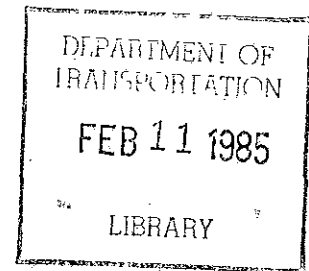


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railroad accident investigation reports



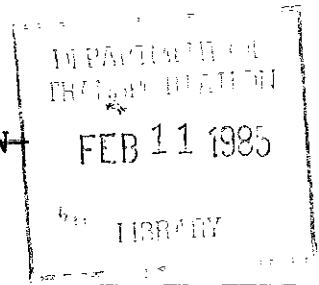
REPORT NO. 80-1
ILLINOIS TERMINAL RAILROAD COMPANY
COLLINSVILLE, ILLINOIS
AUGUST 6, 1978



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION
Office of Safety

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FEDERAL RAILROAD ADMINISTRATION
OFFICE OF SAFETY,



✓ RAILROAD ACCIDENT INVESTIGATION

~~ACCIDENT~~ REPORT, NO. 80-1, 80-2.

ILLINOIS TERMINAL RAILROAD COMPANY

COLLINSVILLE, ILLINOIS

AUGUST 6, 1978

Synopsis

On August 6, 1978, at 12:03 a.m., an Illinois Terminal Railroad Company freight train derailed seven cars at Collinsville, Illinois. The seven derailed cars were tank cars containing liquefied petroleum gas. One derailed tank car ruptured and exploded. The weather at the time of the derailment was clear.

Casualties

There were no injuries to train crew members in the derailment. However, two motor vehicle operators were seriously burned when their automobiles were engulfed in a fire following the explosion.

Cause

The derailment was caused by improper track alignment in the accident area. The variation of cross levels immediately in advance of the initial derailment point contributed to the derailment.

Location and Method of Operation

The accident occurred on that part of the T&E Subdivision 1, between Alton, Illinois and McKinley, Illinois, a distance of 34.9 miles. The initial derailment occurred at Mile Post 22.8, 2.8 miles south of Troy, Illinois.

In the accident area, trains operate in both directions on a single track line under the authority of timetable, train orders, special instructions, general special instructions and bulletins.

The track in the derailment area consists of 115-pound welded rail averaging 1,440 feet in length, laid new in 1970. The joint bars are 115-pound R. E. section, 36 inch six-hole fully bolted. The ties are mixed timber treated hardwood, 6 inches by 8 inches by 8 1/2 feet, averaging 21 inch centers. The tie plates are 7 3/4 inches by 11 inches double shoulder, with two rail holding spikes on tangent track and three rail holding spikes on the curves. The rail is box anchored. Slag ballast is used with a minimum of eight inches under the ties and a minimum of 12 inches for the shoulders.

The grade is .74 percent descending southward in the accident area. The derailment initially occurred on a 5°30' curve to the left which extends for 1,251 feet. The super-elevation in this curve is 3 1/2 inches.

Maximum Authorized Speed

The maximum authorized speed in the accident area is 40 m.p.h., reduced to 10 m.p.h. by a slow order between Mile Post 22.4 and Mile Post 22.9 due to track conditions on bridges in this area. Also, a 10 m.p.h. timetable speed restriction was in effect between Mile Post 20.1 and Mile Post 20.3 due to track curvature.

Circumstances Prior to the Accident

On August 5, 1978, Extra 2301 South, originating at Federal Yard, Alton, Illinois, departed at 9:05 p.m. The train consisted of three diesel-electric locomotive units in multiple unit control, one non-operating diesel-electric unit, six loads, 28 empties and a caboose. Extra 2301 South received the proper brake test. The crew consisted of an engineer, head brakeman, and a conductor.

The train stopped at Reuters siding where the crew picked up 31 loads and five more empties on the head end. After receiving the proper brake test, the train departed Reuters at 9:45 p.m., consisting of 37 loads and 33 empties. The train then proceeded southward until it reached the Le Claire Tower, where the operator on duty notified the train crew, by radio, that the brakes were sticking on or about 10 cars from the caboose. After clearing the Le Claire Interlocking plant, the train stopped and the conductor walked to the 10th car from the caboose. This car, ITG 3403, had the retainer valve set. After releasing the valve, the brakes released. The train then departed Le Claire at 11:15 p.m., and proceeded southward at a speed of 10 m.p.h. until it reached the point of the initial derailment at Mile Post 22.8.

According to the engineer, a light application of the train brakes was made at Mile Post 21.9 to control the speed of the train over the descending grade, and to keep the train stretched.

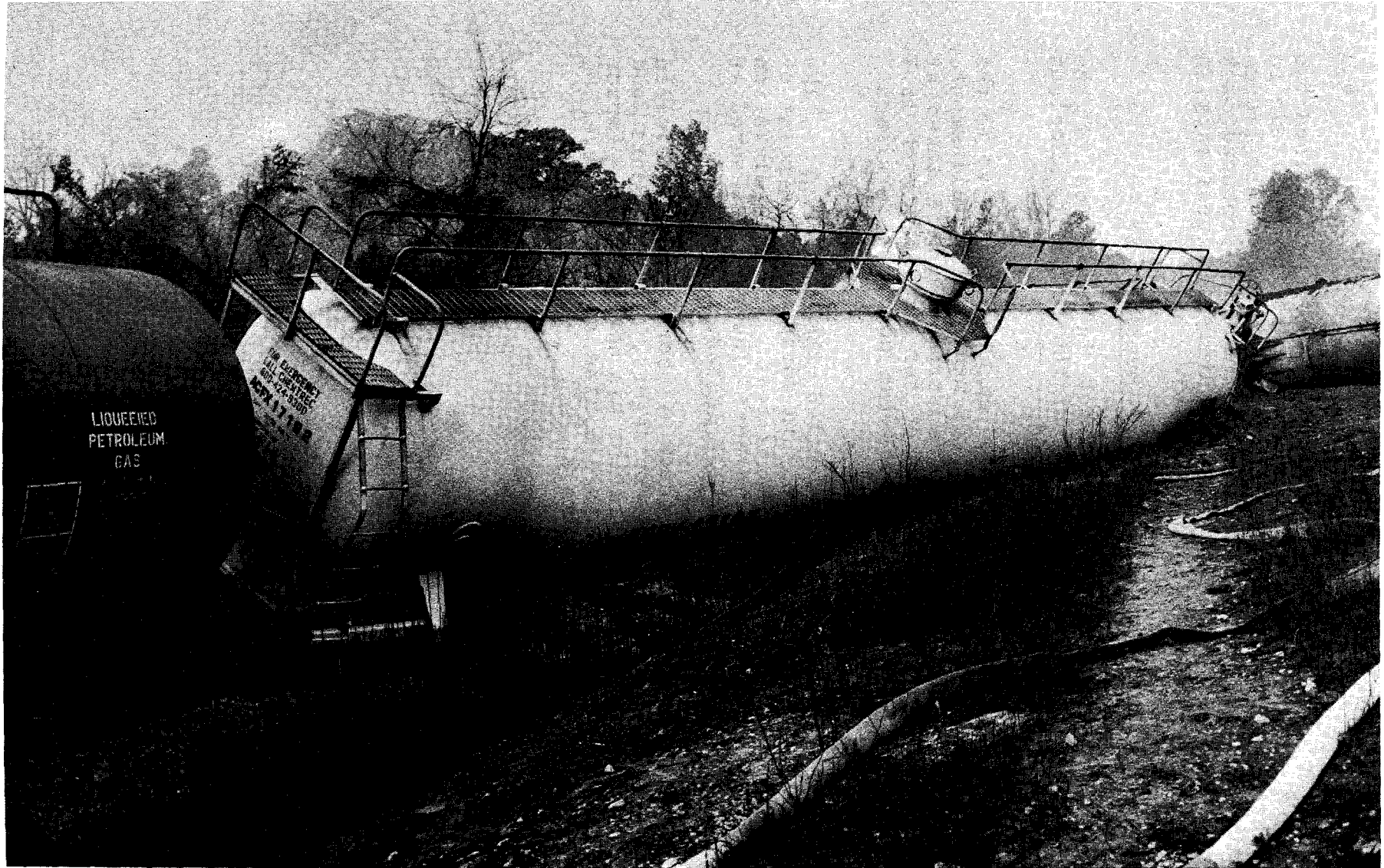
The Accident

After the train had passed the slow order at Mile Post 22.9, the conductor notified the engineer, by radio, that the train was clear. The engineer then increased the speed of the train to between 20 and 25 m.p.h. As the train rounded a right-hand curve, just south of the North Keebler Street crossing, the engineer, from his position on the right side of the locomotive, looked back and saw either sparks or fire back in the train. He immediately applied the brakes in full service to stop the train. Shortly thereafter, the train brakes went into emergency, and an explosion occurred within the train. At this time, the head brakeman was standing beside the engineer, and the conductor was in the caboose.

The initial derailment had occurred 20.5 feet south of a 116.8 foot bridge at Mile Post 22.8. At this point, a lift-off of the wheels on the leading truck of the 21st car caused the tank car to derail over the high rail of the curve. This car, with one set of derailed trucks, traveled 1.2 miles south to the Keebler siding track's south switch where the general derailment occurred. The 21st through the 26th cars in the train subsequently derailed. The 27th car derailed only the south trucks as it stopped on the North Keebler Street crossing. The derailed cars were all "jumbo" tank cars containing liquefied petroleum gas. One of the derailed tank cars was punctured and ruptured, releasing the gas which exploded.



VIEW OF BURNING TANK CAR



VIEW OF DERAILED CARS; THE DARKER CAR, GATX 91452 WAS EQUIPPED WITH SHELF COUPLERS.

The fire and heat from the explosion severely burned two motor vehicle operators waiting in their cars for the train to pass. The hazardous conditions which prevailed as the liquefied petroleum gas continued to burn from the ruptured tank car caused the evacuation of approximately 200 residents in the vicinity for a period of three days.

Post Accident Track Inspection

An inspection of the main track in the area of the derailment was conducted on the day of the accident. Serious track geometry deviations were noted.

The initial derailment occurred on the 5°30' curve to the left. The track at this location was measured for alinement, superelevation and gage. Track measurements were taken at 155-foot intervals. They were taken for a distance of 15.5 feet prior to and 75.5 feet beyond the point of derailment. (See Detailed Track Measurements)

The track measurements revealed the following: The alinement of the curve immediately in advance of the point of derailment varied 9 1/2 inches in 62 feet. The superelevation in the same area varied 2 5/16 inches. The gage, measured at the point of derailment, was 57 1/2 inches.

Inspection of the open deck timber trestle revealed serious deterioration of the stringers, framed bents and bracing members. This deterioration was having a major impact on the railroad ability to maintain line and cross level on both the bridge deck and the track.

Detailed Track Measurements

<u>Station</u>	<u>Gage</u>	<u>Superelevation</u>	<u>Mid Ordinate</u>
10	56 ^{7/8} "	3 ^{5/8} "	4 ^{1/2} "
9	57	3 ^{15/16}	5
8	56 ^{3/4}	4	2
7	56 ^{5/8}	3 ^{7/8}	0
6	56 ^{1/2}	3 ^{9/16}	4 ^{1/2}
5	56 ^{9/16}	4 ^{3/4}	5
4	56 ^{15/16}	6 ^{3/16}	9
3	56 ^{7/8}	5	9 ^{1/2}
2	57 ^{3/16}	4	6
1	56 ^{7/8}	5	8
0	57 ^{1/2}	3 ^{3/4}	5 Pt. of Derailment
-1	57 ^{1/8}	3 ^{1/4}	5 ^{1/2}
-2	56 ^{15/16}	3 ^{9/16}	4 ^{1/2}
-3	57	3 ^{9/16}	3
-4	56 ^{15/16}	3 ^{1/2}	5
-5	56 ^{15/16}	3 ^{1/8}	4 ^{1/2}

Stations 15^{1/2}' intervals.

Superelevation take not under load.

Mid-ordinate measurement is both inches and degrees.

Damages

Five of the derailed cars were severely damaged and one car was slightly damaged. There was no significant damage to the seventh derailed car which had only one set of trucks derailed. The cost of damage to both track and equipment was approximately \$97,300.

Hours of Service

The train crew which operated Extra 2301 South went on duty at McKinley Yard, Madison, Illinois, at 3:30 p.m., August 5, 1978, after having completed the required off-duty period.

Hazardous Material Aspects

Post accident investigation disclosed that all of the seven derailed cars were 33,000-gallon capacity tank cars loaded with liquefied petroleum gas shipped by the Shell Oil Company, Roxana, Illinois. These cars were not equipped with head shields. The post accident conditions of these cars are listed below:

The first car, the 21st car, WRNX 30107, DOT specification 112A340-W with type E couplers, overturned on its right side just north of the track. There was no rupture or damage to the tank head.

The second car, SUEX 3177, specification 112A340-W with type E shelf couplers, veered off to the north of the track and came to rest on its right side with the front end pointed toward the track. The tank car had a broken knuckle at the front end of the car. The entire draft gear assembly also broke loose on the trailing end. Each head of the tank sustained a deep dent, but no rupture.

The third car, SOEX 3368, specification 105A300-W with jacketed insulation and type F tightlock couplers, turned over and rested parallel to and south of the track. The insulation jacket on the north side of the car had been ripped loose and folded toward the rear end of the car. The drawbar on the rear end was bent downward to a vertical position with the car.

The fourth car, GATX 97275, specification 112A340-W with type E couplers, was punctured in the tank head by the coupler of the fifth car, after which it spun approximately 180 degrees, sheering the insulation off the third car and coming to rest slightly on its right side. The punctured rear end of the car stopped facing west and was positioned approximately six feet from the first and third derailed cars. Following the puncture, spillage and explosion, the remaining liquefied gas in the tank continued to burn for 35 hours from a hole near the center of the tank car head. The other end of the car sustained a strong impact against the brake wheel, which in turn, dented the head of the car.

The fifth car, ACFX 17192, specification 112A340-W with type E couplers, the sixth car, GATX 91452, specification 112T340-W with jacketed insulation and type E shelf couplers, and the seventh car, NATX 32151, specification 112A340-W with type E couplers, remained coupled together, upright and in line with the track structure. Only the lead truck of the seventh car derailed.

ACFX 17192 was tilted slightly on its right side, with the front end pointed slightly away from the track. The movement of the end of this car resulted from the counterclockwise movement of GATX 97275 after it became punctured by the coupler of ACFX 17192. The knuckle and pin of this coupler was broken off, and fell inside the tank of GATX 97275.

As Extra 2301 South passed the Keebler public road crossing just prior to the general derailment, the engineer noticed cars on each side of the track waiting for the train to pass. After the train brakes were applied in emergency and the liquefied petroleum gas from the ruptured tank car exploded, the engineer notified the train dispatcher of the explosion and advised him that the occupants of these cars might have been injured. Appropriate emergency authorities were promptly notified by the railroad, and local police and fire departments were dispatched to the scene of the accident.

Firemen found the occupant of the pickup truck, on the north side of the track, critically burned. The occupant of an automobile on the south side of the track sustained serious burns.

The fire and intense heat from the explosion destroyed trees and other vegetation for a distance of approximately one quarter of a mile from the point of the explosion and scorched some trees on the far side of a highway.

Findings

1. Extra 2301 South was being operated in accordance with carrier rules and operating instructions at both the time of the initial and general derailment.

2. Post accident track measurements indicate that the track alinement of the 5°30' curve varied 9 1/2" in 62 feet. Section 213.55 alinement of the Federal Track Safety Standards (49 CFR 213) states in part on curved track the deviation of the mid-ordinate of a 62-foot cord may not be more than 5 inches on Class 1 track. The 9 1/2 inch deviation exceeds this minimum requirement.

3. In the area of the derailment, the superelevation varied 2 5/16" and the gage was 1 inch wide. Both of these conditions contributed to the accident.

4. The serious deterioration of the stringers, framed bents and bracing members of the bridge at Mile Post 22.8 made it difficult to maintain line and cross-level.

5. The initial derailment was caused by improper track alinement in the accident area. The single derailed car was dragged 1.2 miles to a switch at a siding. The switch subsequently deflected the derailed car, causing the general derailment.

Dated at Washington, D. C., this
24th Day of January 1980
by the Federal Railroad Administration

J. W. Walsh
Chairman
Railroad Safety Board