

1908

INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY CONCERNING AN
ACCIDENT ON THE NORTHERN PACIFIC RAILWAY NEAR BIG LAKE,
WASH., ON APRIL 6, 1934.

June 11, 1934.

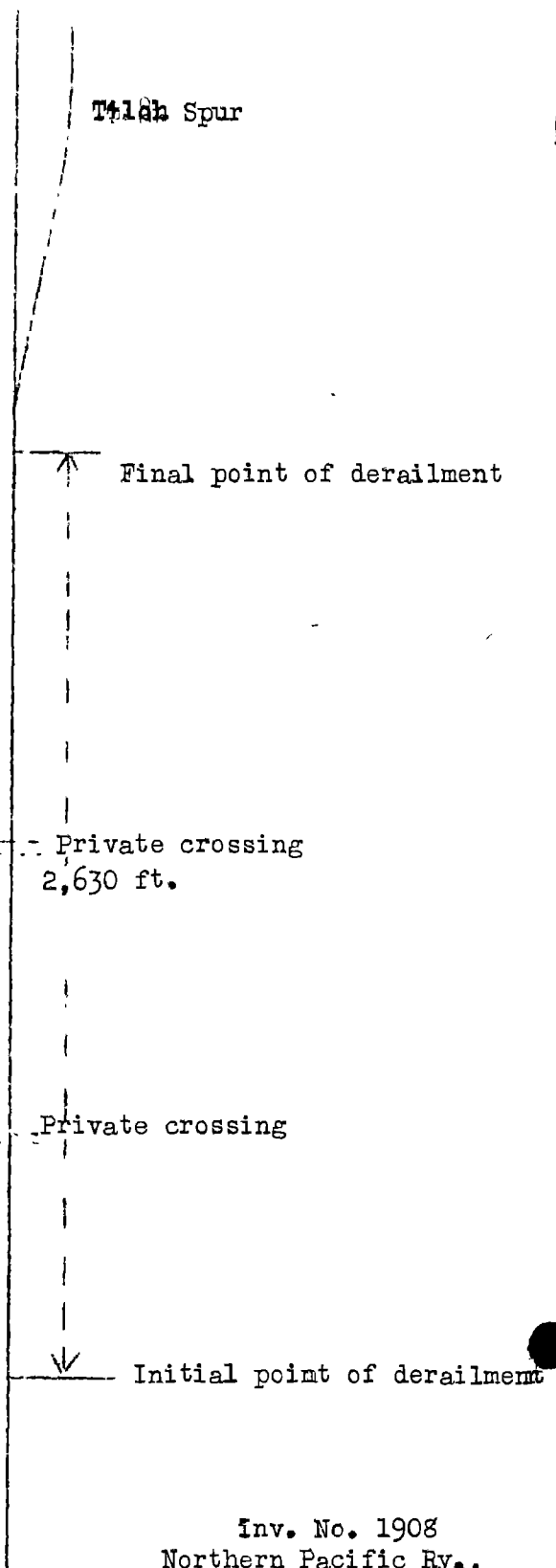
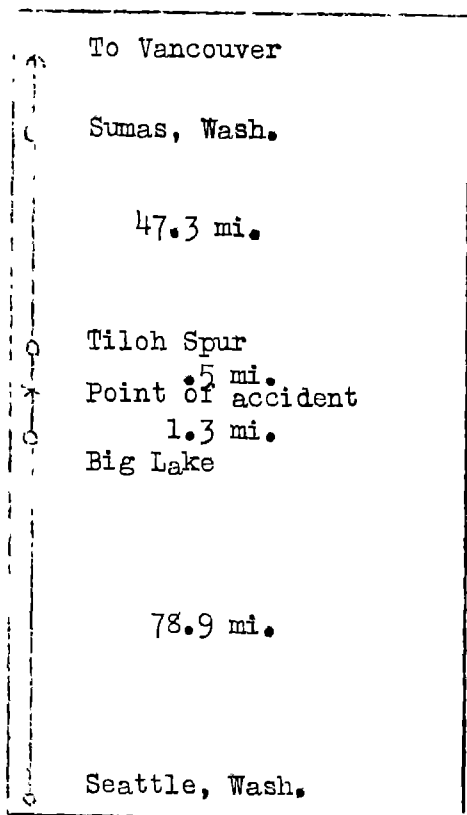
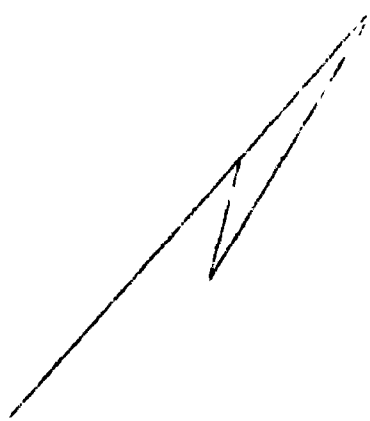
To the Commission:

On April 6, 1934, there was a derailment of a passenger train on the Northern Pacific Railway near Big Lake, Wash., which resulted in the death of 1 employee and the injury of 1 employee and 1 mail clerk. This accident was investigated in conjunction with a representative of the Department of Public Works of the State of Washington.

Location and method of operation

This accident occurred on the Fifth Sub-division, known as the Sumas Branch, of the Tacoma Division, which extends between Seattle and Sumas, Wash., a distance of 128 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by time table and train orders, no block signal system being in use. The initial point of derailment was approximately 1.3 miles west of Big Lake, while the final derailment occurred about $\frac{1}{2}$ mile beyond at the switch leading to Tiloh Spur. Approaching the initial point of derailment from the east the track is tangent for a distance of 2,754 feet, followed by a $0^{\circ}30'$ curve to the left 833 feet in length, and then tangent track for a distance of 3,896 feet, the initial point of derailment being on this latter tangent at a point 758 feet from its eastern end, and at the leaving end of a vertical curve 800 feet in length, which was followed by a slight ascending grade to the spur track.

In the vicinity of the initial point of derailment the track is on a fill about 4 feet in height and at the time of the accident there was about 1 foot of water on the south side of this fill, the nearest culvert being about 2,200 feet to the west. The track is laid with 90-pound rails, 33 feet in length, with an average of 18 or 19 fir ties to the rail length, about 50 percent being treated ties, fully tieplated and single-spiked; 4 rail anchors to the rail length are used. The track is ballasted with gravel to a depth of about 12 inches.



Inv. No. 1908
Northern Pacific Ry.,
Big Lake, Wash.
April 6, 1934.

Speed restrictions through this territory had been 60 miles per hour for passenger trains and 45 miles per hour for freight trains, but on August 10, 1933, special bulletin instructions were issued restricting the speed for passenger trains on this sub-division to 50 miles and for freight trains to 40 miles per hour.

Tiloh Spur is an industrial track leading westward to the plant of Knapp Brick & Tile Company, the switch being a facing-point switch for west-bound trains. At the time of the accident there were four box cars standing on this spur just clear of the main track. Opposite the spur track the main track is laid on a fill about 12 feet in height.

The weather was clear at the time of the accident which occurred about 11:20 a.m.

Description

West-bound passenger Train No. 443 consisted of 1 mail and baggage car, 3 coaches, and 1 baggage car, in the order named, hauled by engine 2198, and was in charge of Conductor Anderson and Engineman Baughn. The baggage cars were of all-steel construction while the coaches were of wooden construction. This train left Arlington, the last open office, 17.6 miles east of Big Lake, at 10.48 a.m., according to the train sheet, 1 minute late, and on approaching Tiloh Spur was derailed while traveling at a speed estimated to have been between 30 and 45 miles per hour.

The rear tender truck wheels were derailed to the right and followed the rails until they encountered Tiloh spur track switch approximately 2,630 feet beyond. The engine remained on the track and stopped at a point 694 feet beyond the switch; the tender remained coupled to the engine with the front truck derailed to the left; the rear tender truck was detached and stopped to the right of the main track 187 feet behind the tender. The first three cars stopped on their right sides at the foot of the fill between the main and spur tracks. The fourth car was tipped at an angle to the right down the embankment while the last car was leaning to the right against a box car on the spur track, with its front wheels derailed. The employee killed was the conductor.

Summary of evidence

Engineman Baughn stated that approaching Tiloh Spur he was operating his train at a speed of about 35 or 40 miles per hour, using a light throttle, and on reaching the switch leading to the spur track the fireman called to him to apply the brakes, which he did, although he thought that it was too late to have any

effect. He looked back and saw the cars turning over. Engine-man Baughn had noticed nothing unusual in the track conditions and there was nothing about the movement of the tender that attracted his attention; he thought that if there had been anything wrong with the tender he would have detected it from the noise. Before leaving the roundhouse he inspected the engine and the tender brakes and trucks and found them in good condition. The air brakes were tested before leaving Seattle and worked properly en route. This was his first trip with a steam engine for the past two years, having operated a motor car during that period; he thought his judgment of speed was about the same when operating a steam engine as when operating the motor car, and it was his opinion that the track in that vicinity was safe for the speed allowed as specified in the special bulletin.

Fireman Walker stated that on rounding the curve east of the tangent on which the accident occurred he put in a fire and then swept the deck of the engine and the apron between the engine and tender and had started to get back on his seatbox when it felt as though the rear truck of the tender jumped the track and the tender started bouncing; this occurred as the engine reached the frog of the spur track switch and was the first intimation he had of anything wrong. He did not notice any rough riding of the engine prior to that time or any bouncing of the tender or apron that would indicate that any of the wheels of the tender were derailed.

Head Brakeman Knoell stated that the first intimation he had of anything wrong was when the car in which he was riding, the second car in the train, started to move in a zigzag fashion and about 3 seconds later it turned over. He did not hear any noise under the car at any time that would indicate there was anything wrong. Most of his experience had been on the main line and he noticed that this branch line was not as smooth as the main line, but he did not feel any concern over the rate of speed at which they were traveling and he did not consider the track unsafe.

Flagman Terhune stated that when the accident occurred he was riding in the second car from the rear and he did not notice any rough condition in the track at any point.

Express Messenger Trambly, who was riding in the first car in the train, stated that approaching Tilton Spur he heard gravel striking the car floor and he thought perhaps the track was being ballasted; he went to the side door and looked out but could see nothing wrong and just about that time the car started to tip. Mail Clerk Irons, who was also in the first car, stated that when they were about $\frac{1}{2}$ mile from the spur track he heard a knocking and what sounded like rocks hitting the bottom of the car.

He then heard what he thought was a brake rod dragging and by the time he decided it was dangerous and reached for the emergency cord, the cars were derailed. Both the express messenger and the mail clerk said their car was not derailed before reaching the spur track switch.

Section Foreman Neal, in charge of the section on which the accident occurred, stated that he went over the track on the morning before the accident and found nothing that required his immediate attention. He last performed work in that vicinity about three weeks previously. While measurements showed that there was a variation of 1 inch in the track level, he was of the opinion that this condition would not cause any trouble, but said if he found several low joints he would give them immediate attention. He covers his section of 15 miles every day on his motor car and once a month he walks over it; at the time of the accident he had only two men beside himself on this section, but since the accident his crew has been increased to four men beside himself. The roadbed was good and he had no trouble in keeping the track in good condition and he considered it safe for the speed allowed.

According to the statements of District Engineer Hayward, Division Roadmaster Ashworth and District Roadmaster Kowol, a careful examination of the track was made subsequent to the accident and measurements were taken as to gauge which was found to vary not more than $\frac{1}{4}$ inch; beginning at a point 700 feet east of the point of derailment track levels were taken and found to vary from $\frac{1}{8}$ to 1 inch high on the left rail; the point at which the left rail was 1 inch high was approximately 250 feet east of the point of derailment and opposite a joint of the right rail. District Engineer Hayward called attention to the fact that the levels were taken while the track had no load on it and therefore the actual riding condition of the track would not be reflected. Each of these officials was of the opinion that there was nothing seriously wrong with the condition of the ties, gauge or surface that would contribute to the cause of the derailment, and they considered the track safe for the allowed speed of 50 miles per hour. Roadmaster Ashworth stated that he looked especially for hanging ties or loose joints; the bolts were tight and there were no slewed ties. While there was a variation in the track level he did not think it was sufficient in itself to cause the tender to rock to the extent that it would become derailed. He rode over the track on the following day before any work had been done upon it and noted no unusual movement of the tender. Roadmaster Kowol also was of the opinion that the 1 inch variation in the track did not contribute to the cause of the accident. District Engineer Hayward, however, advanced the theory that due to unevenness in the track a rolling motion of the train would result and that if this motion and

motion due to the speed became properly synchronized it might result in the derailment of the rear tender truck, particularly in view of the fact that the tender was followed by a heavy mail car.

Road Foreman of Engines Anders rode on the engine of this train on the day of the accident from Seattle to Machias, about 35 miles east of the point of accident; he inspected the engine and tender at two points en route and found it in good condition. He called the engineman's attention to the fact that as he had been operating a motor car regularly he would find that the engine would not ride as smoothly and that if there were any low joints they would be more noticeable from the engine; he cautioned the engineman not to make any excessive speed on rounding curves. He considered the track safe for the speed allowed on tangent track and curves of 3° or less, but thought it good judgment to steady the steam train by a light application of the brakes where the curvature was greater. He also inspected the engine and tender after the accident and found nothing that would have contributed to the cause of the accident. The same tender trucks were placed under the tender when the wreckage was being cleared, and the only repairs made before it was moved to Seattle consisted of replacing and straightening some of the brasses. He was unable to give any opinion as to the cause of the accident, stating that he did not think it was excessive speed, basing his opinion on the condition of the equipment and the fact that the brake pipe parted at the switch and the engine traveled a distance of only 694 feet before it stopped. Road Foreman of Engines Anders further stated that the tender has a capacity of 7,000 gallons of water and 12 tons of coal; after the accident there were 1,795 gallons of water and about 8 tons of coal in it.

Master Mechanic Dunkerley stated that engine 2198 was inspected before its departure from Seattle and found to be in good condition. He personally inspected the engine and tender after the accident and could find nothing that could have contributed to the cause of the accident. This engine had traveled 31,458 miles since it last had been shopped.

General Master Mechanic Neish made an inspection of the track and equipment and found marks on the wheels of the rear tender truck indicating that they had come in contact with the rails after being derailed. He found no visible defects in any of the trucks of the cars; the wheels were in good condition and apparently in good alignment; some damage was sustained as a result of the accident but there were no marks on the flanges indicating that they had come in contact with any obstruction on the track. There were two private planked crossings between the initial and final points of derailment and the planks were splintered and partially torn up; splinters were found wedged between the pedestal binder and pedestal safety strap on the rear truck of the tender, which confirmed his opinion that the rear tender truck was the first to be derailed.

He also found imprints on some of the ties indicating that they had been made by the binder safety strap on the tender truck; the passenger cars did not have the same kind of strap.

Superintendent Newton also advanced the opinion previously stated by District Engineer Hayward that possibly the accident was due to a combination of factors; the unevenness of the track, the rolling effect of the tender and the speed, although in his opinion, no one of these factors alone would have caused the accident.

District Claim Agent Benton stated that he interviewed three passengers who were riding on the train at the time of the accident and on inquiry as to the rate of speed the train was traveling at the time of the accident, they said it was about 30 miles per hour.

Mr. Alvin Johnson, whose farm was located approximately 540 feet west of the initial point of derailment, made a statement to the superintendent of this railroad and one of the Commission's inspectors to the effect that he was working in his yard when Train No. 443 passed him and he saw the rear end of the tender wobbling and he noticed considerable dust but he did not think that the train was traveling at an unusually high rate of speed.

Examination of the track after the accident disclosed that the right rear tender truck wheels crossed the rail, not marking the top of the rail but chafed the outside of the ball of the rail; this mark continued for a distance of 3 feet 4 inches to a point opposite a joint and just before reaching this point slight indentations of wheel marks were noted on the spike heads. The ties on the outside of the rail were then marked intermittently for a distance of 22 ties, and from that point westward there were two flange marks about 6 inches from the outside of the rail which continued to the spur track. The first wheel marks on the inside of the ball of the left rail were similar to those on the right rail and began 4 feet 3 inches west of the point where the right wheels crossed the rail; at the angle bar 4 feet 7 inches beyond, two bolts on the gauge side were slightly indented; at a point 4 feet 5 inches beyond this angle bar slight indentations of one flange were found on the ties and continued for a distance of 37 feet, gradually leading toward the center until they measured 18 inches from the gauge side of the rail. At this point a second heavily indented flange mark appeared about 8 inches from the rail, and the first marks mentioned then turned back toward the rail until they joined the mark 8 inches from the rail; these marks then continued in a uniform line to the spur track.

The Commission's inspectors inspected the track between Big Lake and Tule Spur and found that an average of about $1\frac{1}{2}$ ties to the rail length were decayed; however, in only one place were as

many as three bad ties found together. The gauge checked a little tight at two points and the track surface varied. Beginning at a point 758 feet east of the initial point of derailment levels were taken and it was found that the left rail varied from about $\frac{1}{4}$ inch high to $\frac{1}{4}$ inch low until a point was reached 234 feet east of the point of derailment where the left rail was 1 inch high. From that point to the point of derailment there followed points $\frac{1}{2}$ and $\frac{3}{8}$ inch high and $\frac{1}{2}$ inch low. The ties under the joint of the left rail following the point where the wheels left the rails were badly decayed.

Practically the entire year there is standing water near the base of the fill and at times it is inhabited by mountain beavers which frequently burrow in where it is dry under the ties and while the burrowing done by these animals does not appear to be extensive, several places were found where they had been at work and while there were not enough holes made by them to be serious, all such undermining tends to weaken the track support. After the accident slow orders were placed on the track. Observations were made by the Commission's inspectors of trains passing over this fill at a speed of about 15 miles per hour; at the joint near the point of derailment the track was depressed $\frac{5}{8}$ inch.

Engine 2198 is of the 4-6-2 type with a wheel base of 32 feet, 6 inches, the wheel base of the tender being 19 feet 4 inches, making a total of 51 feet 10 inches. The loaded weight of engine and tender is 378,950 pounds. The tender is equipped with four-wheel equalizer type trucks and has a water capacity of 7,000 gallons and a fuel capacity of 12 tons of coal. The weight of the tender, loaded, is 141,351 pounds. Detailed inspection by the Commission's inspectors of the engine and tender revealed no defects that might have contributed to the cause of the derailment. Accurate measurements of the side bearing clearances on the tender which existed prior to the derailment could not be obtained due to the damage sustained by the tender.

Conclusions

It is believed that this accident was due to a combination of several factors, including irregular track surface, speed and distribution of the tender load which caused the tender to rock sufficiently to derail the rear truck.

The track surface was found to be uneven to some extent, the left rail being 1 inch high at a point 234 feet east of the point of derailment and the ties under the joint near the point of derailment were badly decayed. At the time of the accident the tender had about 1 foot of water or about 1,800 gallons and approximately 8 tons of coal. Owing to the comparatively short

wheel base the center of gravity of the tender was quite high and the greater portion of the weight being in the forward end, its center of gravity was raised accordingly and the greater part of the weight was being carried on the front trucks. The intermittent flange marks on the ties when the wheels were first derailed indicate that there was a severe rolling action of the tender just prior to the derailment and which was evidently intensified at the joint where two old and decayed ties were found in the track, and it is thought that the poor joint in the track had a material effect in locking the rear wheels of the tender off the track.

Respectfully submitted,

W. J. PATTERSON,

Director.