INTERSTATE COMMERCE COMMISSION

REPORT NO. 3399

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS UNDER THE LOCOMOTIVE INSPECTION ACT OF FEBRUARY 17, 1911, AS AMENDED

LONG ISLAND RAILROAD

June 29, 1951

Accident at Glendale, N. Y., on April 20, 1951, caused by an explosion in crankcase of the engine which propelled a Diesel-electric locomotive unit.

REPORT OF THE COMMISSION[1]

PATTERSON, Commissioner:

On April 20, 1951, about 4:40 a.m., at Glendale, N. Y., an explosion occurred in the crankcase of the engine of Long Island Railroad Diesel-electric locomotive unit 455 while the unit was hauling a freight train at an estimated speed of 15 miles per hour. The fireman was seriously injured.

---

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

DESCRIPTION OF ACCIDENT

Long Island Railroad Diesel-electric locomotive unit 455, assisted by Diesel-electric unit 452 used as a rear-end pusher, hauling eastbound freight train L-42, departed from Yard A, Long Island City, N. Y., at 4:00 a.m., April 20, 1951, and proceeded without any known unusual incident to the base of Olivet Hill, where the lubricating oil pressure gage in the cab of unit 455 began to fluctuate and when the unit reached a point about 10 car-lengths from the summit the driving wheels slipped, the engine overspeed trip functioned, and the Diesel engine stopped. The overspeed trip was reset and the handles on the Cuno lubricating oil strainers were rotated, after which the engine was restarted and the lubricating oil pressure immediately returned to 40 pounds per square inch. When the train arrived at Fresh Pond, N. Y., 4.4 miles from Long Island City, pusher unit 452 was detached. The train continued, and as it was approaching Cooper Avenue Bridge at Glendale, N. Y., the engineer noticed that the lubricating oil pressure had again decreased, almost to the point of causing the engine to stop. He closed the throttle and allowed the train to drift, and the handles of the lubricating oil strainers were again rotated by the fireman. About 4:40 a.m., while the train was just east of Cooper Avenue Bridge, 5.2 miles from Long Island City, and moving at an estimated speed of 15 miles per hour, an explosion occurred in the crankcase of the engine.

At the time of the accident the train consisted of 55 cars, and a caboose, 2860 tons; rating for the two units from Long Island City to Fresh Pond was 3100 tons. The engineer was in his usual position in the cab, the fireman, after having rotated the oil strainer handles, was standing erect on the right running board, and the brakeman was standing in the left doorway of the cab when the explosion occurred; the front hood doors were open at the time, and flames flashed across the front of the engine. The grade near the summit of Olivet Hill, where the engine first stopped, was 1.5 percent ascending for eastbound trains and the grade at the point of the accident was 0.52 percent descending. The train stopped about ten car-lengths from the point of accident.

The fireman was seriously injured by the flames which flashed across the front of the engine. He was taken in an ambulance to a hospital. The brakeman was slightly burned, but not seriously injured.

DESCRIPTION OF LOCOMOTIVE UNIT

Diesel-electric locomotive unit 455, type B-B, company's class designation AS-10, was built by the American Locomotive Company January 10, 1949, and placed in service on the Long Island Railroad on January 14, 1949. It was equipped with a 1000 horsepower, turbocharged, six-cylinder, four-cycle Diesel engine, 12⅛-inch bore and 13-inch stroke, which was direct connected to a generator that supplied electric power for four traction motors, mounted on two four-wheel swivel type trucks, all axles of which were motor driven; gear ratio 16:75; wheel diameter 40 inches; weight on driving wheels 234,100 pounds; tractive effort 58,525 pounds. It was equipped with lubricating and fuel oil pressure gages, water temperature gage, wheel slip buzzer, and engine overspeed trip; an oil pressure switch and governor solenoid provided protection against low lubricating oil pressure. The No. 1 cylinder of the Diesel engine was at the front of the unit; the pistons were made of hard close-grained aluminum alloy; each piston was fitted with five compression rings and one oil ring above the pin boss and two oil rings below it.

The capacity of the engine lubricating oil system was 80 gallons: a filling hole, to permit make-up oil to be added, was provided in the left front corner of the base. A 4-inch threaded pipe nipple, approximately 6 inches in length, was screwed in the filling hole and a hinged loose fitting cover was attached to the upper end of the nipple. The upper surface of the cover base upon which the cover rested, was roughly finished and provided with four rough recesses, each approximately 1/8 inch in depth and 3/4 inch in length.

The crankcase was equipped with three vent pipes, one just ahead of the generator, at each side of the base, and the third pipe extended from the water pump drive gear casing to the intake side of the turbocharger. A gear-case safety cover (termed explosion cover) was located on left side, at rear of engine.

On May 29, 1950, the unit received general repairs which included:

All cylinder heads and pistons removed.
Renewed all connecting rod, main and thrust bearings.
All cylinder heads reconditioned.
All piston rings renewed.
Renewed No. 3 cylinder liner and Nos. 3 and 5 pistons.
Undercut removed from all cylinder liners.
Fuel injection nozzles recalibrated.

On January 30, 1951, the unit received the following repairs:

No. 5 piston, wrist pin, connecting rod and connecting rod bearing renewed.
Reconditioned cylinder head applied.
New fuel injection nozzle applied.
Lubricating oil changed.

The last lubricating oil change was March 1, 1951.

From the overhaul on May 29, 1950, to date of accident, the unit made 35,536 miles; mileage since built 97,429.

EXAMINATION OF PARTS INVOLVED

Examination of the unit at Morris Park, N. Y., shop disclosed that the hood and exterior of the engine were undamaged; all of the base and cylinder block covers were intact and the running boards were clean. The lubricating oil filling hole cover was unfastened and in open position. There was indication that flame from the oil filling hole had reached a 50-watt lamp located against the inside wall of the hood, approximately 10 inches outside and 42 inches above the center of the lubricating oil filler opening, and the hood roof-stiffening member almost directly above the lamp. At time of examination 430 gallons of fuel oil remained; there was 8 inches of water in the 9-inch gage on the expansion tank; the bayonet type lubricating oil gage showed oil level at the high mark; the safety cut-out valve and the engine overspeed trip were in normal position.

The No. 1 cylinder liner was badly galled; the remaining liners were in fair condition. The outer cylindrical portion of the No. 1 piston was badly galled over approximately 50 percent of its area, and the five compression rings and oil ring, above the pin boss, were frozen in their grooves; Nos. 1 and 2 compression rings were broken but no pieces were missing. The bottom of the two oil rings, below the pin boss, was free in its groove and the upper ring was also free except where the piston was galled. The upper surface of the land beneath the No. 2 compression ring was depressed for a distance of 3 inches and the edge forced outward; the greatest depth of this depression was 1/8 inch, at the center, and apparently was caused by a broken compression ring. The three upper compression rings on the No. 6 piston were stuck in their grooves, otherwise, this and the remaining 4 pistons were in good condition. The main and connecting rod journals were in good

condition and the corresponding bearings were in fair condition. There was no indication of overheat found on any journal or bearing.

Particles, some of which apparently were aluminum, were found throughout the engine lubricating oil system, and some grit, apparently of the same composition, was found on the Cuno lubricating oil strainers; the waste packed filter was clean. The lubricating oil pressure regulating valve was removed and tested on unit 452, of the same class, where it functioned properly. The lubricating and fuel oil pressure gages and the lubricating oil low pressure switch were tested; the gages were found satisfactory, the switch was tested three times and on each test it closed at 20 pounds and opened at 18 pounds. The water temperature gage was tested and found accurate and when its electrical circuit was completed the wheel slip buzzer sounded.

INSPECTION AND REPAIR REPORTS

Last monthly inspection was made March 31, 1951, at Morris Park, N. Y.

Work reports for the month of April 1951, on file at all points out of which the unit operated were examined and the following items were found reported:

April 10, at Patchogue, N. Y., reported by engineer: "Examine cooling system engine heats up too quickly." Notation: "Ex. O.K." was signed by machinist. Report was approved by foreman.

April 13, at Long Island City, N. Y., reported by engineer: "Engine heats up too quickly. It may be the cooling system or thermometer." Repairs signed for by machinist. Report was approved by foreman.

April 20, 1:55 a.m., at Long Island City, N. Y., reported by engineer: "Lubricating oil pressure gauge does not go above 30 lbs." and "Fuel oil pressure gauge does not go above 42 lbs. (drops when under power)." The first item was signed for by a machinist. The last item had the following notation: "Fuel oil pressure normal range 30 to 50." Report was approved by foreman.

SUMMARY OF EVIDENCE

The engineer who brought unit 455 in off the road at 1:55 a.m. on April 20 stated that he had operated this unit on April 18 and 19 and on both dates the engine lubricating oil was at proper level; on April 18 the oil pressure gage registered 45 pounds, but on April 19 the gage pressure would not go above nor below 30 pounds; that the fireman had turned the handles of the Cuno lubricating oil strainers twice without affecting the gage reading. He shut down the engine for about 20 minutes, at lunch period, and the gage pressure reduced to zero, and when he restarted the engine the gage pressure built up more slowly than usual. He stated that otherwise the unit operated normally.

The engineer in charge of the unit at time of the accident stated that he received the unit at 2:00 a.m. and noticed the lubricating oil pressure was 20 pounds. A mechanic who had been requested to check the cause of low oil pressure tapped the gage and found nothing wrong then checked the oil level and reported ample but very dirty oil and advised him to report the oil to be changed on arrival. He then turned the filters and the pressure immediately increased to 40 pounds. The machinist then said, "She will be all right now, but you will have to turn the filters quite often during the day." The engineer then coupled to the train and departed at 4:00 a.m. The engine worked satisfactorily until arrival at Olivet Hill, when the pressure began to fluctuate. At the top of Olivet Hill, the engine slipped and overspeed trip functioned. The fireman reset it; turned the filters and the oil pressure increased to 40 pounds. The train was started and at Glendale the engineer noticed the oil pressure decreasing; he shut the engine off and asked the fireman to go out and turn the filters. The fireman was about ready to close the doors when there was a heavy flash which burned the fireman. He made a service application and stopped the train. He further stated that he found the lubricating oil filling hole open after the accident.

The machinist stated that he inspected unit 455 on April 20; after he noted the inbound engineer's report that lubricating oil pressure did not go above 30 pounds; he then stopped the engine and checked the lubricating oil on the lube oil dipstick gage and found it showed full, but the oil was very dirty. He also checked the oil in the air compressor crankcase. He then started the Diesel engine and found the gage still registered about 30 pounds. At this time the outbound engineer came into the cab and was told of the low lubricating oil pressure. He thought perhaps the lubricating oil pressure gage was stuck but when he tapped the pipe

he found the hand would fluctuate. He found the handles of the lubricating oil Cuno strainers very hard to turn but by using both hands he was able to free the strainers after which they worked easily. When he turned the handles of the strainers, the engineer indicated that the pressure was going up. He then went into the cab and found the pressure was about 43 pounds. He told the engineer to be sure to have the strainer handles turned frequently. He further stated that when he left the locomotive the lubricating oil filler hole cover was closed.

DISCUSSION

Evidence indicates that dirty lubricating oil was the cause of frozen rings and galled piston and liner in No. 1 cylinder. Apparently sediment in the lubricating oil also clogged the filter and the consequent low oil pressure resulted in inadequate lubrication, overheating of the engine and formation of a combustible mixture in the engine base which was ignited by products of combustion that passed frozen rings on the defective piston. The unsecured cover of lubricating oil filler tube permitted escape of the flame.

CAUSE OF ACCIDENT

It is found that this accident was caused by a crankcase explosion, resulting from contaminated lubricating oil and a defective piston.

Dated at Washington, D. C., this 29th day of June, 1951.

By the Commission, Commissioner Patterson.

SEAL

W. P. BARTEL,

Secretary.