. 88 did not see the stop indication displayed by that signal a distance of more than 1,400 feet, which was insufficient for stopping the train short of the signal from a speed of 50 miles per hour. The engineman said that he observed simultaneously the reflection of the fusee and the stop indication displayed by signal 6576.

Subsequent to the accident, two adjacent poles carrying the signal circuit lines involved were found lying on the ground. Apparently these poles fell during a high wind a short time be-

fore the accident occurred. Representatives of the signal department thought the position in which the wires were found would not cause a cross between the control wires; nevertheless, tests made subsequent to the accident disclosed that it was possible for the wires carried by two adjacent fallen poles to be crossed in a manner to cause a signal to display a proceed indication when the second block in advance was occupied. Tests of the signals and relays disclosed no condition that might have caused or contributed to a false clear indication. In view of the testimony of the employees concerning the indication displayed by signal 6592 and the results of tests involving the wires on the fallen poles, it is believed that this signal displayed a false proceed indication for No. 88, and that this indication was probably caused by wires becoming crossed when poles of the line carrying the control circuits were blown down by a storm.

Conclusion

This accident was caused by failure to provide adequate flag protection for Extra 9031 and by No. 88 being operated in accordance with a false clear signal indication.

Respectfully submitted,

S. N. MILLS,

Director.