

1993

INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY CONCERNING
AN ACCIDENT ON THE GREAT NORTHERN RAILWAY NEAR LANARK,
MONT., ON JULY 5, 1935.

August 30, 1935.

To the Commission:

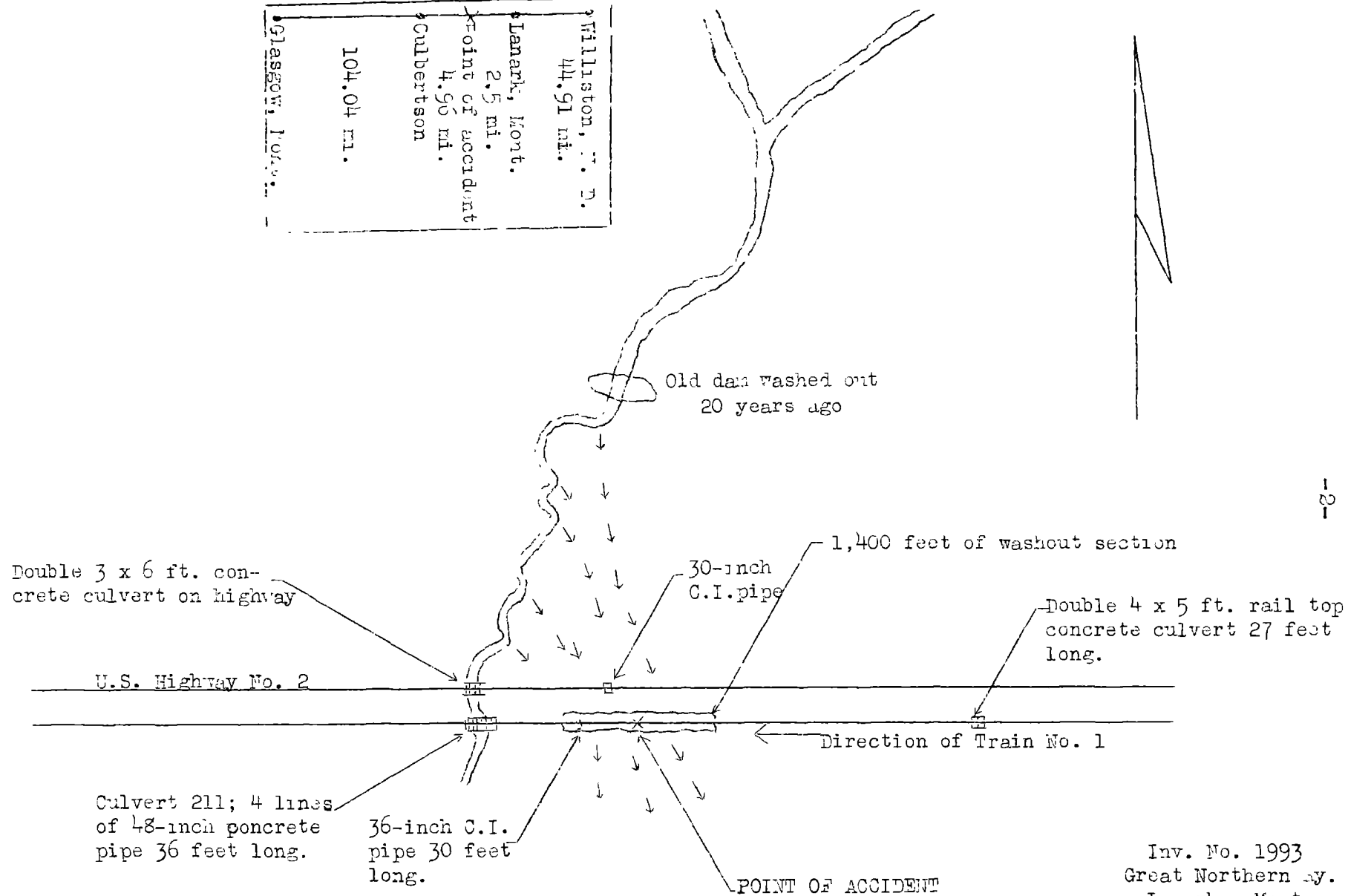
On July 5, 1935, there was a derailment of a passenger train on the Great Northern Railway near Lanark, Mont., which resulted in the injury of 18 passengers, 15 dining car employees, 1 train porter and 3 railroad employees.

Location and method of operation

This accident occurred on the First Subdivision of the Butte Division extending between Williston, N.D., and Glasgow, Mont., a distance of 153.41 miles; in the vicinity of the point of accident this is a single-track line over which trains are operated by time table, train orders and an automatic block-signal system. This accident occurred approximately $2\frac{1}{2}$ miles west of Lanark. The track is tangent from Lanark westward for a distance of approximately 4 miles; the grade is level at the point of accident.

The track is laid with 90-pound rails, 53 feet in length, with 20 treated ties to the rail length, single-spiked, fully tieplated, and ballasted with pit run gravel from 10 to 12 inches in depth. The track is laid on a slight fill, passing through fairly level country, the maximum height of the fill at the point of accident being about 5 feet. U.S. highway No. 2 parallels the track on the north; it is also on a slight fill but its surface opposite the point of accident is about 4 feet lower than the top of the rail. There are drainage ditches on both sides of the highway and borrow-ditches on both sides of the track. About $\frac{3}{4}$ mile north of the track there is a series of small rolling hills which extend back into the country to the north for several miles; there is also a similar series of hills on the south side of the track $\frac{1}{2}$ mile distant; these hills are known as the "Missouri River drainage breaks", this river lying south of the southern series of hills. The strip of farmland lying between these hills slopes gradually toward the south near the southern hills, then slopes slightly toward the west and northwest. There are small ravines or coulees between the

Williston, N. D.
 44.91 mi.
 Lanark, Mont.
 2.5 mi.
 Point of accident
 4.96 mi.
 Culbertson
 104.04 mi.
 Glasgow, Mont.



Inv. No. 1993
 Great Northern Ry.
 Lanark, Mont.
 July 5, 1935

northern hills and water flowing from the hills follows the coulees which join one another at different points and eventually converge into one common ravine, from which point it follows a well defined channel in a southwesterly direction and flows under the highway and railroad tracks through culverts; the channel is dry practically all of the time except during unusually wet weather.

The water course under the highway is about 1,600 feet west of the point of accident and consists of a double 3 by 6 foot concrete culvert; about 300 feet west of the point of accident there is a 30 inch corrugated iron pipe. Opposite the first culvert mentioned, under the track there are 4 lines of 48 inch concrete pipe 36 feet in length, installed in 1928; at a point about 800 feet east thereof is a 36 inch cast iron pipe 30 feet in length passing under the track, and about 2,000 feet east of the point of accident there is a double 4 by 5 foot rail-top concrete culvert 27 feet in length under the track.

It was raining at the time of the accident, which occurred about 2:20 a.m.

Description

Train No. 1, a west-bound passenger train, consisted of 1 baggage car, 1 smoking car, 2 coaches, 2 tourist cars, 1 Pullman sleeping car, 2 dining cars, 6 Pullman sleeping cars, and 1 club car, in the order named, all of steel construction, hauled by engine 2582, and was in charge of Conductor Morrison and Engineman Schroeder. This train departed from Williston, N.D., 44.91 miles east of the point of accident, at 1:11 a.m., according to the train sheet, 16 minutes late, left Bainville, 6.81 miles east of Lanark, at 2 a.m., still 16 minutes late, and was derailed by a washout about $2\frac{1}{2}$ miles west of Lanark while traveling at a speed as shown by a speed recorder, of 48 miles per hour.

Engine 2582, the tender and first seven cars and the forward truck of the eighth car were derailed. The engine stopped upright in line with the rails in an excavation about 6 feet deep; the tender was derailed to the right, turned over on its right side to the rear of the engine at an angle of about 45° to the track. The first car stopped in an upright position to the right of the track while the other derailed cars stopped in various positions to the left of the track. The tender and cars were badly damaged. The railroad employees injured were the brakeman, baggageman, and train salesman.

Summary of evidence

Just prior to the occurrence of the accident there had been an unusually heavy rainstorm, causing a heavy rush of water down the channel from the north, overflowing its banks and resulting in about 1,400 feet of track being damaged by water. This consisted of a 600 foot section on which the track was washed from a slight scour through the ballast to a 2-foot cutting off top of the subgrade, and within this section there was 80 feet near the western end where the south half of the roadbed was cut to a depth of 5 feet under the ties. Just west of the 600-foot section there was a 300-foot section in which holes were washed from 5 to 6 feet in depth under the ties and from 20 to 30 feet in length. The engine stopped in one of these holes. For the next 500 feet westward the flood damage varied from a slight scour through the ballast section to a 2 foot cutting off top of the subgrade.

Engineman Schroeder stated that it commenced to sprinkle at Lakeside, 13.23 miles east of Lanark, it rained a little harder at Bainville, 3.42 miles beyond, but it was not a real hard rain, and it continued to rain to the time of the accident. On passing through Lanark a medium rain was falling; he was looking through the front window of the cab and could see the block signals plainly, but due to the raindrops on the glass his vision of the track was obscured. The side windows were open but he did not see any water along the right of way. He noticed several automobiles along the highway and it was only a few minutes after passing them when the engine dropped and he applied the air brakes in emergency. He thought that the track was washed out about 4 feet when the engine first lurched, then there seemed to be a portion of firm track about a car length, followed by a portion of track entirely washed out, the engine stopping at this point. Engineman Schroeder stated that he had encountered no uneven track or other unusual conditions; the headlight was burning brightly and the brakes had been tested at Williston and were working properly en route. After passing Bainville he stopped at two block signals which were in the stop position; after passing the second stop signal he proceeded at a speed of about 8 miles per hour to the next signal which was displaying a clear indication, and from that point the speed was gradually increased until a speed of 47 or 48 miles per hour had been attained at the time of the accident.

Fireman Spoonemore stated that while it was raining moderately, at no time did he think it was of sufficient severity to cause the speed of the train to be reduced. He noticed no great amount of water flowing at any place around Lanark; after

the accident the water was deep at the point of accident but it was not running over the track; the engine had it backed up, but there was a current where it could get through under the engine and around the front end of the engine.

Conductor Morrison stated that he considered the rain to be light and one that would be good for the country. He rode in the ninth car in the train and looked out from time to time and he did not notice any heavy flow of water in the ditches along the track. Flagman Beaudoin stated that after leaving Bainville he noticed water in the ditches but nothing to cause any alarm. He estimated the speed of the train to have been about 25 miles per hour at the time of the accident. After the accident when on his way back to flag he saw that the water was higher than usual in the ditches but thought it was 2 or 3 feet below the track. Head Drakeman Hellblom estimated the speed of the train to have been 40 miles per hour at the time of the accident.

Operator Mauritsen, on duty at Culbertson, located about $4\frac{1}{2}$ miles west of the point of accident, stated that commencing about 10 p.m. there were light showers which turned into a heavy rain about 11:30 p.m. which continued for about $1\frac{1}{2}$ hour but was not of unusual severity. The rain then abated to some extent and settled into a moderate rain which lasted about $1\frac{1}{2}$ hours. He went outside of the station frequently and observed weather conditions, saw water in the ditches and along the right of way but at no time did he feel any apprehension as to any danger to the track. He stated that he reported the weather conditions to the dispatcher.

Signal Maintainer Hill, located at Culbertson, stated that he did not feel any concern about the rain that fell on the night of the accident. When the rain ceased he took some friends to their home about 4 miles south of Culbertson; this was between 1:30 and 2 a.m., and he did not find much water along the highway. On his return to his home he was informed through the telephone operator that the signals were out at Bainville yard and that Train No. 1 was in trouble between there and Lanark. He started immediately for Bainville in his automobile and on reaching a point about $2\frac{1}{2}$ miles west of the point of accident his car went into the ditch due to water on the highway; the water was up to the running board of his car and as near as he could tell in the dark it was within 3 feet of the top of the ties on the track; the track was about 1 foot higher than the highway; this was about 2:30 a.m. There were other automobiles stalled there and on some of the automobiles the water had been

up to the seat cushions. He walked back to Culbertson and procured a truck to get his automobile out of the ditch, and again proceeded toward Lanark, at which time there was a drizzle but it was not raining hard. While the water had receded to some extent it was still over the highway at some points, it being about 3 inches deep on the highway opposite the point of accident; he said that he traveled in water about 500 or 600 feet before coming to the point of accident and it was running like a fast creek. He tested the signals and found them to be functioning properly.

Section Foreman Spragno, in charge of the section on which the accident occurred, stated that he patrols his section daily and at other times when conditions warrant, and at such times he does not wait for instructions. He lives at Culbertson and at the time he retired on the night of the accident, about 10 p.m., there had been a light rainfall but no indication of a severe storm. He was called to go to the scene of the accident soon after its occurrence. He encountered high water about 3 miles east of Culbertson and from that point eastward water was running along the track and over the highway which in some places reached the tops of the fence posts along the right of way, but there was no ballast washed out on the track until reaching the point of accident. Upon his arrival at the scene of the accident, about 3 a.m., the water appeared to have receded. Inspection of the culvert near the point of accident showed it to be open. Section Foreman Spragno stated that he had last inspected the culverts and waterways under the track about a week prior to the accident, at which time he cleared them of tumble weeds. He also stated that in 1932 there had been a washout in that vicinity caused by a cloudburst, although it was not of a serious nature.

Dispatcher Krinbring stated that when he went on duty at midnight at Harve, Mont., he consulted the train sheet and noticed that it had been raining over practically the entire first district. He kept in touch with the operators, but did not receive any reports indicating that the rain was sufficient to endanger the track or to warrant calling out trackmen. The first intimation he had of trouble was when Train No. 1 failed to reach Culbertson; after waiting a short time, when the train did not appear he notified the section men to go out to ascertain the cause of the delay, thinking possibly that there might be engine trouble. His first report of the derailment was from the traveling engineer who called from Culbertson about 3:30 a.m.

The engine crew of Train No. 27 west-bound stated that after passing through Bainville about 10:55 p.m. on the night of the accident they noticed lightning and heavy dark clouds ahead, and when about 1 mile west of Lanark they encountered a heavy shower, but there was no water in the ditches and the rain appeared to have just started. They soon passed out of the shower, but there was more lightning in the west and also in the northeast, with heavy black clouds; on reaching Culbertson it was only sprinkling.

The crew of Train No. 446, east-bound, stated that their train passed through Lanark between 12:15 and 12:30 a.m. on the night of the accident, and while it was raining, there was not a heavy downpour at that time and nothing to cause alarm. There was some water in the ditches but no indication of an amount of water sufficient to wash out the track. The engineer and fireman stated that just as they reached what was formerly Clover, located just west of the point of accident, there was a terrific crash of thunder which came from the south, across the river.

Statements made by automobile drivers on the night of the accident indicated that the water over the highway north of the point of accident had been exceedingly high. Mrs. Becker and Mr. Landry, occupants of one of the first cars which encountered this high water between 1 and 1:30 a.m., stated that soon after their car became stalled they were forced out of their seats due to the water coming up over the seat, and when they got out of the car they stood in water up to their waists the current nearly sweeping them off their feet. They made their way back to a truck which in the meantime had pulled up behind them and was tipped over due to the rush of water. The water appeared to be coming from the hills and coulees north of the highway. The driver of the truck, Mr. Carlin, stated that he drove about 50 feet in the water before the truck was tipped over. About 40 or 50 minutes later when he was sitting with people in another car which in the meantime had become stalled near his truck, they saw the headlight of an approaching train; it was so dark that they could not see whether or not water was on the track as the track was about 4 or 5 feet higher than the highway. They saw the engine drop and knew that something was wrong but due to the thunder could not hear the derailment. He thought that his car had tipped over at a point about 6 or 8 blocks west of the derailed engine.

Mr. Kampfer, Manager of the Mountain States Telephone & Telegraph Company, stated that he was driving his car west-bound on highway 2 when he encountered a short but heavy shower about 2 miles east of Lanark about 1:30 a.m. The shower seemed to be over about a mile beyond, but on reaching a point about 1 mile west of Lanark it was evident that there had been a cloudburst; the ditches along the highway were filling rapidly with water

flowing from the west and north. At a point which he was able to identify later as 300 feet east of the point of derailment the water on both sides of the highway was becoming so high that he felt it was unsafe to continue further; up to that time no water was running across the highway, but in the length of time that it took to turn his car around the water had risen on the highway to such a height that it was necessary to move slowly to avoid its running into the radiator of the car. By this time the rain had started falling again in the proportions of a second cloudburst which made it impossible to drive very fast with safety. He proceeded to Bainville to inform the Great Northern operator of the possibility of a washout west of Larark as it seemed impossible to reach the telephone booth at Larark due to the water. He passed out of the worst of the rain about half way between Larark and Bainville. Train No. 1 was pulling out of the station at Bainville as he reached a point about 1 mile west thereof.

There were other automobiles being driven westward just prior to the accident that became stalled east of the area of high water on the highway. Mr. Lyngen stated that when he stopped his car the water was running up to the running board and he could see other cars stalled on the road ahead of him some distance farther west. He had been there about 45 minutes when he saw Train No. 1 approaching, but as the water was not running over the track opposite him he did not think a dangerous condition existed, although an attempt was made to signal the train with a flashlight, but the signal was not acknowledged. After the train stopped his automobile was standing about opposite the third car from the rear of the train. He afterwards discovered that at the point he stopped his automobile the highway was at a higher elevation than just west thereof.

Mr. Hanson, who lives on a farm about 1 mile north of the point of accident, stated that it commenced to rain about 11 p.m. but did not rain hard until after midnight; it rained hard for about an hour and then slackened and he fell asleep. About 4 a.m. he got up and walked over to the creek and there was about 2 feet of water in it at that time but he could see by the trees in the creek bed that the water had been as high as 16 feet. The creek did not overflow its banks near his house as the banks are higher than 16 feet, but about 1/2 mile from the railroad tracks it overflowed the banks on both sides; the water had run out in the field on the east side for a distance of about 40 rods. From the amount of water standing in a couple of coffee cans that had been outside he judged that more than 3 inches of rain fell that night. About a week prior to the occurrence of the accident he had been plowing along the railway culverts and noticed that at that time they were clear of any obstruction.

Mr. Morrow, who lives about 4 miles north of the tracks, at the head end of what is known as Stafford Coulee which runs almost south and joins another quite large coulee at a point just north of Mr. Hanson's place, stated that the cloudburst lasted from 1 to 1½ hours and after it was about over, approximately 1 a.m., he went over to the creek about 200 feet below his house and at that time the creek was running full of water; about 2½ feet deep and 25 feet across. Both Messrs. Hanson and Morrow stated they remembered about 3 years previously that there had been a cloudburst of greater proportions that had washed out the track at that point.

Mr. Larson, who also lives at the head end of Stafford Coulee, stated that from a half-barrel drum which was empty the night before, he figured there had been between 3 and 4 inches of rain that fell that night, while Mr. Nelson, who lives about 1½ miles south of the tracks stated that his measuring container indicated that about 1½ inches had fallen at that point.

Assistant Engineer Harris stated that after a careful study of the drainage area delivering water to the point where the washout occurred, and of conditions existing along the drainage area, he found that a very heavy rainfall or cloudburst had occurred that could not be expected to be handled by the normal water channel below the coulee or by the culvert openings under the state highway and the railroad track. North of the track, which runs east and west through this territory, the gradually ascending bottom land flats extend for about ¾ mile to the toe of the hills. The coulee, referred to locally as "Stafford Coulee", extends in a general northerly direction among the hills for a distance of about 4 miles, with a secondary coulee branching to the east. At the south end of the coulee, and about at a point where the ravine flows into the shallow channel of the bottom lands, there is an old dam site; this dam has not been in use for more than 20 years and is broken out. The water channel then winds down across the flat land, gradually reducing in size to the point where it passes under the highway and railroad at G.N. culvert 211. From the old dam northward along the coulee for a distance of slightly more than ¼ mile the channel is marked with high banks, the top of the banks being about 20 feet above the flow line; about ¼ mile beyond the channel spreads out into a wider sloping waterway with broken, rolling hills on both sides, the main coulee extending northerly along the range line for more than 3 miles. The secondary coulee branches to the east about ¾ mile above the old dam site, extending north for about 2½ miles.

Cross sections were obtained of the high water flow, two sections above the old dam and two below, with one section of the water channel at the lower end near the highway and culvert 211. The following figures show these cross sections:

Highwater flow area:

Section about 100 feet above dam.....	450 sq.ft.
Section about 1,200 feet above dam.....	460 sq.ft.
Section through dam.....	320 sq.ft.
Section just below dam.....	380 sq.ft.
Channel at highway culvert.....	72 sq.ft.
Highway culvert - double 3 by 6 ft.....	36 sq.ft.
Railroad culvert 211 (4 lines 48" pipe)...	50 sq.ft.

These figures indicate that the water was far in excess of what the lower water channel could handle and carry to the culvert openings under the highway and track. The channel evidently ran full, carrying tumble weeds and debris with it, clogging the mouth of culvert under the highway.

After passing the old dam site the water, which was in excess of the diminishing water channel, tended to overflow the banks and to seek release where it could. At each bend of the winding stream the amount and velocity of water was so great that it was not able to make the turn with the channel and continued in the direction it was flowing, spreading out over the fields and towards the point of washout. The debris at two of these bends indicated that this overflow action was very prominent, one of these points appearing to be an old high water channel. The water also overflowed the banks between the channel bends. About 1 mile north of the old dam site there is a farmer's reservoir dam; this dam is 240 feet long, the south 90 feet of the dam falls away to about $2\frac{1}{2}$ feet below the crest of the dam and at the end there is a free opening 6 by 10 feet. The amount of flow at the dam was such that the free opening thus provided could not handle the water so that it backed up to an additional 5 feet in elevation and then overflowed the crest of the dam. About 1,000 feet above this reservoir there was a plank deck bridge on concrete abutments carrying the county road over the water channel. The opening under the bridge was approximately 6 by 12 feet with the roadway about 7 feet above the flow line; at this point the water overflowed the roadway, washing out the bridge and carried part of the concrete slabs of the abutment a considerable distance down stream. The county road which crosses over the east branch of the coulee had a 6-foot fill over three lines of 36 inch galvanized iron pipe. At that point the water backed up and overflowed the roadway, washing it out and carrying the pipe from two lines of pipe down stream about 1,000 feet and carried the concrete headwalls at the culvert

pipe several feet down stream. The estimated drainage area accommodated by this channel contains about 5,000 acres. From the information received from the nearby farmers and the conditions found it appeared that the heaviest rainfall centered near the upper end of the coulee, this heavy rainfall lasting about 1 hour with a lighter fall before and after the heavy rain.

On two previous occasions, in July 1923, and again in June, 1932, the track has been washed out or disturbed by water from this channel at approximately the same location, although no accidents resulted.

Discussion

The evidence indicates that within 1½ hours prior to the accident there had been a storm of cloudburst proportions within a small area, originating among the hills north of the track, which included the territory drained by the channel passing under the highway and track about 1,000 feet west of the point of accident. The volume of water was such that it could not be accommodated by the drainage ditch and the culverts, resulting in the water overflowing the banks, spreading out into the fields, over the highway and scouring out the roadbed for a distance of 1,400 feet. The culvert under the highway became clogged with tumble wood and debris which was an added factor in causing the water to back up and run over the highway and a greater amount of water to be delivered along the track east of the culvert under the track provided to accommodate the water from this channel. The severity of the storm in this area was indicated by the damage done by the stream as it flowed towards the tracks for a distance of approximately 4 miles, scouring out a county road, washing out a concrete bridge and carrying the concrete slabs of the abutments a considerable distance down the stream, and also two lines of pipes under the county road at another point, and at one point the water had flowed through the ravine at a height of 15 feet.

There had been intermittent showers of moderate intensity along this subdivision for a period of about 4 hours prior to accident, but at no point had there been any storms of an alarming nature. The evidence indicates that the storm was so local in its character that employees a few miles distant were unaware of its severity. An east-bound train had passed over the point of accident about 2 hours prior to its occurrence, at which time no water was seen on the track or in the fields, and but very little water in the ditches.

The driver of an automobile, who had been forced to turn back due to the high water on the highway in the vicinity of the point of accident, was on his way back to Bainville to inform the

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Great Northern operator of the possibility of a washout west of Lanark when he saw Train No. 1 pulling out of the station at Bainville as he reached a point about 1 mile west thereof.

The track has been washed out in this vicinity on two previous occasions, in July, 1923, and in June, 1932, but no accidents resulted.

Conclusion

This accident was caused by a washout due to an unusually heavy local rainstorm.

Respectfully submitted,

W. J. PATTERSON

Director.