INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 2618

THE UNION PACIFIC RAILROAD COMPANY

REPORT IN RE ACCIDENT

AT MOAPA, NEV., ON

AUGUST 20, 1942

SUMMARY

Railroad:	Union Pacific	
Date:	August 20, 1942	
Location:	Moapa, Nev.	
Kind of accident:	Rear-end collision	
Trains involved:	Freight	: Passenger
Train numbers:	Second 154	: First 8
Engine numbers:	5005	: 7851
Consist:	58 cars, caboose	: 12 cars
Speed:	Standing	: 20-30 m. p. h.
Operation:	Timetable, train orders and automatic block-signal system	
Track:	Single; tangent; 1 percent ascending grade eastward	
Weather:	Clear	
Time:	About 8:40 a. m.	
Casualties:	125 injured	
Cause:	Accident caused by train entering an occupied siding after it had accepted indications at approach and home signals as being proceed when restrictive signal indications should have been displayed	

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2618

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

THE UNION PACIFIC RAILROAD COMPANY

October 24, 1942

Accident at Moapa, Nev., on August 20, 1942, caused by a train entering an occupied siding after it had accepted indications at approach and home signals as being proceed when restrictive signal indications should have been displayed.

REPORT OF THE COMMISSION[1]

PATTERSON, Commissioner:

On August 20, 1942, there was a rear-end collision between a freight train and a passenger train on the Union Pacific Railroad at Moapa, Nev., which resulted in the injury of 112 passengers, 10 dining-car employees and 3 train-service employees.

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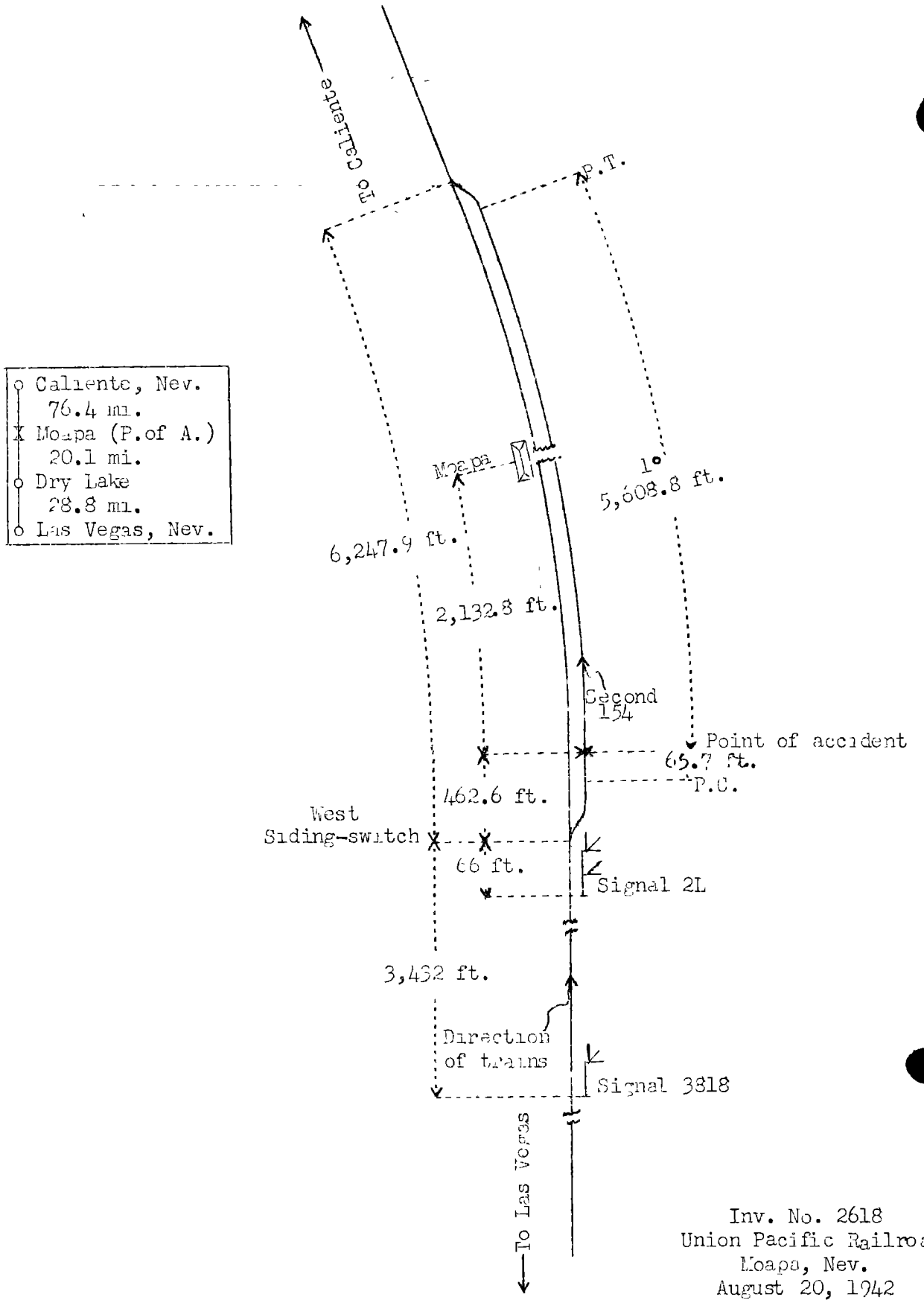
[1] Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.



Inv. No. 2618
Union Pacific Railroad
Moapa, Nev.
August 20, 1942

Location of Accident and Method of Operation

This accident occurred on that part of the Los Angeles Division designated as the Third Subdivision and extending between Las Vegas and Caliente, Nev., a distance of 125.3 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. At Moapa a siding 6,247.9 feet in length parallels the main track on the south. The west switch of this siding is located 2,595.4 feet west of the station and is equipped with dual-control mechanism. When it is operated by power it is under the control of the operator at Moapa. The accident occurred on the siding at a point 462.6 feet east of the west siding-switch. As the point of accident is approached from the west on the main track there is a tangent 1.14 miles in length to the west siding-switch. On the siding there are, in succession, a No. 14 turnout to the right 131.76 feet in length, a tangent 265.14 feet, and a 1° curve to the left 65.7 feet to the point of accident and 5,608.8 feet beyond. In the vicinity of the point of accident the grade for east-bound trains is 1 percent ascending.

The automatic-block system is arranged on the overlap principle. Signals 3818 and 2L, which govern eastward movements, are located, respectively, 3,432 and 66.2 feet west of the west siding-switch. Signal 3818 is an automatic signal of the one-unit, three-indication, color-light type, and is approach lighted. The aspects and corresponding indications and names of this signal are as follows:

Aspect	Indication	Name
Green	Proceed	Clear Signal
Yellow	* * * reduce speed to 20 miles per hour * * * to be able to stop before passing the next home signal. * * *	Approach Signal
Red	Stop	Stop Signal

Home signal 2L, which is operated at times as a semi-automatic signal and at other times as an automatic signal, is of the two-unit, four-indication, color-light type, and is approach lighted. The aspects and corresponding indications and names of this signal are as follows:

Aspect	Indication	Name
Green-over-red	Proceed	Clear Signal
Yellow-over-red	* * * reduce speed to 20 miles per hour * * * to be able to stop before passing the next home signal. * * *	Approach Signal
Red-over-red	Stop	Stop Signal
Red-over-yellow	Proceed at slow speed on diverging route	Approach Diverging Route Signal

Under either remote-control or automatic operation the control circuits are so arranged that when the west siding-switch is lined for a train to enter the siding, signal 3818 will display approach and signal 2L will display red-over-yellow.

The control machine, which is located in the station at Moapa, consists of a two-position switch lever mechanically interlocked with a three-position signal lever. The switch lever is provided with a semaphore indicator which indicates when the switch control relay at the west siding-switch is energized and when any controlled signal is cleared. The switch lever is also provided with an electric lock which prevents the movement of the lever when the indicator is de-energized. A semaphore indicator is also provided to indicate track occupancy of the track section between the remotely controlled signals. A master switch is provided so that the operator can change the operation of the remote-control switch and semi-automatic signals to automatic operation with the signals operating as automatic signals and the siding switch operated manually. The west siding-switch and protecting signals are arranged for normal operation by remote control by the operator. Time locking is provided to prevent the changing of the route after a signal has been cleared until after a predetermined time interval of 1 minute 45 seconds has elapsed. In order to change from remote-control operation to automatic operation the instructions require that switch lever 1 and signal lever 2 be placed in the normal positions. After an interval of 2 minutes, the master switch is placed in the reverse position. To restore the operation to remote-control operation, the master switch is placed in the normal position. After an interval of 30 seconds the time release is operated and the plant is in readiness for remote-control operation.

At the switch involved the maximum authorized speed for trains moving on the main track is 30 miles per hour.

Description of Accident

Second 154, an east-bound second-class freight train, consisted of engine 5005, 25 loaded and 33 empty cars and a caboose. This train departed from Las Vegas, 48.9 miles west of Moapa, at 3:10 a. m., according to the dispatcher's record of movement of trains, 10 minutes late, departed from Dry Lake, 20.1 miles west of Moapa and the last open office, at 5:53 a. m., 1 hour 43 minutes late, entered the siding at Moapa at the west siding-switch, and about 8:14 a. m. stopped with the rear end standing 462.6 feet east of the switch. About 26 minutes later the rear end was struck by First 8.

First 8, an east-bound first-class passenger train, consisted of engine 7851, one refrigerator car, three coaches, one articulated-duplex dining car and seven coaches, in the order named. The first car was of steel-underframe construction and the remainder were of steel and aluminum construction. After a terminal air-brake test was made this train departed from Las Vegas at 7:41 a. m., according to the dispatcher's record of movement of trains, 1 hour 16 minutes late, passed Dry Lake at 8:17 a. m., 1 hour 16 minutes late, passed signal 3818 and home signal 2L, and while moving at an estimated speed of 30 miles per hour it entered the west siding-switch at Moapa and struck the rear end of Second 154.

The brakes of First 8 functioned properly at all points where used en route. There was no condition of the engine that obscured the vision or distracted the attention of the employees on the engine.

The caboose and the rear two cars of Second 154 were demolished. The third and fourth cars from the rear were damaged. Engine 7851, of First 8, was derailed to the right and stopped, badly damaged, on its left side with the rear end on the siding and at right angles to it. The front end of the engine and the cab were demolished. The tender was derailed but remained upright and stopped at the rear of the engine and parallel to the siding. The first car was derailed and stopped, badly damaged, across the main track and the siding and at an angle of 45 degrees to them. The second to eighth cars, inclusive, were derailed and stopped upright, considerably damaged, and at various angles to the tracks. The front truck of the ninth car was derailed.

It was clear at the time of the accident, which occurred about 8:40 a. m.

The train-service employees injured were the engineer, the fireman and the conductor of First 8.

Data

During the 30-day period preceding the day of the accident, the average daily movement in the vicinity of the point of accident was 26.43 trains.

Immediately after the accident, inspection of the west siding-switch disclosed that it was lined for entry to the siding, and that the lock rod in the switch mechanism had moved sufficiently to open the circuit controlling signal 2L but not sufficiently to unlock the switch.

In tests made on August 23 and 24, the signals functioned properly and no evidence of crossed wires or grounds was disclosed. The apparatus functioned in accordance with the circuit arrangement; however, if the prescribed time interval between the restoring of the switch lever to normal position and the changing of the system to automatic operation did not elapse, the remote-control switch would not be operated, and signal 2L would continue to display either red-over-yellow or red-over-red.

Discussion

The rules governing operation on the line involved provide that trains will approach interlocking limits at a speed not exceeding 30 miles per hour. In addition, when an approach signal displays a yellow aspect, trains must reduce speed to 20 miles per hour and be prepared to stop at the next signal. When a home signal displays a red-over-yellow aspect, trains must proceed at not exceeding 15 miles per hour and be prepared to enter a diverging route. All the employees involved understood these requirements.

The operator at Moapa lined the route for Second 154 to enter the siding at the west siding-switch. This train entered the siding and cleared the insulated joint about 8:14 a. m. and stopped with the rear end standing 462 feet east of the west siding-switch. About 8:40 a. m. First 8 entered the west siding-switch and struck Second 154.

As First 8 was approaching the point where the accident occurred the speed was about 30 miles per hour, the throttle was in drifting position, and the enginemen were maintaining a lookout ahead from their respective sides of the cab. Both enginemen said that signals 3818 and 2L displayed proceed for their train, and they called these indications to each other. They observed that the rear end of Second 154 was into clear on the siding. The first they were aware of anything being wrong was when the engine rolled as it entered the turnout to the right. The engineer said that he moved the brake valve to emergency position as the engine entered the turnout but the distance was not sufficient for First 8 to stop short of the train in the siding, and the speed was not

materially reduced before the collision occurred. The conductor of First 8 was not aware of anything being wrong until the collision occurred. The brakeman and the flagman said that the brakes became applied just an instant before the collision occurred. The flagman said that when he alighted to provide flag protection he observed signal 2L displaying red-over-red.

The operator said that soon after Second 154 was in the clear on the siding he moved the switch lever to the position for the west siding-switch to be lined for movement on the main track, cleared the eastward signal, waited about 4 minutes, moved the signal lever to normal position and then placed the master switch in position for automatic operation. After the accident, inspection disclosed that the west siding-switch was lined for entry to the siding, the switch lever of the control machine was in position for the siding switch to be lined for movement on the main track, the signal lever was in normal position, and the master switch was in position for automatic operation of the signals. The switch lock-rod had moved a distance sufficient to open the circuit controlling signal 2L but not enough to unlock the switch. The switch was not damaged but part of the turnout east of the switch was destroyed. A signal maintainer, who was at the station at Moapa a short time before the accident occurred, said that after Second 154 was into clear on the siding he observed that the operator had failed to operate the time release, and he called the attention of the operator to this condition, and then left the station. According to the statement of the flagman of Second 154, he was in the vicinity of the switch about 8:16 a. m. At that time the switch was still lined for the siding, but he assumed that the switch would be closed by the operator before the following train arrived.

In the investigation no evidence of crossed wires or grounds was found, and the apparatus functioned in accordance with the circuit arrangement. In tests made after the accident, if the prescribed time interval between the restoration of the switch lever to normal position and the changing of the signal to automatic operation did not elapse, the remote-control switch would not be operated and signal 2L would display either red-over-yellow or red-over-red. The operation in these tests was at variance with the operation indicated by the evidence at the time of the accident, when the switch was not lined for movement on the main track, but both enginemen were positive that signals 3818 and 2L displayed proceed from the time these aspects first became visible until the engine passed them, and the engineer operated his train in accordance with proceed indications. If the apparatus operated as intended it would not be possible for this condition to exist, as the control circuits of signal 2L were broken through a circuit controller in the switch mechanism to insure that a proceed aspect will be displayed only when the west siding-switch is in main-track position. Irrespective of any manipulation of the levers and switches in the station, with the siding switch set for the siding it would not be possible

for signal 2L to display a green-over-red aspect unless there was a signal failure. It is therefore apparent that there either was a false clear signal failure, which caused signals 3818 and 2L to display proceed when the west siding-switch was open, or the indications displayed by these signals were not properly observed and correctly understood.

The investigation disclosed that the indicators in the station as arranged at the time of the accident did not provide reliable and definite information as to the position of the west siding-switch or the indication of signal 2L. After the accident, officials of the carrier stated that the remote-control arrangement at Moapa will be changed so that the indicators will correctly indicate the positions of the switch and the signals, and the master switch will be controlled by interlocked levers to insure that the siding switch will be in main-line position before the master switch can be operated.

Cause

It is found that this accident was caused by a train entering an occupied siding after it had accepted indications at approach and home signals as being proceed when restrictive signal indications should have been displayed.

Dated at Washington, D. C., this twenty-fourth day of October, 1942.

By the Commission, Commissioner Patterson.

W. P. BARTEL,

(SEAL)

Secretary.