Inv-2376

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT OF THE DIRECTOR

BUREAU OF SAFETY

ACCIDENT ON THE

CENTRAL RAILROAD OF NEW JERSEY

CHATSWORTH, N. J.

AUGUST 19, 1939

INVESTIGATION NO. 2376

SUMMARY

Inv-2376

Railroad:	Central Railroad of New Jersey
Date:	August 19, 1939
Location:	Chatsworth, N. J.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	4218
Engine number:	820
Consist:	5 cars
Speed:	30-45 m. p. h.
Operation:	Timetable, train orders, and an automatic block-signal system supplemented by an automatic cab-signal system
Track:	Single; tangent; 0.28 percent descending eastward
Weather:	Raining
Time:	4:37 p. m.
Casualties:	30 injured
Cause:	Washout

October 20, 1939.

To the Commission:

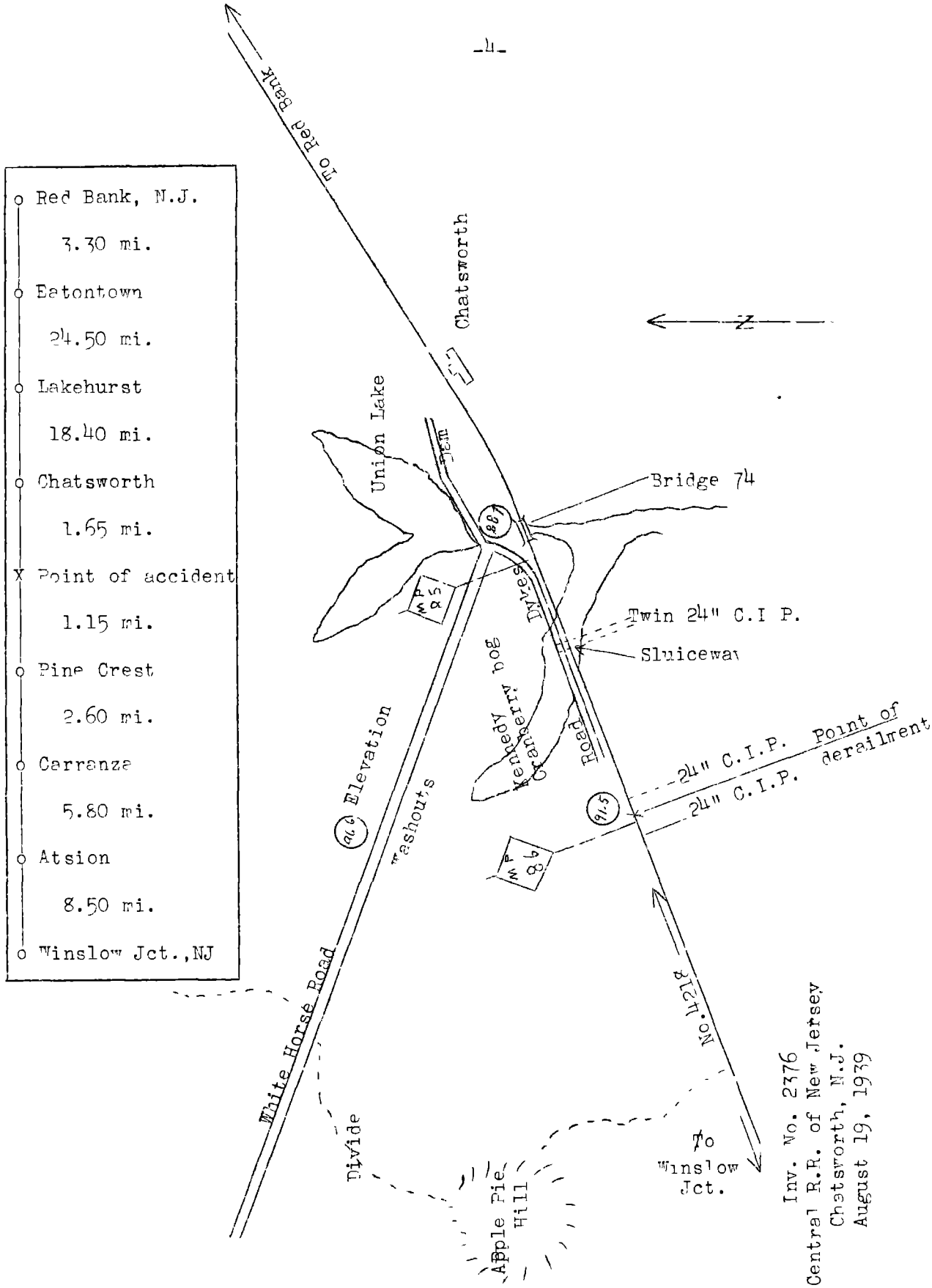
On August 19, 1939, there was a derailment of a passenger train on the Central Railroad of New Jersey near Chatsworth, N. J., which resulted in the injury of 52 passengers, 4 dining-car employees, 1 porter, and 1 train-service employee. This accident was investigated in conjunction with the New Jersey Board of Public Utility Commissioners.

Location and Method of Operation

This accident occurred on that part of the Southern Sub-Division which extends between Winslow Junction and Red Bank, N. J., a distance of 65.9 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by timetable, train orders, and an automatic block system supplemented by an automatic cab-signal system. The derailment occurred at a point approximately 1.65 miles west of the station at Chatsworth. Approaching from the west the track is tangent about 4.5 miles to the point of derailment and more than 1 mile beyond. The grade is 0.28 percent descending eastward about 0.5 mile to the point of derailment, then level about 1 mile.

Mileposts are numbered from east to west; the accident occurred 152 feet east of milepost 86. The terrain in this vicinity is generally flat and the roadbed is on an embankment averaging 2 feet in height. The drainage area north of the track consists of about 15 square miles; it extends about 6 miles eastward from milepost 87 to milepost 81, and northward from the track about 3.5 miles. The water in this area is drained to the south by four 24-inch cast-iron pipe culverts and a creek known as Old Union Stream. The first culvert, located about 65 feet west of milepost 86, is 5 feet 2 inches below the tops of the rails and drains an area directly north of the point of derailment. The second culvert, located about 525 feet east of milepost 86, is 5 feet 5 inches below the tops of the rails and drains an area north of the track; these two areas are separated by higher ground. Both of these water courses are for use principally during heavy rains. Twin culverts, located about 3,700 feet east of milepost 86, drain Kennedy cranberry bog, which lies north of the track at this point. Bridge 74, a three-span wooden trestle 59 feet in length, is located 841 feet east of milepost 85; Union Lake is located about 800 feet north of the track at this point and the outlet at the south end thereof is bordered by a dam and a highway. The highway, known as White Horse Road, extends from northwest to southeast.

The track structure consists of 90-pound rail, 33 feet in length, laid on about 18 treated ties to the rail length; it is



Inv. No. 2376
Central R.R. of New Jersey
Chatsworth, N.J.
August 19, 1939

single-spiked, fully tieplated, ballasted with cinders to a depth of 18 inches, and well maintained.

The maximum authorized speed for passenger trains is 70 miles per hour.

Rule 361 of the maintenance-of-way department reads as follows:

> "361. During heavy storms or high water, whether by day or night, whereby tracks or structures are liable to be damaged, Section Foremen and such of their forces as they deem necessary, must be on duty. At such times, they must go over their sections to make sure that the track is safe, taking stop signals with them."

Special Instruction 34 in the timetable reads as follows:

> "34. During storms and bad weather, all trains must be handled carefully at all points, where slides or washouts are liable to be encountered."

It was raining excessively for some time prior to and at the time of the accident, which occurred about 4:37 p. m.

Description

No. 4218, an east-bound passenger train, consisted of one passenger-baggage car, one coach, one diner, one coach, and one observation car, in the order named, hauled by engine 820, and was in charge of Conductor Walsh and Engineman Thomas. The cars were of all-steel construction except the diner, which was steel sheathed. At Winslow Junction, 19.7 miles west of Chatsworth, the crew received a message which read as follows:

> "Acct. hard rains keep sharp look out for sand washed down on crossings."

On the bottom of this message there was a notation which read:

> "Look out for orders at Chatsworth."

This train departed at 4:14 p. m., according to the train sheet, 6 minutes late, and approaching Chatsworth at a speed estimated to have been between 30 and 45 miles per hour was derailed at a point where the track had been washed out.

Engine 820 and its tender were separated from the cars and stopped 3,300 feet east of the initial point of derailment; only the rear tender-truck was derailed. The rear-truck floating-lever of the tender was broken as a result of the acci-

dent; this rendered the tender brakes inoperative. All five cars were derailed; they stopped in general line with the track, across and on both sides thereof, and leaned at various angles. The first two cars remained coupled, but the other cars were separated. The rear end of the last car stopped 120 feet east of the initial point of derailment. The track was destroyed a distance of about 500 feet. The injured train-service employee was the flagman.

Summary of Evidence

Engineman Thomas stated that the air brakes were tested at Atlantic City and they functioned properly en route. The assistant supervisor of track boarded the engine at Hammonton, about 3 miles west of Winslow Junction. At Winslow Junction a message containing instructions to keep a sharp lookout for sand on crossings because of hard rains and to look out for orders at Chatsworth was received. When leaving Winslow Junction the sun shone and the engineman remarked that it looked as though the rain were over. The speed was about 50 miles per hour at Atsion, 9.55 miles west of the point of accident; it was reduced while crossing several bridges and then was increased to about 40 or 45 miles per hour. At Carranza, 5.75 miles west of the point of accident, excessive rain was encountered; he closed the throttle and had the drifting valve in operation. He was leaning out the side cab-window and looking ahead; the range of visibility was a distance of only a few feet. The headlight was burning brightly, the speed was reduced to almost half of the maximum authorized speed, and the wayside and cab-signal indications were clear. The highway crossings at Pine Crest, 1.15 miles west of the point of accident, were not obstructed. The first intimation he had of anything wrong was when a crash occurred, at which time the train was drifting at a speed of between 35 and 40 miles per hour. Immediately he looked back and saw that his engine had parted from the cars. The locomotive continued moving eastward with only the rear [illegible] truck derailed, and stopped a considerable distance from the point where the crash occurred. During his 30 years of service over this track he had experienced no previous trouble with washouts. Weather conditions were worse on this occasion than he had ever seen them before. He was not anticipating trouble because of the storm until Bridge 74 was reached. Afterward he was informed that the accident was caused by a washout, but he did not go back to see it. During the morning of the day of the accident he made a trip westward with the train equipment involved in the accident, at which time it was raining but the condition of the track was normal.

The statement of Fireman Cinque corroborated the statement of Engineman Thomas.

Assistant Supervisor Langenbach stated that when approaching Carranza the speed was about 60 or 65 miles per hour. He

was sitting on the fireman's seat-box and looking ahead through the front window when the storm was encountered. The engineman closed the throttle and permitted the train to drift. The assistant supervisor could not see the stack of the engine because of the excessive rain. He felt no apprehension as to track conditions at this location and in his opinion there was no reason to caution the engineman. The engine rode smoothly and the first he knew of anything wrong was when he felt the locomotive drop slightly. About the same time there was a jolt, and, looking back, he saw that the engine had become separated from the cars, at which time the speed was about 40 or 45 miles per hour. When the engine had almost stopped he glanced down from the cab and saw water within 2 or 4 feet of the roadbed. About one hour after the derailment he went to the rear of the train and saw a washout. At that time water was up to the base of the rails and was washing under about 20 feet of the track. On the north side of the track there was an area about 50 or 75 feet wide where the water was about 3 feet deep. Later, the section foreman told him that the water was rising at Bridge 74 and that this bridge would be lost; he proceeded to that point and saw the water seeping behind the bulkhead. About 9 or 9:30 p. m. there was considerably more water at the point of derailment than there was when the accident occurred; at this time measurements showed that the roadbed was washed out to a depth of 18 inches below the ties throughout a distance of approximately 100 feet. At no time did he observe the water over the tops of the rails. Subsequent to the accident he examined the track west of the point of derailment and found it to be in good condition. He was not on the engine because of storm conditions, but merely as a routine duty in order to check on track conditions. The two 24-inch pipes, one of which is located west and the other east of milepost 86, were provided to carry off any accumulation of water on the north side of the track so that water on one side would be equal in height to that on the other side. Water seeped into the soil and passed away through absorption instead of flowing through the ditches. He had been in the service since January, 1912, and this was the first time to his knowledge that any accumulation of water had washed out the roadbed at this point.

Statements of Conductor Walsh, Trainmen Reener and Anzelone, Dining Car Steward Herring, Waiters Adams and Saunders, and Train Porter McKennan substantiated testimony of previous witnesses. Their estimates of the speed at the time of the derailment ranged from 35 to 40 miles per hour.

Section Foreman Olive stated that his section extended from milepost 83 to milepost 95, a distance of 12 miles. On the day of the accident he went on duty at 7 a. m. at Chats-

worth tool house, and, with his gang of three men, surfaced the track east of the tool house until 9 a. m., when his men went off duty because of a light rain. He worked in the tool house about one hour and then patrolled the track to milepost 85. Between 1 and 2 p. m. he started westward with the intention of going to Kennedy cranberry bog to check the water level there during the storm, as instructed, and determine whether water would drain through the pipes properly. On his way he stopped at Chatsworth at which time it was raining hard. The dispatcher instructed him to ascertain conditions at a point about 1-1/4 miles east of Chatsworth or about 1/4 mile beyond the eastern limit of his own section. He was driven by automobile to that point and he found that the track was covered with sand, water, and scrap ties. He removed what debris he could without assistance, then returned to the station and reported conditions to the dispatcher, who instructed him to take his three men and clear the track at that point. They started out about 3:30 p. m. and had the track cleared about 4:50 p. m. He reported to the dispatcher accordingly, then learned of the derailment on his own section, and proceeded immediately to the point of accident. On his way he observed that the water was high at Bridge 74. He arrived at the scene of the accident about 5:15 or 5:20 p. m., and saw the point where the track was washed out and torn up. The water was flowing with great force at right angles to the track. The single drain pipes on each side of mil post 86 were open. Previously there never had been any condition in which the accumulation of water on the north side of the track was greater than these culverts could convey. He considered the track safe and felt no concern about high water or washouts at this point; therefore, he did not deem it necessary to patrol the track because of the storm. He last inspected the track involved during the morning of the day before the derailment; at that time it was in good condition.

Train Dispatcher Tilton stated that on the day of the accident he went on duty at 1 p. m., at which time it was raining, and he was told that the storm was general. At 3 p. m. he suggested to the chief dispatcher that conditions at a point about 1 mile east of Chatsworth be checked as water trouble had been experienced there about two weeks previously. This was done and the trouble there was cleared up. He did not receive any report of unusual track conditions between Winslow and Chatsworth. During his 21 years of service as dispatcher no previous trouble from a washout had occurred at milepost 86 and at this time he did not anticipate any trouble there.

Statements of Dispatchers Fisher, Cogan, and Bozarth, and Chief Dispatcher Layer developed nothing additional of importance.

Locomotive Inspector Ingersoll inspected engine 820 before its departure from Atlantic City and found it to be in proper condition. Car Inspectors Williams and Webb made an air-brake test and inspected the cars and found nothing wrong.

Air Brake Instructor Brown inspected engine 820 after the accident and no defect that might have caused or contributed to the accident was found. The rear-truck floating-lever of the tender was broken as a result of the accident and the tender brakes thereby were rendered inoperative; as a result the engine moved a considerable distance after it broke away from the cars.

Bridge Engineer Yates stated that the entire drainage area in this locality was about 15 square miles. The terrain north of the track in the vicinity of the two culverts at milepost 86 was very flat but there was higher ground between them which divided the drainage flow. At the culvert west of milepost 86 there was no defined brook and the amount of water expected to reach it was very small. At the culvert east thereof there was a defined brook of small dimensions. The flow to these two culverts was confined to the drainage of small areas, the main drainage of this section being conveyed under Bridge 74. About 300 yards upstream from Bridge 74 there was a road, the embankment of which formed a dam for Union Lake. Subsequent to the accident Bridge 74 was washed out, also the embankment of the road. Prior to the accident he had never known of any unusual water condition at any of the culverts in this vicinity or at Bridge 74, and to his knowledge the heaviest rainfall in any previous storm was 6 inches in 24 hours. In his opinion the drainage facilities were adequate.

Assistant Superintendent Carr had been employed in various capacities by this railroad since 1882. During his years of service no previous water trouble had been experienced between Atsion and Chatsworth, and he said that no such trouble was anticipated on this occasion.

J. W. Meredith, former general superintendent, entered the service in 1885. To his knowledge there had never been any difficulty with water conditions between Atsion and Lakehurst.

Caretaker Stevenson, who lived in Chatsworth and was employed by the Chatsworth Cranberry Association since 1910, stated that it was his duty to watch the water level of the irrigation bogs. He used a water gauge to ascertain the

amount of rainfall and then regulated the gates of the dam accordingly to keep the water from overflowing the top. At 11 a. m. there was about 3/4 inch of water in the gauge. He emptied the water and about 2 p. m. there were about 2-3/4 inches of water in the gauge, which he emptied. He then proceeded to the bogs and relieved the ditches. Returning home about 1 or 1-1/2 hours later he found that the gauge had about 4 inches of water in it and he emptied it again. A few minutes later there were 2 inches of water in the gauge. It continued to rain excessively until about 5:45 p. m., when it diminished. He estimated that about 13-1/2 inches of rain fell, and that of this amount about 10-3/4 inches fell between 2 and 6 p. m. Last year there was a 5-day storm and about 10 inches of rain fell during that period; however, the storm which was in progress at the time of the accident was the worst he had ever seen.

Maintenance of Way Engineer Mapes stated that he arrived at Chatsworth about 9 p. m. and walked to the point of accident. At Bridge 74 the west-approach embankment was washed out and the track was suspended a distance of 30 feet, but this washout did not occur until Union Lake dam broke which was after the accident had occurred. The surface of the water was 2 feet 6 inches below the tops of the rails. Through the night this water receded at the rate of about 4 inches per hour. At the point of accident the ground on each side of the railroad was lower than the track. The entire area between Bridge 74 and the point of accident was flooded on both sides of the track and in some places almost to the top of the ties. The only place where water had crossed the track was at the initial point of derailment, and from that point eastward about 100 feet it was over the roadbed and flowing swiftly southward and the roadbed was washed out to the depth of the subgrade or about 18 inches beneath the base of the ties. Heretofore he had not known of any storm in which the amount of rainfall was equal to this. Subsequent to the accident he examined the track a distance of 1/2 mile west thereof and found it to be in proper line and surface. In his opinion the accident was caused by the track being washed out during the period of excessive rainfall.

Chief Engineer Owen submitted a report based upon an analysis of contour maps of the Department of Conservation and Development of the State of New Jersey, and from observations made during the latter stages of the storm and thereafter. He stated that the 10-foot contour interval of the map did not reflect local rises and falls which undoubtedly had a large influence in the run-off of extraordinary precipitation in a flat and spongy area. The rainfall on August 19, 1939, was a record for this section of the State of New Jersey. The official observer for the United States Weather Bureau at Tuckerton, located about 18 miles south

of Chatsworth, reported a rainfall of 14.81 inches between 8 a. m. and 10 p. m. No record of rainfall by hours was available but the evidence indicated that the heaviest fall occurred about 3 p. m. At the initial point of derailment the evidence indicated that the water on the north side of the track was up to the tops of the ties, an elevation of 91.5, when the derailment occurred, and the water level on the south or downstream side was at a somewhat lower elevation. The flood waters reached the level of the tops of the ties in the vicinity of milepost 86 and a distance of 1/2 mile east thereof. Farther east the water level was lower and at bridge 74 it did not rise above an elevation of 88.7. The greater part of the drainage on a tributary to bridge 74 and the four 24-inch cast-iron-pipe culverts drained to Union Lake which in turn drained under the railroad at bridge 74; the remaining area drained through the four 24-inch cast-iron pipes. Formally there was a division of the water shed between the twin 24-inch pipes at the cranberry bog and the two 24-inch pipes at milepost 86. The indications were that very little drainage from the northeastern section of the water-shed flowing into Union Lake and the creek found its way eastward into the adjoining portion of the water-shed drained by the four 24-inch pipes. In the vicinity of White Horse Road the normal drainage conditions were changed. Washouts occurring on White Horse Road north of the initial point of derailment indicated that water crossed this road from north to south at an elevation 6 feet higher than the normal water level at the railroad at mile post 86. This would cause a diversion of water from the water-shed drained by the twin 24-inch pipes at the cranberry bog to that drained by the two 24-inch pipes at milepost 86 and would produce the abnormally high water at the latter point where the derailment occurred. The character of the surrounding terrain was such that the usual run-off formulas for determining the size of culverts and bridges could not be applied because of the flat land with heavy woods, underbrush, numerous swamps and cranberry bogs located throughout the area, but it had been necessary to depend on experience. Continual observation in this territory showed the drainage facilities provided to be entirely adequate prior to this storm. According to the train sheet, the train involved in this accident left Wind Gap Junction at 4:14 p. m., and the derailment occurred about 4:57 p. m., the distance of approximately 18 miles being covered in 23 minutes, or at an average rate of speed of 47 miles per hour.

Observations of Commission's Inspectors

The Commission's inspectors visited the territory involved on the day after the accident. The two 24-inch pipes at milepost 86 were open and water was trickling through them.

There was no evidence of a defined brook at either pipe to indicate a regular flow of water. The contour of the surrounding land was as described by witnesses. Examination of the track west of the point where the washout occurred disclosed it to be in good condition. No indication of the roadbed or ballast being washed out within two miles on either side of the point of derailment was observed. The water conditions at Bridge 74 apparently did not contribute to the washout at milepost 86. The extent of the storm was evident in that it was necessary to make numerous automobile detours, because of badly washed road and washed out bridges, in order to reach Chatsworth station.

Discussion

According to the evidence, there was a heavy rain storm during several hours prior to and at the time of the accident. The crew had received instructions to look out for sand washed down on crossings and, in compliance with these instructions and because of excessive rain restricting vision to less than the length of the engine, the train was moving, at the time of the accident, at a speed between 30 and 45 miles per hour instead of the maximum authorized speed of 70 miles per hour. The headlight of the engine was burning brightly. The wayside and cab signals displayed clear indications. The three men on the engine were not aware of anything wrong until the train encountered the damaged track.

After the accident about 20 feet of the track behind the train was found to be washed out. At this point water, which was up to the base of the rails, was flowing at right angles to the track. Water continued to rise and about 5 hours later it was found that the ballast had been washed out to a depth of 18 inches below the ties.

Prior to the accident the last train which moved over the track involved passed about 4-1/2 hours before the accident occurred; this train was composed of the same equipment and manned by the same crew which were involved in the accident. No unusual condition was observed at that time.

According to the record of the U. S. Weather Bureau at Tucherton, 18 miles south of Chatsworth, the rainfall during the period from 8 a. m., until 10 p. m., August 19, was 14.81 inches. The heaviest rainfall occurred about 3 p. m. An attendant of cranberry bogs, who used a water gauge in the vicinity of the point of derailment, estimated that about 13.5 inches of rain fell between the hours of 11 a. m. and 6 p. m., 10.75 inches having fallen between 2 and 6 p. m. Several witnesses stated that never previously had there been trouble in this vicinity because of water conditions. Other witnesses stated that this was the worst storm in more than 40 years.

The chief engineer stated that because of the character of the surrounding terrain the usual run-off formulas for determining the size of culverts and bridges could not be applied; therefore it was necessary to depend on experience, but the drainage provided had previously been sufficient.

Conclusion

This accident was caused by the track being washed out as a result of unusually heavy rainfall.

Respectfully submitted,

S. L. MILLS

Director.