

INTERSTATE COMMERCE COMMISSION
WASHINGTON

REPORT OF THE DIRECTOR
BUREAU OF SAFETY

ACCIDENT ON THE LINE
OF THE
SOUTHERN PACIFIC COMPANY

CALIENTE, CALIF.

MARCH 20, 1939

INVESTIGATION NO. 2338

SUMMARY

Inv-2338

| | |
|-------------------|-------------------------------------------------------------------------------------|
| Railroad: | Southern Pacific |
| Date: | March 20, 1939 |
| Location: | Caliente, Calif. |
| Kind of accident: | Derailment |
| Train involved: | Freight |
| Train number: | 811 |
| Engine number: | 4111 |
| Consist: | 55 cars and caboose |
| Speed: | 15-20 m.p.h. |
| Operation: | Timetable, train orders and automatic block signal system |
| Track: | Single; 100 curve to the right; 2.0 percent descending grade for westward movements |
| Weather: | Clear |
| Time: | 9:23 a.m. |
| Casualties: | 1 killed and 1 injured |
| Cause: | Broken car wheel, apparently caused by overheating |

Inv-2338

May 9, 1939

To the Commission:

On March 20, 1939, there was a derailment of a freight train on the line of the Southern Pacific Company near Caliente, Calif., which resulted in the death of one trespasser and the injury of one employee. The investigation of this accident was made in conjunction with a representative of the Railroad Commission of California.

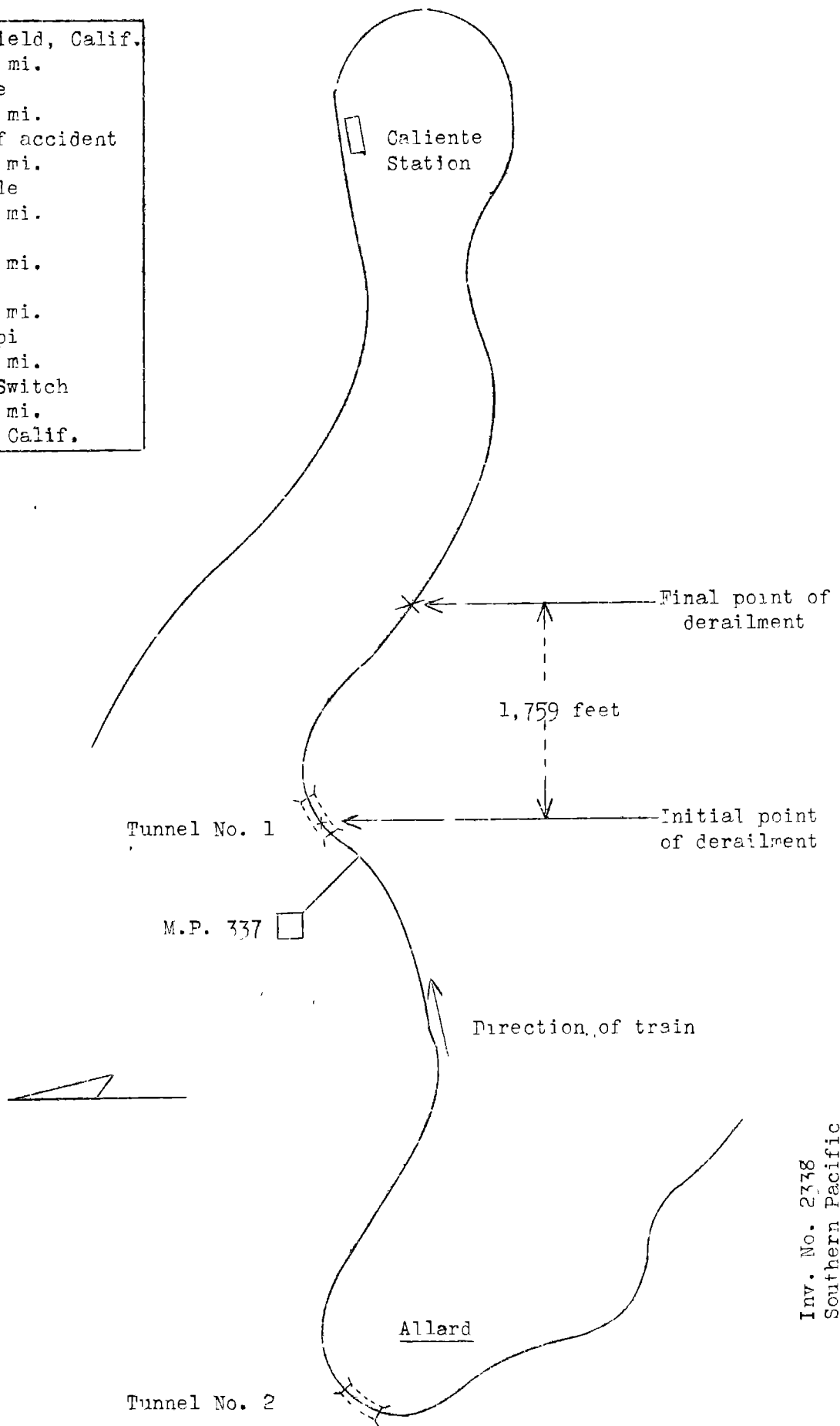
Location and Method of Operation

This accident occurred on that part of the San Joaquin Division designated as the Tehachapi Subdivision which extends between Mojave and Bakersfield, Calif., a distance of 67.8 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. The accident occurred at a point approximately 1.6 miles east of the station at Caliente. Approaching this point from the east there is a compound curve to the left approximately 1,125 feet long varying in curvature from $4^{\circ}30'$ to $4^{\circ}33'$, followed by a tangent 187 feet long, and then a 10° curve to the right 1,050 feet long and a tangent 813 feet long. The initial point of derailment was on the 10° curve at a point approximately 100 feet from its eastern end, and the final derailment occurred 1,759 feet beyond, on the western end of the tangent. The average gradient for west-bound trains is 2.086 percent descending from Rowen to the point of accident, a distance of approximately 8.7 miles; it is 2.0 percent descending at the initial point of derailment and 2.2 percent at the final point of derailment.

The track is laid in mountainous country with many sharp curves and through several tunnels; the initial derailment occurred in Tunnel No. 1, at a point 70 feet from its east portal. At the point of derailment the track structure consists of 131-pound rail, 39 feet in length, laid on an average of 24 creosoted pine ties to the rail length; it is double-spiked on the inside and single-spiked on the outside, fully tieplated, and ballasted with 8 inches of crushed rock. The alignment and surface are good, and the gage is uniformly $1/8$ inch wide. The track is well maintained.

Rule 33 of the Air Brake Rules and Regulations provides in part:

| | | |
|---|---------------------|--|
| o | Bakersfield, Calif. | |
| | 22.5 mi. | |
| o | Caliente | |
| | 1.6 mi. | |
| X | Point of accident | |
| | 2.7 mi. | |
| o | Bealville | |
| | 5.0 mi. | |
| o | Rowen | |
| | 8.6 mi. | |
| o | Marcel | |
| | 6.5 mi. | |
| o | Tehachapi | |
| | 1.8 mi. | |
| o | Summit Switch | |
| | 18.3 mi. | |
| o | Mojave, Calif. | |



Inv. No. 2348
Southern Pacific
Caliente, Calif.
March 20, 1909

"When retaining valves are used, the time consumed in traveling any one mile for the first five miles must not exceed 20 miles per hour, after which speed must not exceed 25 miles per hour. This must not be construed as authority to exceed specified speed restrictions. The first stop to permit wheel heat radiation and train inspection must not be less than 4 nor more than 10 miles from the point at which braking commenced. Trains must remain at such stop 10 minutes to accomplish the object desired."

Special time-table instructions provide that at Marcel and Rowen on the Tehachapi Subdivision freight trains will stop 10 minutes to allow heat to equalize in wheels and to make inspection. At other stops, inspection may be made provided the initial run is not to exceed a distance of 8 miles, succeeding runs not to exceed 10 miles.

The maximum speed allowed for freight trains between the west switch at Tehachapi and one mile west of Ilmon, between which points the accident occurred, is 20 miles per hour.

The weather was clear at the time of the accident, which occurred about 9:23 a.m.

Description

No. 811, a third-class freight train, consisted of 31 loaded and 23 empty cars and a caboose, hauled by engine 4111, and was in charge of Conductor Mathews and Engineman Humiston. At Mojave, 45.5 miles east of Caliente, a helper engine was attached, and the train departed at 6:20 a.m., according to the train sheet, 40 minutes late. The helper engine was cut off at Eric, 12.7 miles beyond, and at Monolith, 3 miles beyond Eric, a car was picked up. No. 811, then consisting of 32 loaded and 23 empty cars and a caboose, passed Tehachapi, 25.4 miles east of Caliente, at 7:47 a.m., 1 hour 7 minutes late, passed Bealville, the last open office, 5.3 miles east of Caliente, at 9:14 a.m., and was derailed when approaching Caliente while traveling at a speed estimated to have been from 15 to 20 miles per hour.

The engine, tender, and first three cars were not derailed. The fourth to thirteenth cars, inclusive, were derailed and stopped in various positions on both sides of the track within a distance of 212 feet. The fourth car stopped to the left of the track, leaning at an angle of 30 degrees, approximately 1,780 feet beyond the initial point of derailment; the lead truck was detached from the car. The following 7 cars passed the fourth car and stopped a short distance beyond it. The twelfth car stopped in general line with the track near the fourth car. The rear truck of the thirteenth car remained on the rails. The

seventh car was loaded with cylinders of acetylene gas and oxygen gas and as a result of the derailment the valves of these cylinders were broken and the gas became ignited and exploded, resulting in seven of the cars being destroyed by fire.

The employee injured was the head brakeman.

Summary of Evidence

Engineman Humiston stated that an air-brake test was made at Los Angeles, their initial terminal, and the brakes functioned properly en route. Between Mojave and Eric, a distance of 12.7 miles, a helper engine was used, and a car was picked up at Monolith, 29.8 miles east of Caliente. A running test of the air brakes was made at Summit, 2.6 miles beyond. At Tehachapi, 1.8 miles beyond Summit, the speed was reduced to permit the brakemen to turn up the retaining valves. Stops were then made at Marcel and Rowen, 18.9 and 10.3 miles, respectively, east of Caliente for the regulation inspection and the cooling of the wheels. Prior to arrival at Rowen there was practically no smoke issuing from the wheels of the train except a very slight amount in the vicinity of the sixth or seventh car; after leaving that point there was no smoke coming from any of the wheels. He stated in effect that considerable smoke will issue from wheels overheated by heavy braking. His train passed through Bealville at 9:10 a.m. After passing through Tunnel No. 2, located approximately 2.7 miles west of Bealville and 4,500 feet east of Tunnel No. 1, he saw the head brakeman on what appeared to be the eighteenth or nineteenth car. Approaching Tunnel No. 1 he reduced speed to permit the brakemen to turn down the retainers, and when his engine was about 30 car lengths beyond the tunnel he saw that the train had parted and the cars were piling up. The engine and first three cars stopped about eight car lengths beyond the wreckage. There was no occasion to set any hand brakes on the train as they are never set to control the speed. The weather was clear at the time of the accident. The train stopped at 9:23 a.m.

Fireman Stewart stated that he looked back over his train frequently and did not notice any excessive smoke coming from any of the wheels. When the train was between Tunnels Nos. 2 and 1 he saw the head brakeman on top of the cars walking toward the engine and he appeared to be between the fifteenth and twentieth cars. He estimated the speed to have been about 20 miles per hour from Bealville to Tunnel No. 1; the speed was then reduced and was about 15 miles per hour at the time of the accident.

Conductor Mathews stated that retainers are used from Tehachapi to Tunnel No. 1 and that the retainers on the first 40 or 42 cars had been turned up. He made a rolling inspection of the entire train as it left Monolith, and no defects were noted when the inspections were made at Marcel and Rowen, although at Rowen

he did turn down a retainer on the fifteenth car ahead of the caboose. He was in the cupola of the caboose and had a clear view of the train as it rounded the curve east of Allard, 1.4 miles east of the point of accident, and he saw a little smoke in the vicinity of the tenth car from the engine. The train traveled at a uniform speed of about 20 miles per hour descending the grade and was traveling at that speed at the time of the accident. As soon as the train stopped he left the caboose and saw a piece of broken wheel lying on the right side of the track about 2 car lengths from the tunnel; it was hot and smoking, and the rim was somewhat blue, although he did not feel it. This piece had broken from one of the lead wheels of the lead truck of the fourth car; examination disclosed a small flaw in the tread; because of the presence of rust it appeared to have been cracked for some time. Inspection of the track showed wheel marks on the guard rail, followed by wheel marks on the ties leading toward the center.

Head Brakeman Fleming stated that in the inspection at Rowen he found all wheels to be cool. He was on top of a car at some point between the twelfth and fifteenth cars from the engine when he saw the cars begin to pile up and he was thrown to the ground.

Middle Brakeman Scott stated that retainers were turned up on 44 cars. At Marcel he inspected about one-third of the train, starting at almost the rear end. He always inspects one side of the cars, then crosses over and gives the other side a rolling inspection as the train leaves. The same procedure is followed at Rowen. After leaving Rowen he saw a brake on one of the rear cars sticking and he turned down the retainer on this car. He then rode on top of the cars until the time of the accident. The train traveled about its usual speed, 18 or 20 miles per hour, from Bealville to Tunnel No. 1. Approaching Allard, he started turning down retainers, working toward the head end of the train, and was in the vicinity of the eighteenth car from the rear at the time of the accident. The head brakeman also was turning down retainers and at the time of the accident was in the vicinity of the sixteenth car from the engine.

Flagman Jacobs stated that he assisted in the inspection of the train at Marcel as it stood on the siding, but at Rowen the train was on the main track so he furnished flag protection. When leaving Bealville he stood in the caboose doorway in compliance with recent instructions to observe the track for any fresh wheel marks; however, when he saw Brakeman Scott on top of the train he climbed up in the cupola to observe him and the train, as he noticed that the conductor was busy reading the train orders, and he then remained in the cupola.

Operator Smith, at Bealville, 3.7 miles east of the point of accident, stated that he stood on the platform and inspected the fireman's side of No. 811 as it passed. There was nothing unusual in the movement of the equipment and there was no smoke issuing from the wheels of the train. He estimated the speed to be between 15 and 20 miles per hour. After delivering train orders at the rear he immediately went in the office and lined the route for an east-bound train to move from the siding to the main track. He then observed that it was 9:14 a.m. and reported both trains out at that time. He thought that he did not consume more than 15 seconds in arranging for the movement of the east-bound train.

Trainmaster Hoffman stated that after he arrived at the scene of the accident he inspected the fourth car, P. F. E. 13227, which was lying on its side. The wheels of the leading truck were blue. He made what he calls a thermal test with his finger on the failed wheels and found that they were above the ordinary heat and above the heat of the other cars. However, he has seen many wheels with similar blue marks, yet the wheels did not fail and he did not consider that they were overheated. The retainer was turned up to the horizontal position in which it would retain 15 pounds pressure. The brake cylinder, brake rods, and the check case on the K-2 type triple were broken. When this car arrived at Bakersfield, the retainer and triple valve were removed and another check case was applied to the triple valve. Both the retainer and triple valve were then tested and there was nothing developed that would cause the air brake to stick. The retainer test disclosed no condition that would cause retardation in the blow-down which would give high brake-shoe pressure and overheat the wheels.

Car Foreman McClure stated that the failure of R-1 wheel, B end, or the left lead wheel, was caused by a slight progressive chill crack through the tread of the wheel. The chill crack was about $\frac{1}{2}$ inch deep and extended in the tread about $1\frac{1}{2}$ or $1\frac{3}{4}$ inches in length. This crack did not reach the condemning limits of the A. A. R. There was no evidence of overheating; the indications were only those of the usual mountain braking heat. The marks on the track indicated that after this wheel broke it proceeded on the outside of the left rail, scuffing the ties west of the guard rail in the tunnel, and that the right wheel ran between the main and the guard rails and after leaving the guard rail it proceeded toward the center of the track. The right wheel was found loose and broken and the broken piece was lying nearby. This truck was lying at an angle to the track, and the car foreman was of the opinion that one of the trucks of the cars in passing this car struck the wheel with such force that it became loose, driving it inward and also breaking it. At Bakersfield this wheel was pressed off by a pressure of 20 tons, and the left wheel required a pressure of 125 tons to unseat it.

According to data furnished by railroad representatives, PFE car 13227 is a refrigerator car, class R-30-11-4, A. A. R. class B, of steel underframe construction. It was built in December 1917 and rebuilt in March 1931. It was equipped with Bettendorf truck, U-section with Simplex rigid bolsters. The journals were 5 by 9 inches, and the wheels were single plate cast iron. The light weight of the car is 55,900 pounds and its capacity is 50,800 pounds. On the date of the accident it was loaded with 20,060 pounds of bananas, plus 80 pounds of dunnage. The lead pair of wheels on the B end, R-1 737134 and L-1 736623, were 700-pound single plate cast iron wheels, cast by the Griffin Wheel Company, Los Angeles, in July 1937. The records of the Pacific Fruit Express Company show that according to the recording tape for hydraulic press at their Roseville, Calif., shop, wheel No. 737134 was mounted on the axle at a pressure of 50 tons and wheel No. 736623 was mounted at a pressure of 55 tons. The wheels were mounted on the axle on September 2, 1937, and applied to P. F. E. car 13227 on September 22, 1937. During the derailment the air-brake cylinder of this car was broken and the check-valve case of the K-2 triple valve was broken off. The brake rods and their levers were also broken and torn off both trucks. The undamaged portion of the triple valve was removed and, with another check case substituted, the triple valve was subjected to tests which developed that it functioned within the limits prescribed by the test code. The last cleaning of the triple valve and the cylinder was at Roseville, August 24, 1938. After the derailment the handle of the retainer was found in the horizontal position. This retainer was the double-spring 15-30 type, retaining 15 pounds brake-cylinder pressure when the handle was in the horizontal position and 30 pounds when in the 45-degree position. This retainer valve was removed from the car and tested, and it developed that there was a rapid blow-down from maximum brake-cylinder pressure to 15 pounds retained pressure. After 3 minutes the retained pressure had reduced to 12 pounds, averaging 1 pound blow-down per minute, which indicated a very good holding retainer.

A report submitted by the engineer of tests, covering a laboratory test of the defective wheel, states the following:

Nominal weight of wheel: 700 pounds
 Contour: AAR 1936 single plate
 Date cast: 7-27-37
 Number: E-737134
 Iron: Sound
 Depth of chill at tread: 10/16"
 Condition of flange as to AAR gauge: good
 Condition of tread as to AAR gauge: good
 Location of break: one-third of wheel broken out through plate. Broken portion received in several pieces.

Cause of break: Overheating at or shortly before time of failure.

Remarks: Tread blued and heat cracked. Back face of flange toward hub shows flat surface entirely around wheel and 5/8" wide, caused by rubbing against some part of truck.

Observations of Commission's Inspectors

The Commission's inspectors observed that the first mark on the track was an abrasion on the top of the south rail 242 feet east of the point of derailment. About 19 feet east of this abrasion a small piece of broken wheel was found, and a large fragment, consisting of about 25 percent of the total area of the wheel, was found on the right side of the track 72 feet west of the first mark on the left rail. A diagonal flange mark on a tie on the inside of the left or south rail pointed directly to the place where this piece of wheel stopped on the right side of the track. The abrasions on the top of the south rail were at intervals of 30 feet 9 inches, 22 feet 8 inches, 21 feet 8 inches, and then spaced 9 feet 8 inches to 8 feet 10 inches to a point where the wheels dropped off the rails, 242 feet 9 inches beyond the first abrasion mark. Fragments of the wheel were scattered within this distance; ten pieces recovered were fitted into the periphery of the left lead wheel of the lead truck of the fourth car in the train, although smaller pieces were missing.

Discussion

The evidence indicates that the left lead wheel of the lead truck of P. F. E. refrigerator car 13227, the fourth car in the train, was broken into ten or more pieces, the largest segment consisting of about 25 percent of the area. After the wheel started to break it continued on top of the rail a distance of about 242 feet before it dropped to the ties on the outside of the rail and then continued on the ties a distance of 1,759 feet where the final derailment occurred.

Testimony of car department and operating officials was to the effect that although the wheel bore evidence of high temperature from brake applications while descending the grade it was not sufficiently overheated to cause the failure. The car foreman was of the opinion that the failure was caused by a slight progressive chill crack. The conductor stated that there was rust in a wheel crack. A laboratory test of the wheel subsequent to the date of accident revealed that the metal was sound, the depth of chill at tread was 10/16 inch which was within A. A. R. specifications, and the condition of the flange and the tread as to A. A. R. gauge was good; the tread, however, was blued and heat-cracked, and the cause of the break was attributed to overheating at or shortly before the time of failure.

The train stopped at Marcel and Rowen, 17.3 and 8.7 miles, respectively, east of the point of accident for inspection and cooling of the wheels. When the operator at Bealville delivered train orders and watched the train as it passed he observed nothing wrong and the crew observed nothing wrong prior to the accident except the conductor thought that he saw a little smoke in the vicinity of the tenth car from the engine.

Since the operator at Bealville reported the train by his station at 9:14 a.m. and the accident occurred about 9:23 a.m., it would appear that the maximum authorized speed of 20 miles per hour was slightly exceeded over the distance of 3.7 miles, however the engineman stated that the engine passed the station at 9:10 a.m., and all members of the crew stated that the speed was not in excess of 20 miles per hour at any time. The operator attended to some other duties before reporting the train to the dispatcher and his report was based upon the time the rear of the train passed the station, which probably accounts for the seeming discrepancy.

On the descending grade beginning at Tehachapi, about 23.8 miles east of the point of accident, approximately 42 retainers had been turned up, and approaching Allard, 1.4 miles east of the point of accident, the brakemen began to turn down the retainers. However, after the accident, the retaining valve on the fourth car was found in the horizontal position, which indicated that the accident occurred before the head brakeman had reached that car. Since the air-brake equipment on this car was damaged and the brake rods and the brake levers were broken off in the derailment, it could not be determined what caused the overheating. There was evidence to the effect that the wheel involved had been overheated at some previous time but it was not determined to what extent, if any, the previous overheating contributed to its failure.

Conclusion

This accident was caused by a broken wheel, apparently caused by overheating.

Respectfully submitted,

W. J. PATTERSON,

Director.