INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 3113

THE BALTIMORE AND OHIO RAILROAD COMPANY

REPORT IN RE ACCIDENT

AT ALIDA, IND., O.

JUNE 30, 1947

SUMMARY

Railroad:	Baltimore and Ohio
Date:	June 30, 1947
Location:	Alida, Ind.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	26
Engine numbers:	Diesel-electric units 60A and 60B
Consist:	9 cars
Speed:	76 m. p. h.
Operation:	Signal indications; interlocking
Tracks:	Double; tangent; 0.2 percent ascending grade eastward
Weather:	Clear
Time:	5:15 p. m.
Casualties:	64 injured
Cause:	Train entering open switch at high rate of speed, as result of approach and home signals of interlocking displaying false proceed indications

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3113

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

THE BALTIMORE AND OHIO RAILROAD COMPANY

August 4, 1947

Accident at Alida, Ind., on June 30, 1947, caused by a train entering an open switch at a high rate of speed, as a result of approach and home signals of an interlocking displaying false proceed indications.

REPORT OF THE COMMISSION[1]

PATTERSON, Commissioner.

On June 30, 1947, there was a derailment of a passenger train on the Baltimore and Ohio Railroad at Alida, Ind., which resulted in the injury of 45 passengers, 11 dining-car employees, 3 train porters, 2 mechanical supervisors and 3 train-service employees. This accident was investigated in conjunction with a representative of the Indiana Public Service Commission.

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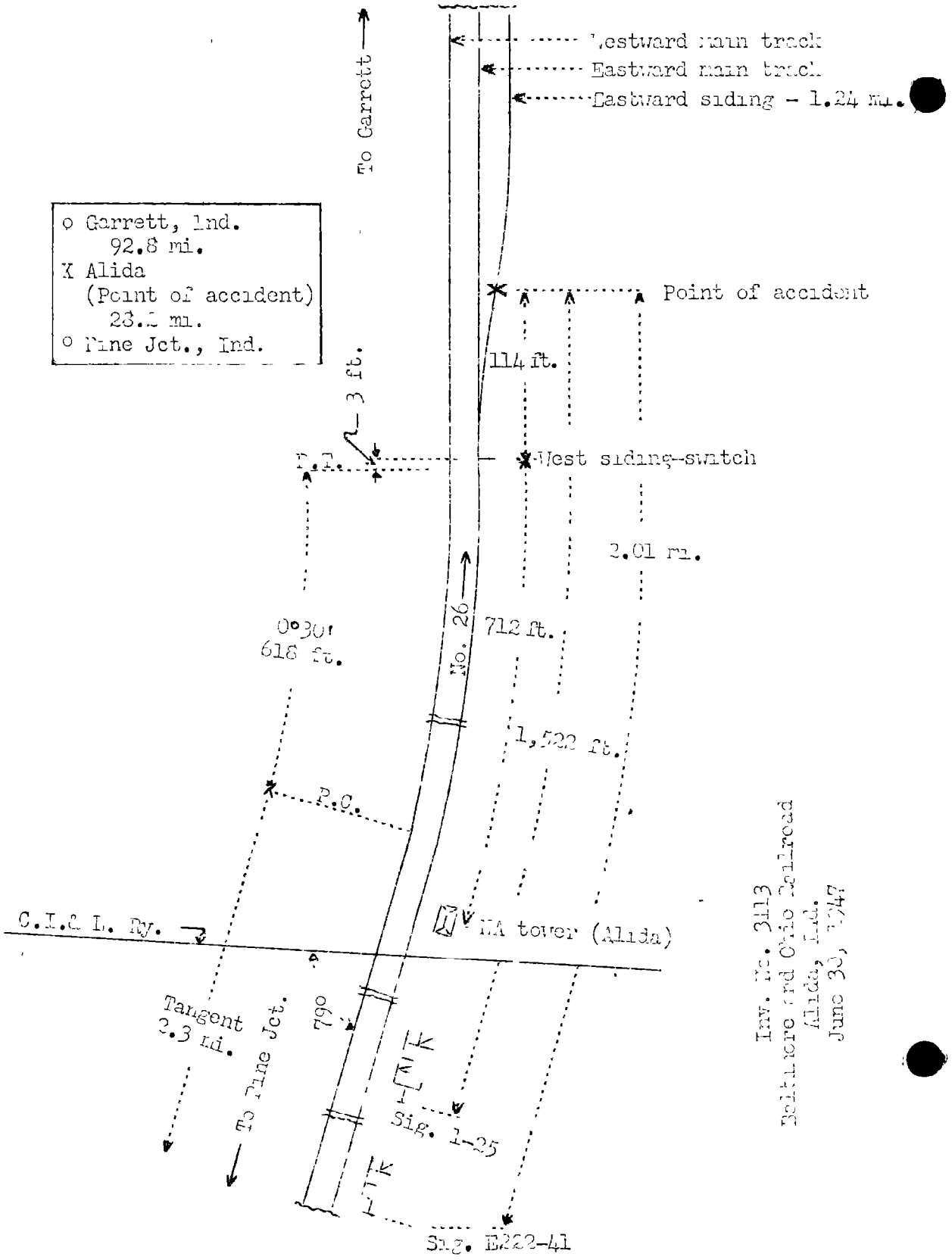
[1] Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.



Inv. No. 3113
Baltimore and Ohio Railroad
Alida, Ind.
June 30, 1947

Location of Accident and Method of Operation

This accident occurred on that part of the Chicago Division extending between Pine Jct. and Garrett, Ind., 121 miles, a double-track line in the vicinity of the point of accident, over which trains moving with the current of traffic are operated by signal indications. At Alida, 28.2 miles east of Pine Jct., a single-track line of the Chicago, Indianapolis and Louisville Railway crosses the tracks of the Baltimore and Ohio Railroad at an angle of 79°. This crossing is protected by an interlocking which is controlled from NA tower, located 36.4 feet east of the C.I.& L. main track and 10 feet south of the B.& O. eastward main track. At Alida the eastward siding, which is 1.24 miles in length, parallels the main tracks on the south. The west switch is within interlocking limits and it connects the eastward main track and the eastward siding at a point 712 feet east of NA tower. Entry to the siding at the west switch is made through a No. 16 turnout. The derailment occurred on this turnout 114 feet east of the switch. From the west on the main tracks there are, in succession, a tangent 2.3 miles in length, a 0°30' curve to the left 618 feet, and a tangent 3 feet to the west siding-switch and a considerable distance eastward. The grade is 0.2 percent ascending eastward.

The turnout of the west siding-switch consists of 131-pound switch rails and rail sections, a No. 16 rail-bound frog 23 feet in length, and one-piece guard rails 9 feet 3 inches in length. The switch rails are 24 feet long and move on 20 switch plates. The curvature of the turnout is 2°40'34", and the angle of the frog is 3°34'37". The distance from the switch points to the frog point is 120.5 feet. The turnout is laid on 100 switch ties, and is ballasted with gravel to a depth of 12 inches. No superelevation is provided. The distance between the centerlines of the eastward main track and the eastward siding is 13 feet 1 inch. The switch points are arranged for a throw of 4-1/2 inches, and the points are maintained in proper relation by two switch rods 3 inches wide by 1 inch thick and secured to the points by clips bolted through the webs and the reinforcing bars of the switch points. A front rod is bolted to the ends of the switch points and connected to the facing-point locking rod. The No. 1 switch rod is provided with an adjusting basket to which the operating rod is attached. The operating rod is 5 feet long and 1-1/4 inches thick, and is reduced in diameter at its outer end to a tang end 1 inch in diameter and 7 inches long, for insertion into the end of the operating pipe-line from the interlocking machine. The rod is threaded throughout a length of 1-1/2 inches

immediately inward from the base of the tang end, and the tang end is drilled for the insertion of 1/4-inch rivets at points 1 and 5 inches inward from its outer end. These holes are at right angles to each other. The connecting pipe is of extra-strong type 1-inch galvanized pipe, which normally fitted over the tang end of the operating rod and was joined to it by a standard 1-inch pipe coupling. Normally, the pipe was secured to the operating rod by 1/4-inch rivets 1-11/16 inches long, which passed through the pipe and the tang end at the back of the coupling.

Approach signal E222-41 and home signal 1-25, governing east-bound movements on the eastward main track, are, respectively, 2.01 miles and 1,522 feet west of the point of accident. Signal E222-41 is of the two-arm, upper quadrant, semaphore type. Signal 1-25 is of the three-arm, upper quadrant, semaphore type. These signals are approach lighted, and the day aspects, and corresponding indications and names are as follows:

Signal	Aspect	Indication	Name
E222-41	Top arm vertical in upper quadrant over horizontal lower arm	Proceed	Clear
	Top arm 45° in upper quadrant over horizontal lower arm	Proceed, preparing to stop at next signal * * *	Approach
1-25	Top arm in vertical position over 2 arms in horizontal position	Proceed	Clear
	Three arms in horizontal position	Stop	Stop

The interlocking at Alida consists of a mechanical machine having 38 working levers in a 48-lever frame. Twelve levers operate 7 switches and 9 derails, 11 levers operate 16 facing-point locks, and 15 levers operate 15 signals. With the exception of the top arm of main-track home signals on the B.& O., all signals, switches, derails and facing-point locks

are mechanically operated by pipe-lines connected to the levers in the interlocking machine. The top arm of home signal 1-25 is semi-automatically controlled, and is electrically operated. Approach and indication locking for signal 1-25, and route and electric switch locking are provided. Under normal conditions, when the west switch of the eastward siding is lined and locked for entry to the siding, signal E222-41 displays proceed-preparing-to-stop-at-next-signal, and home signal 1-25 displays a restrictive indication, and when the west siding-switch is locked in normal position and the block immediately east of signal 1-25 is unoccupied, signal 1-25 displays proceed.

Operating rules read in part as follows:

> 34. All members of train and engine crews will, when practicable, communicate to each other the indication of each signal affecting the movement of their train or engine.
>
> * * *
>
> SIGNALMEN.
>
> 612. Appliances must be operated carefully and only by those charged with that duty. If an irregularity affecting their operation is detected the signals must be displayed to give their most restrictive indication until repairs are made.

The maximum authorized speed for the train involved was 80 miles per hour. The maximum authorized speed for all trains through the turnout involved was 10 miles per hour.

Description of Accident

No. 26, an east-bound first-class passenger train, consisted of Diesel-electric units 60A and 60B, coupled in multiple-unit control, one sleeping car, one baggage-club car, two coaches, one dining car, three coaches and one lounge-observation car, in the order named. All cars were of steel construction. This train passed signals E222-41 and 1-25, which displayed proceed, passed the tower at Alida at 5:15 p. m., 7 minutes late, and while moving at a speed of 78 miles per hour it entered the west switch of the eastward siding, which was lined for entry to the siding, and the third to ninth cars, inclusive, were derailed.

A separation occurred between the fourth and the fifth cars. The front portion of the train stopped on the siding with the front end of the first Diesel-electric unit and the rear of the fourth car, respectively, 2,070 and 1,593 feet east of the west siding-switch. The third and fourth cars were derailed to the north, but remained in line with the siding, and leaned toward the south. The fifth to ninth cars, inclusive, stopped between the eastward main track and the siding and practically parallel to them, with the front end of the fifth car 911 feet west of the fourth car, and the rear of the ninth car 271 feet east of the west siding-switch. The derailed cars were more or less damaged.

The conductor, the baggageman and the flagman were injured.

The weather was clear at the time of the accident, which occurred at 5:15 p. m.

Discussion

About 4:55 p. m. the operator-leverman at Alida operated the levers in control of the west switch of the eastward siding and the related locks and derails for Work Extra 2895 to enter the eastward siding to clear for No. 26. Work Extra 2895 cleared the west siding-switch at 5:03 p. m., and the operator-leverman placed the levers in control of this switch and its related locks and derails in position for the movement of No. 26, an east-bound passenger train, on the eastward main track, then moved the lever in control of home signal 1-25 to the position for that signal to display an indication in conformity with the condition of track occupancy immediately east of signal 1-25.

As No. 26 was approaching Alida, the speed was 78 miles per hour, as indicated by the tape of the speed-recorder with which the first Diesel-electric unit was equipped. The maximum authorized speed for this train in the territory involved was 80 miles per hour. Signals E222-41 and 1-25 displayed proceed, and the enginemen, who were in the front control compartment of the first unit, called the indications. When the first unit was about 450 feet west of the west switch of the eastward siding, which is 1,522 feet east of signal 1-25, the enginemen observed that the west switch was lined for entry to the eastward siding. Then the engineer moved the brake valve to emergency position and stopped the Diesel motor. The first that the members of the train crew, who were in various cars of the train, knew of anything being wrong was

when the brakes became applied in emergency. The brakes of this train had been tested and had functioned properly en route. At the time of derailment, the speed was about 76 miles per hour. The maximum safe speed for the Diesel-electric units involved moving on the turnout of the west siding-switch is 35 miles per hour.

After the accident, examination of the west siding-switch disclosed that the switch was lined for entry to the siding and the facing-point lock was in locked position. The point of the left-hand switch-rail fitted tightly against the north stock rail, and the right-hand switch-point was open 4-1/2 inches. The switch rods and the locking rod were in good condition and properly secured. However, the transverse section of the pipe-line connection had become separated from the tang end of the operating rod but remained attached to the pipe-line, which was unbroken throughout its length to the controlling lever in the interlocking machine. This pipe-line paralleled the tracks on the south. The separation at the tang end of the operating rod occurred as a result of the shearing of the rivets and worn condition of the threads of the coupling.

The first mark of derailment was a flange mark on the south guard rail at a point 6 feet 1 inch west of the point of frog. The frog had been forced out of alinement 2 feet 11 inches to the north during the movement of the engines and the first two cars of No. 26 over the frog, and the gage was widened sufficiently for the wheels of the following cars to drop to the ties.

According to the evidence, the switch involved had been inspected by the signal inspector on September 28, 1946, by the signal supervisor on March 11 and May 16, 1947, by the signal maintainer in the charge of the territory involved on June 28, 1947, and by the maintainer's helper about 7 a. m. on the day of the accident. These employees said that at the time these inspections were made they found no defective condition of the coupling involved. The maintainer said that on May 9, 1947, he had replaced one rivet in the connection, because of looseness. Examination disclosed that both rivets had been sheared at each end at the surface of the tang end of the operating rod inside the pipe. The threads at the operating-rod end of the pipe coupling and on the operating rod were considerably worn. The coupling was tightly in place on the pipe. A small area around the north rivet hole of the coupling was worn bright, which indicated that this rivet had been loose during a considerable period. The switch

involved is 712 feet east of the interlocking tower, and is operated by a pipe-line connection with the lever in the interlocking machine. This pipe-line was supported on carriers spaced about 8 feet apart, and was arranged with compensators. The control cranks and lever were so arranged that the lever was required to be pulled back to push the switch open and to be pushed forward to pull the switch to closed position. Apparently, the operating-rod connection failed when the operator-leverman pushed the lever to pull the switch closed. The operator-leverman said that he detected no difference in the resistance to movement offered by the lever during its movement. Employees of the signal department said that the rivets sheared as a result of vibration.

Section 306 of the Commission's order of April 13, 1939, prescribing rules, standards and instructions for interlocking systems, requires that signals governing movements over switches, movable point frogs, and derails shall be so controlled that indications to proceed can be displayed only when such units are in proper position. When the operator-leverman moved in proper sequence the levers in control of the locks, the derails and the switch involved to their respective positions for east-bound movement on the eastward main track and placed the lever in control of the top arm of signal 1-25 in position for this signal to display an indication to proceed, the indication displayed by signal 1-25 changed from stop to proceed, but, because of the failure of the operating-rod connection, the west switch of the eastward siding was locked in position for entry to the siding. If the controls of signal 1-25 with respect to the position of the west siding-switch had been arranged in accordance with the provisions of Section 306 of the Commission's order of April 13, 1939, the signals involved would have displayed restrictive indications for No. 26. The lack of such controls is in violation of this order.

Cause

It is found that this accident was caused by a train entering an open switch at a high rate of speed, as a result of approach and home signals of an interlocking displaying false proceed indications.

Dated at Washington, D. C., this fourth day of August, 1947.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.