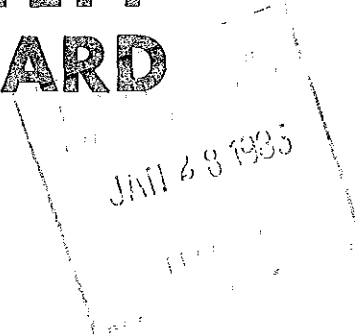
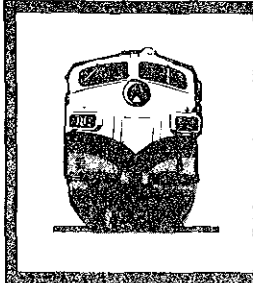


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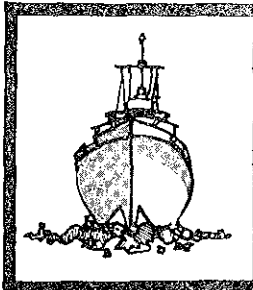
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# NATIONAL TRANSPORTATION SAFETY BOARD

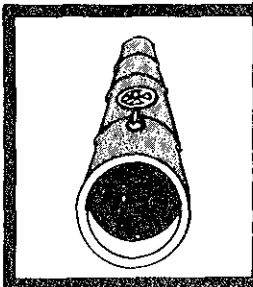


WASHINGTON, D.C. 20594



## ✓ RAILROAD/HIGHWAY ACCIDENT REPORT, ///

COLLISION OF  
AMTRAK PASSENGER TRAIN NO. 301  
ON ILLINOIS CENTRAL GULF RAILROAD  
WITH MARQUETTE MOTOR SERVICE TERMINALS, INC.  
DELIVERY TRUCK  
WILMINGTON, ILLINOIS  
JULY 28, 1983



✓  
NTSB/RHR-84/02,



UNITED STATES GOVERNMENT

TECHNICAL REPORT DOCUMENTATION PAGE

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16. Abstract About 9:48 a.m., c.d.t., on July 28, 1983, Amtrak train No. 301, operating on the Illinois Central Gulf Railroad, collided with a Marquette Motor Service Terminals, Inc., delivery truck at the New River Road railroad/highway grade crossing about 1 mile north of Wilmington, Illinois. The locomotive unit and all three cars of the train were derailed, and the truck and its lading were destroyed. Two train crewmembers, the truckdriver, and 18 train passengers were injured. Total damage was estimated to be \$584,000.  The National Transportation Safety Board determines that the probable cause of the accident was the failure of the truckdriver for undetermined reasons to perceive the crossbuck warning signs, the flashing light signals, the approaching train, or the whistle of the approaching train and to stop his vehicle short of the tracks at the railroad/highway grade crossing.			
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**NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C. 20594**

**RAILROAD/HIGHWAY ACCIDENT REPORT**

Adopted: October 16, 1984

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**COLLISION OF  
AMTRAK PASSENGER TRAIN NO. 301  
ON ILLINOIS CENTRAL GULF RAILROAD  
WITH MARQUETTE MOTOR SERVICE TERMINALS, INC.  
DELIVERY TRUCK  
WILMINGTON, ILLINOIS  
JULY 28, 1983**

**SYNOPSIS**

About 9:48 a.m., c.d.t., on July 28, 1983, Amtrak train No. 301, operating on the Illinois Central Gulf Railroad, collided with a Marquette Motor Service Terminals, Inc., delivery truck at the New River Road railroad/highway grade crossing about 1 mile north of Wilmington, Illinois. The locomotive unit and all three cars of the train were derailed, and the truck and its lading were destroyed. Two train crewmembers, the truckdriver, and 18 train passengers were injured. Total damage was estimated to be \$584,000.

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the truckdriver for undetermined reasons to perceive the crossbuck warning signs, the flashing light signals, the approaching train, or the whistle of the approaching train and to stop his vehicle short of the tracks at the railroad/highway grade crossing.

**INVESTIGATION**

**The Accident**

About 8:50 a.m., c.d.t., on July 28, 1983, southbound National Railroad Passenger Corporation (Amtrak) passenger train No. 301, The State House, consisting of one locomotive unit, two coaches, and a combination coach and food service car, departed Chicago, Illinois, for St. Louis, Missouri, on the main track of the Joliet District of the Illinois Central Gulf Railroad (ICG). Inspections and brake tests performed at Chicago indicated no defects, and the train departed on schedule.

According to the engineer and fireman, the accuracy of the speed indicator was checked over the course of 1 mile after the train left Chicago. The fireman, who was operating the locomotive, stated that the mile was covered in 43 seconds and that during the speed check the indicator needle at times rested at 80 mph, and at other times it was as low as 76 mph and as high as 82 mph. The engineer recalled that the indicated speed was 2 mph less than the actual speed of 83.72 mph as calculated on the basis of elapsed time between the milepost (MP) markers. The maximum allowable operating speed of the train was 79 mph.

The train left Joliet, Illinois (MP 37.2), the only station stop between Chicago and Wilmington, Illinois, about 3 minutes behind schedule. The fireman was operating the locomotive unit from the right (west) side of the cab. The engineer was seated on the left side opposite the fireman. The lead car, a coach, was unoccupied. Of the 102 passengers on the train, about 85 were in the second car; the others were in the rear car. The conductor and flagman also were seated in the second car. An Amtrak car service attendant was in the rear car.

The train traveled over a long, level tangent section of track for 5 miles between Elwood, Illinois (MP 45.8), and Wilmington. According to the fireman, as the train approached the railroad/highway grade crossing at New River Road (MP 51.4) north of Wilmington, he began sounding the standard crossing whistle signal before the train reached the whistle post 1,660 feet before the crossing. The activation of the whistle would have caused the locomotive unit's headlight automatically to brighten and its strobe light to operate. The locomotive was in the power mode with the throttle in the third or fourth position, or about midway between the idle and full throttle positions. Both the engineer and fireman said that the train's speed approaching the crossing was about 70 to 75 mph.

A two-axle, cargo van truck, operated by Marquette Motor Service Terminals, Inc., (MMS), was moving east on New River Road en route to deliver merchandise to a factory about 1 mile east of the crossing. The driver was alone in the truck. The engineer and fireman of the train stated that the truck closely followed an automobile onto the crossing and appeared to be traveling about 40 to 50 mph. The fireman applied the train's brakes in emergency when he realized that the truck was not going to stop and that a collision was imminent. The locomotive unit struck the van cargo area of the truck behind the cab, separating it from the chassis. One side of the van cargo area became wrapped around the windshield of the locomotive. (See figure 1.) The truck's chassis and cab also were separated, both coming to rest in a ditch in the southeast quadrant of the crossing. Other parts of the truck and its lading were scattered east of the crossing. (See figure 2.)

As a result of the collision, the locomotive unit derailed, and upon exiting the crossing its lead truck turned over and displaced the east rail from the track structure. The displaced rail caused the train's cars to derail as they passed over the crossing. The couplers between cars did not separate. The locomotive unit remained upright on the track structure and came to a stop about 800 feet south of the crossing. The lead car remained in line with the locomotive unit but was tilted about 45 degrees to the left (east). The second car came to a stop diagonally to the track with its left side against the east embankment. The rear car was diverted laterally from the track structure down an embankment into a deep ditch east of the track grade, where it came to a stop on its left side. (See figure 3.)

The truckdriver told investigating police officers immediately after the accident that he did not see or hear the train and that he did not see the crossbuck warning signs and flashing light signals as the truck approached the crossing. Other than the truckdriver and the train's engineer and fireman, there were no known witnesses to the accident. The driver of the automobile that preceded the truck onto the tracks did not stop. A motorist on a highway parallel to the railroad about 1/2 mile to the east saw a cloud of dust at the crossing and drove there to investigate. He reported the accident to the Wilmington police dispatcher over the citizens band radio in his car.



Figure 1.--View north of derailed train No. 301.

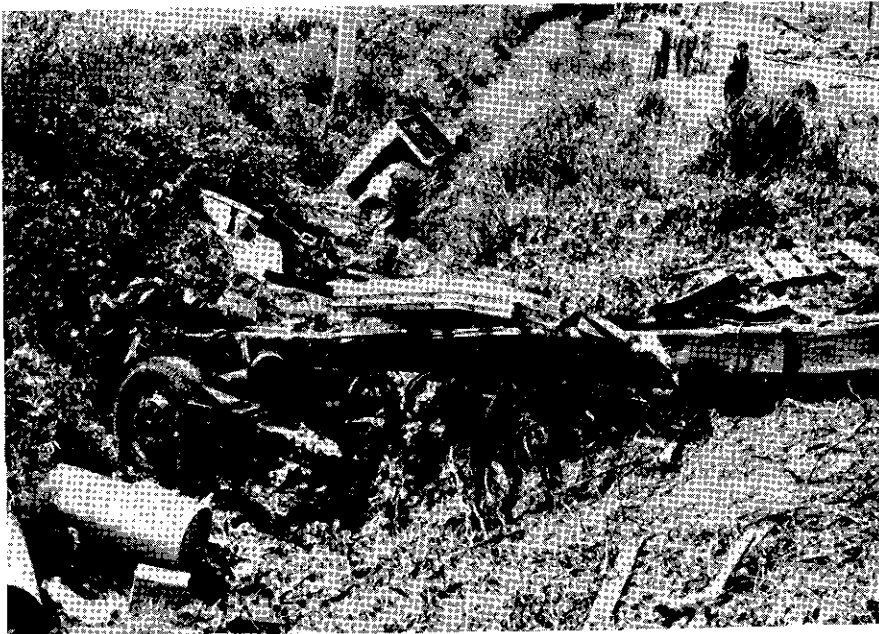
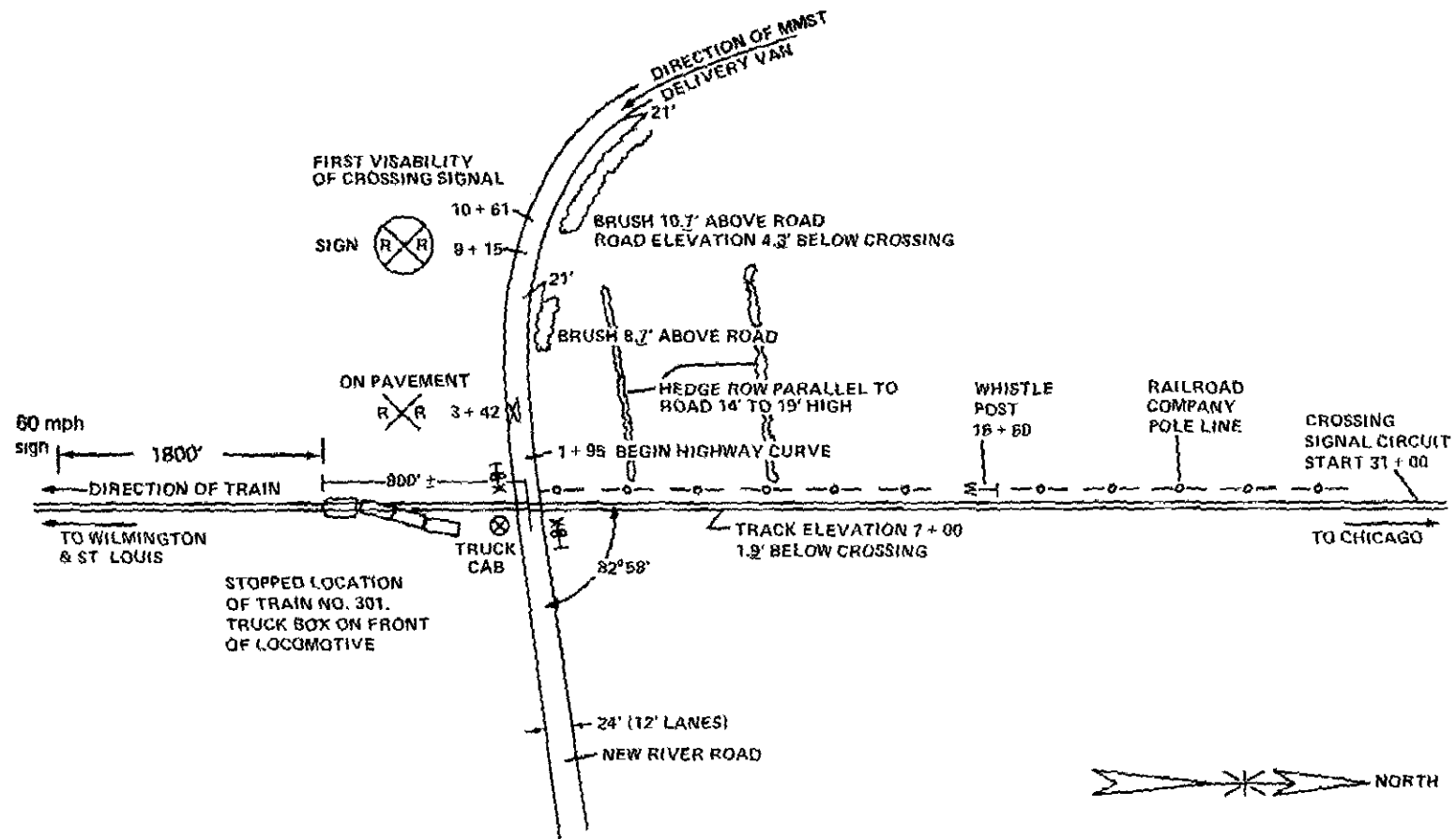


Figure 2.--View south of truck chassis and cab.



SCALE (APPROX.) 1" = 500'

Figure 3.--Plan view of accident site.

**Injuries to Persons**

<u>Injuries</u>	<u>Truckdriver</u>	<u>ICG Traincrew</u>	<u>Amtrak Personnel</u>	<u>Train Passengers</u>	<u>Total</u>
Fatal	0	0	0	0	0
Nonfatal	1	2	0	18	21
None	0	2	1	84	87
Total	1	4	1	102	108

**Damage**

The locomotive unit sustained considerable front-end damage as a result of the collision, with both halves of the windshield shattered and the running gear damaged as a result of the postcollision derailment. The bodies and underframe equipment of the two rear cars were damaged extensively. The underfloor batteries and other apparatus of the emergency lighting system were damaged. Microwave ovens and other equipment and supplies were ejected from wall stowage locations in the food service car and caused considerable interior damage. About 700 feet of track was damaged.

The truck and its lading were destroyed.

Damage was estimated to be as follows:

Train equipment	\$550,000
Truck and lading	24,000
Track	10,000
Total	<u>\$584,000</u>

**Personnel Information**

The 23-year-old truckdriver held an unrestricted driver's license issued by the State of Illinois. His driving record indicates that he was cited three times for speeding--twice in Indiana on January 18, 1981, and once in Illinois on February 7, 1983. His last physical examination was in April 1983. His general health was good.

The truckdriver had completed a 2-month training course at the Trainco Truck Driving School in Chicago on April 29, 1983. According to the school, the curriculum included a comprehensive course in safe driving practices which emphasized railroad/highway grade crossing safety.

He had worked for Marquette Motor Service Terminals, Inc., (MMS) since May 23, 1983. Training given to the truckdriver by MMS consisted of 5 days of on-the-job training with two experienced drivers in trucks similar to the accident vehicle and informal counseling by the firm's operations manager and safety supervisor. MMS did not have a performance record for the truckdriver since he had made only two trips before the accident. However, while driving a truck for MMS, he had been involved in a minor property damage accident in Illinois, following which he was cited by a police officer for improper backing.

The truckdriver's work with MMS consisted of long-distance delivery of less-than-truckload (LTL) merchandise over long and varied routes determined by the firm's dispatcher. The truckdriver's starting times and working hours varied with the length of the route he was assigned and the number of deliveries to be made en route. On previous



trips, he had started work as early as 3 a.m., worked as long as 10 to 12 hours and, due to truck mechanical problems, had been stranded in south-central Illinois for as long as a week. Because of slack business conditions, the truckdriver had last worked on July 11, 1983.

On July 27, 1983, the truckdriver went to bed at 10 p.m. He awoke at 5 a.m. on July 28, 1983, and started work at 6 a.m. He had driven about 160 miles of a 350-mile route, about half of which was over secondary roads, and had made two of his nine scheduled deliveries when the accident occurred. More than half of the merchandise in the truck was unloaded during these stops, which is estimated to have taken as long as a total of 1 hour. In addition to a route sheet, he had been given a route map hand-drawn on the backs of shipping tags. As far as the Safety Board could determine, the truckdriver had not driven on New River Road previously, and he was unfamiliar with the crossing where the accident occurred.

The engineer of train No. 301 entered railroad service in 1959. His service record indicated that he had been twice suspended for violating maximum allowable speeds while operating trains--for 30 days on May 16, 1980, while operating an Amtrak passenger train and subsequently for 7 days while operating a freight train. The disciplinary action involving the passenger train followed a radar speed check by an Illinois Commerce Commission inspector which determined that the engineer was operating at excessive speed over crossings in the town of Chatham, Illinois. The check was prompted by complaints from citizens of Chatham.

The fireman of train No. 301 entered railroad service in 1968. His service record indicated that he had been discharged on January 30, 1981, for responsibility in connection with the October 30, 1980, derailment of an Amtrak passenger train at Springfield, Illinois, resulting from its operation at 60 mph through a 10-mph turnout.<sup>1/</sup> Prior to being rehired on March 29, 1982, with full seniority rights restored, the fireman was examined on the ICG operating rules and timetable instructions and was required to pass a physical examination. Neither examination resulted in any restrictions.

All members of the traincrew were regularly assigned and had been off duty for about 10 1/2 hours before reporting for their assignments on July 28. At the time of the accident, they had been on duty for 1 hour 43 minutes. (See appendix B.)

The Amtrak car attendant was not involved in the operation of the train.

### **Truck Information**

The cargo van truck was a 1979 International Harvester single unit Model 1854 with an aluminum cargo box; a 6-cylinder, 180-hp diesel engine; a 5-speed Spicer transmission; a single rear axle with dual wheels; and hydraulic brakes. It was painted white. The vehicle's overall length was about 29 feet 7 inches, and the wheelbase was 18 feet 2 inches. Its tare weight was about 8,500 pounds, and the truck was carrying about 3,300 pounds of lading at the time of the accident. Maximum allowable gross vehicle weight was 33,200 pounds. The truck's engine was limited to 2,600 rpm and a maximum speed of about 63 to 65 mph. According to Grane Trucking Company, which owned the truck and leased it to MMS, the vehicle's windshield was tinted and there was a sunvisor on the driver's side. The vehicle was not equipped with air conditioning or a radio.

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<sup>1/</sup> For more information, read Railroad Accident Report-"Derailment of Amtrak Passenger Train No. 21 on the Illinois Central Gulf Railroad at Springfield, Illinois, October 30, 1980" (NTSB-RAR-81-5).

### Train Information

The train's locomotive unit, No. 311, was a General Motors Model F-40PH, 1 of 191 such units in Amtrak service. It was painted the standard Amtrak color scheme--silver with horizontal, 8-inch-wide, red, white, and blue stripes across the middle of the front end and the sides. The unit had a snowplow-type front-end pilot, a fixed dual 400-watt headlight, a bell mounted on the underframe, red and white strobe lights mounted on the cab roof, and a five-trumpet air horn-type whistle mounted in the center of the cab roof with all trumpets facing forward. Inside the unit's cab were an operable radio, a crew-alerting light system, a speed indicator, and a Barco tape-type speed recorder. <sup>2/</sup> The speed indicator was mounted at the top of the windshield on the operator's side. A three-position switch on the control console governed the operation of the two strobe lights. With this switch in the "Auto" position, the white strobe light and the engine bell are automatically activated while the engine whistle is being sounded. Following the accident, the switch was found to be in the "Auto" position.

All Amtrak F-40PH locomotive units have overspeed protection which is effective when the unit reaches a speed of 104 mph. The unit involved in this accident was not equipped with automatic train control or cab signal devices.

The cars in the train were of the Amfleet design with concave sides, stainless-steel, resistance-welded car bodies, and low-alloy high-tensile steel end underframes. All cars had Tight-Lok type couplers. The cars were 85 feet long. The coaches seated 84 persons, and the food service car seated 60 persons. Seats in all the cars were the high-back, reclining type with removable cushions and improved seat-locking devices. The seat pairs could be rotated to reverse the direction they faced. Following the accident, many seats were found partially turned. The cars did not have baggage compartments; luggage was carried in open racks above the seats.

### Grade Crossing Information

A southbound train approaches the grade crossing in a long section of straight track which intersects New River Road at an angle of 97 degrees in the northwest quadrant. The railroad grade is essentially level.

The county-maintained New River Road runs east and west and has two 12-foot-wide, asphalt-surfaced lanes with 10-foot-wide, asphalt-surfaced shoulders on each side of the road. The posted speed limit is 55 mph. New River Road connects Interstate Highway 55 with State Route 53, 1/2 mile east of the ICG crossing, and is part of the main access between the interstate highway and the north side of Wilmington. The most direct route between downtown Wilmington and New River Road is Kankakee Street, which intersects with New River Road about 1/2 mile west of the ICG crossing. Since New River Road is about 1/2 mile north of the city limits of Wilmington, traffic law enforcement on the road is the responsibility of the Will County Sheriff.

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<sup>2/</sup> Sixty-two of Amtrak's F-40PH units are equipped with the Pulse eight-event recorder which records speed, elapsed time, distance, throttle position, horn operation, braking, and other functions. The remaining units, including the one involved in this accident, are equipped with the tape-type recorder that registers speed alone.

The road and railroad approach the crossing at virtually the same elevation, the road having only a short 0.6 percent ascending grade eastbound to reach the fully-planked timber crossing. On the west approach, the road moves through a left-hand, 1,097-foot-long, 2° 30' curve, which ends 195 feet west of the crossing. Shortly before entering this curve, an eastbound driver can see briefly the grade of the railroad north of the crossing. However, by the time the curve is entered, a driver's sightline across the northwest quadrant of the crossing is obstructed by a hedgerow that runs parallel to the road, brush along the north perimeter of the road, and trees along the railroad right-of-way. (See figure 4.) The first clear view across the quadrant is from a point 685 feet west of the crossing where the track can be seen for 515 feet north of the crossing. (See figure 5.)

New River Road was constructed in 1970, and the original crossing protection consisted of standard crossbuck warning signs. Train-activated flashing light signals and a warning bell were installed in the southwest and northeast quadrants in 1971. The activating circuits for the flashing light signals begin 3,100 feet on each side of the crossing. The flasher lights are first visible to an eastbound traveler on New River Road at a point 1,061 feet west of the crossing. There is a standard circular advance warning sign on the south shoulder of the road 915 feet west of the crossing and painted advance warning marks on the pavement in the eastbound traffic lane 342 feet from the crossing. (See figure 4.) Since an industrial siding connects with the main track inside the northbound circuit, the automatic protection includes a motion sensor to time out the signals when a train enters the circuits but does not subsequently pass over the crossing. As far as could be established, no actual count of highway traffic over the crossing has been made. However, in 1976 the Illinois Department of Transportation estimated the average daily traffic volume over the crossing to be 1,960 vehicles.

The engineer and fireman of train No. 301 stated that they saw the "telltale" end indicator lights of the flashing light signals in operation as their train approached the crossing. The motorist who drove to the crossing after the accident stated that the flashing light signals were in operation when he arrived there. Emergency response personnel and train crewmembers also saw the flashing light signals in operation after the accident.

### Method of Operation

Motor Carrier.--Marquette Motor Service Terminals, Inc., operates a long-distance merchandise delivery service from its Chicago terminal throughout most of the State of Illinois and adjacent areas of Indiana, Missouri, and Iowa. Its drivers are paid on the basis of the poundage they deliver, and their workdays conclude when their deliveries are completed and they return their truck to the terminal.

Railroad.--Trains are operated over the part of ICG's Joliet District involved in this accident by timetable, train orders, and the indications of automatic block signals. Crews also are directed in their operations by a dispatcher's radio-transmitted instructions. According to the timetable which was in effect at the time of the accident, the maximum authorized speed for passenger trains was 79 mph. However, the timetable restricted passenger trains to 60 mph "through town" at Wilmington without stipulating where the restriction began and ended. There was a speed sign for southbound trains marked "60" at a point about 1,800 feet south of the accident location and about 200 feet north of the Wilmington city limits at Kankakee River Drive.

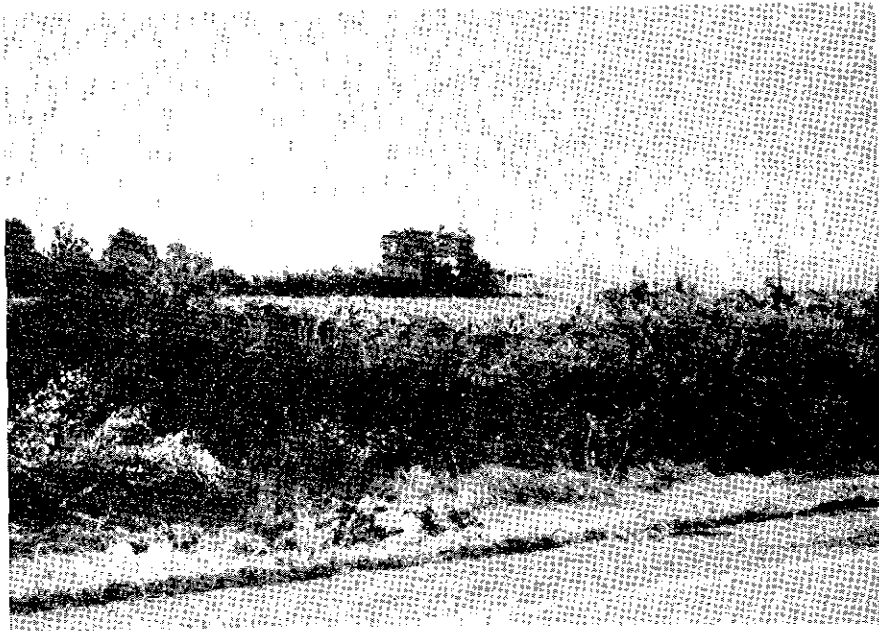


Figure 4.--View east along New River Road.

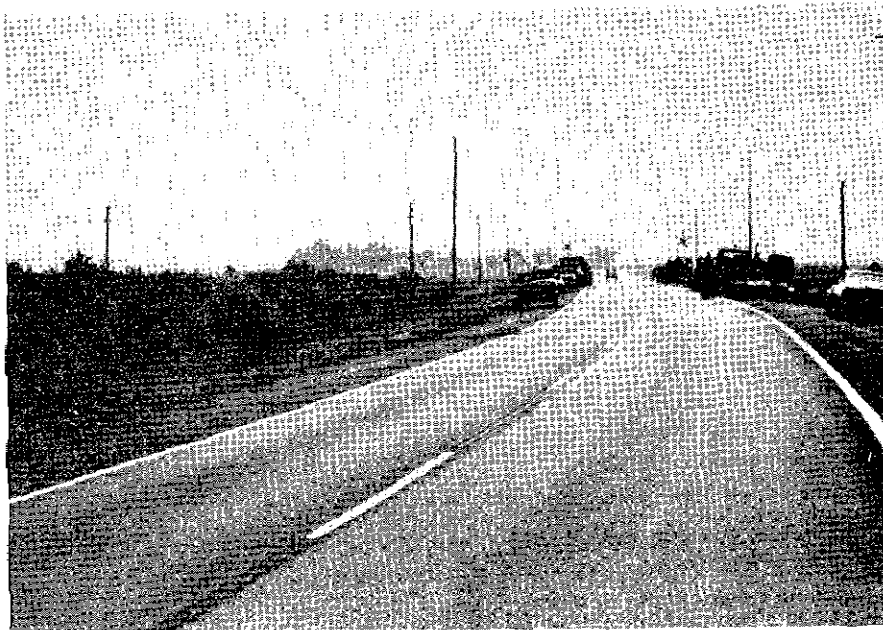


Figure 5.--View of track across northwest quadrant.

ICG Rule 14-L requires that the prescribed whistle signal be sounded beginning at least 20 seconds before reaching a crossing and that it must be prolonged or repeated until the crossing is occupied. When a whistle sign is displayed, the whistle signal must begin before the train reaches the sign. Sounding a whistle is not required by Illinois law at crossings which have train-activated flashing light signals.

ICG operates Amtrak trains under a contract which vests the supervision of train operations in ICG, provides for the payment of substantial incentive bonuses for on-time train performance, and holds ICG harmless from liability in case of injuries to persons and damage to property resulting from accidents. All railroads that operate Amtrak trains have similar provisions in their contracts.

Amtrak's general manager for operations in Chicago stated that, after the Amtrak train derailment in Springfield in 1980, he frequently had ridden the locomotives of Amtrak trains operating over the ICG to check compliance with speed restrictions and signal indications. He stated that he did not take note of the condition of whistle posts and speed boards, both of which are considered to be fixed signals under the operating rules of all railroads. Amtrak officials informed Safety Board investigators that supervisors at Amtrak's locomotive facility in Chicago routinely check the speed recorder tapes from locomotives operating over the ICG for compliance with speed restrictions.

#### **Meteorological Information**

At the time of the accident it was clear and dry without atmospheric restriction to ground visibility. The temperature was 85° F. The sun was in the eastern sky about 40° above the horizon and 10° to the southeast, or right, of the centerline of New River Road approaching the ICG crossing from the west.

#### **Medical and Pathological Information**

The injuries to the truckdriver were a scalp wound, a fracture of the right third posterior rib, compression fracture of the lumbar spine, and soft tissue swelling of the right hand and wrist. Although requested to do so by police and the Safety Board, the hospital which received and treated the truckdriver failed to make a postaccident blood-alcohol test. There was no outward indication that the truckdriver's physical condition at the time of the accident was impaired by alcohol or drugs.

The engineer received minor head injuries, the conductor sustained a back injury. Neither crewmember was requested to submit to a postaccident blood alcohol test. There were no outward indications that any crewmember's physical condition at the time of the accident was impaired by alcohol or drugs.

The injuries to the 18 passengers included: bruised and sprained shoulders; hip, neck, back, and head injuries; blunt trauma to the chest and neck; contusions to the chest and ankles; a concussion; lacerations; and abrasions.

#### **Survival Aspects**

When the impact occurred, the cab of the truck became detached from the rest of the vehicle and came to a rest in the southeast quadrant of the crossing. The truckdriver was not ejected from the relatively undamaged cab during the collision sequence and survived the accident. The evidence suggested that the truckdriver was not using the seatbelt in the cab at the time of the accident.

The cars of the train remained coupled during the derailment sequence, and the train remained generally in line with the track. The two rearmost cars tipped over on their left sides as they were diverted down the grade embankment into the ditch east of the track. As the cars tipped, heavy pieces of luggage from the open overhead racks on the right sides of these cars fell onto passengers seated on the left side. The locking mechanisms of many seats failed, allowing the seats to rotate as much as 90 degrees and causing the seat occupants to be ejected. In many locations seat cushions which had not been secured properly also fell on passengers seated on the left side. The conductor was one of the persons ejected from a seat. One passenger was pinned under a seatframe and was extricated by the flagman using emergency tools from one of the cars. Equipment was dislodged in the food service car.

The Amtrak service attendant had been trained in postaccident emergency response and aided many passengers in the evacuation. The fireman assisted passengers in evacuating the train by removing an emergency exit window. Most of the passengers were evacuated through the removable emergency windows because the tilt of the derailed rear cars made it difficult to open some of the sliding vestibule doors. The underfloor batteries and other apparatus of the emergency lighting systems of these cars were damaged in the derailment, rendering the systems inoperative.

Wilmington had an emergency disaster response plan and had held frequent emergency response drills as provided for in the plan, largely at the instigation of the police chief and other key officials. Neither Amtrak nor the ICG participated in developing the plan. Arrangements had been made to use the services of a local bus company in evacuations and to use the high school gymnasium as a first-aid center and temporary shelter for uninjured evacuees. The police dispatcher had been provided with a checkoff list of persons to be notified in the event of an emergency, including the public safety agencies of nearby communities which had mutual aid agreements. The city had such a mutual aid agreement with Will County where the accident occurred.

Shortly after the accident, the fireman on train No. 301 used the locomotive's radio to notify ICG personnel at Joliet. The Wilmington police dispatcher was notified of the accident at 9:56 a.m. by the motorist who went to the accident site. The police dispatcher dispatched rescue squads at 9:58 a.m. The local rescue personnel assisted in evacuating passengers from the train. Ambulances took the injured to hospitals in Joliet, and buses took the uninjured to the high school gymnasium. Subsequently, buses chartered by Amtrak took the uninjured passengers to their destinations.

### **Tests and Research**

There was no physical evidence at the crossing to indicate that the truckdriver attempted to brake his vehicle before the collision.

Following the accident, Safety Board investigators located what had apparently been a whistle post for southbound trains located 1,660 feet north of the New River Road crossing. The face of this rectangular metal sign, originally having a white letter "W" on a black field, was obliterated by rust. The "60" mph speed board approaching the Kankakee River Drive crossing (MP 52.9) from the north was also in poor condition although the numerals "60," indicating a required maximum speed of 60 mph, were still legible at a near distance.

A postaccident test of the whistle on Amtrak locomotive unit No. 311 was made by Federal Railroad Administration (FRA) inspectors, and the sound level emitted was found to exceed the minimum required by Federal regulations. Some of the passengers and crewmembers said that they recalled hearing the locomotive whistle sounded as the train approached the New River Road crossing. One passenger stated that the whistle was sounded so frequently that it annoyed her.

A review of train No. 301's speed recorder tape indicated that the train's speed just before the collision was 72 mph. A calibration test of the locomotive's speed indicator and recorder was conducted at Amtrak's locomotive facility in Chicago. This test was witnessed by Safety Board, FRA, and Amtrak personnel. The calibration tests developed that the speed recorder registered 70 mph at a calibrated speed of 80 mph, and that the speed indicator was 2 mph slow. Calculations based on these test results indicate that the train actually was traveling about 82 mph just before the emergency brake application. Amtrak calibrates its locomotive speed indicator/recorders when the locomotives are inspected every 92 days in accordance with Federal inspection requirements. Electricians at Amtrak's Chicago facility remove only the used portions of the speed tapes, and these portions are not reviewed. Pulse magnetic tape cassettes are removed during the 92-day inspection and are transcribed for operational tests. The only exceptions to these practices arise in the event that tapes or cassettes are requested for testing or review following an accident.

Testing of the crossing's automatic flashing light signals and warning bell established that they were in proper working order. Calculations based on the train's probable speed of 82 mph and the location of the signal activating device 3,100 feet from the crossing indicate that the lights flashed for about 25.5 seconds before the locomotive entered the crossing. Examination of the lenses of the red flashing light signals facing west established that they were clean and focused to compensate for the road curvature approaching the crossing.

On July 29, 1983, a clear day, tests were made at the time the accident occurred to evaluate the effect the morning sun might have had on a driver approaching the crossing from the west. It was found that the sun did not interfere with the view of the crossing, the warning signs, the flashing light signals, and the northwest quadrant. The flashing light signals were plainly visible 1,061 feet west of the crossing. Several test approaches to the crossing were made at 55 mph to evaluate the view of the railroad north of the crossing. At a point slightly less than 1/2 mile west of the crossing, while traversing the long left-hand curve of the road, it was possible to see the railroad track briefly across an open field between two hedgerows planted perpendicular to the railroad. However, it was not possible to see the railroad again across the northwest quadrant until 48 seconds later at a point very near the crossing. Calculations indicate that the flashing light signals would have been visible to a driver for 14.5 seconds before a vehicle traveling at 40 mph reached the crossing and for 18 seconds before a vehicle traveling at 50 mph reached the crossing.

About a month after the accident, Safety Board investigators observed vehicular traffic approach and cross the ICG main track on New River Road. The vehicles appeared to be moving at the posted speed of 55 mph, and there was no discernible reduction of speed for any vehicle approaching the crossing from either direction except for that of a State Highway Department truck.

The Wilmington police chief said that he had routinely monitored the speed of trains by radar as they passed through the city. He gave 35 to 40 mph as typical of the speed of freight trains and 45 to 50 mph as the typical passenger train speed. The police chief said that they routinely monitored motorist performance at grade crossings inside the city and that violations and arrests were rare.

### Other Information

Other Available Track.--ICG's Joliet District includes two separate, parallel main lines between South Joliet and Mazonia, Illinois, a distance of about 25 miles, which are to the north and south, respectively, of Wilmington. The easterly of these two lines is the single-track "old main line" which passes through Wilmington and is used by six Amtrak passenger trains daily, three in each direction. A local freight train and an occasional through freight train also use this line. None of the Amtrak passenger trains stops to pick up or discharge passengers between South Joliet and Mazonia. The parallel line, known as the Pequot Cut-off, is used exclusively by ICG for the operation of its through freight trains. Between Mazonia and Coal City, a distance of 5 miles, the cut-off line is single track, but between Coal City and South Joliet, the ICG track is paired with an adjacent Atchison, Topeka and Santa Fe Railway (ATSF) single-track main line to permit double-track operation by the two railroads. ATSF operates Amtrak passenger trains and its freight trains over this paired operation. The Pequot Cut-off line runs west of Wilmington and the "old main line." Interstate Highway 55 runs parallel to and between the two railroad lines.

According to data furnished by the Illinois Commerce Commission, there are 22 intersections of public streets and highways on the "old main line" between South Joliet and Mazonia; 1 is grade separated, 2 are grade crossings with train-activated automatic flashing light signals and shortarm gates, 9 are grade crossings with flashing light signals and warning bells but no gates, 1 is a grade crossing protected by train-activated "wig-wag" signals, and 9 are grade crossings passively protected by crossbuck warning signs. The Pequot Cut-off intersects 15 public roads and streets; 3 are grade separated, 6 are grade crossings with flashing light signals and shortarm gates, 2 are grade crossings with flashing light signals and warning bells, and 4 are grade crossings with only crossbuck warning signs. There is no record of a train on the Pequot Cut-off having had a grade crossing collision. However, in 1975 an Amtrak train on the "old main line" collided with a truck at a grade crossing in Elwood, 5 miles north of Wilmington. 3/

Operation Lifesaver.--The State of Illinois, through the agency of the Illinois Commerce Commission, has been active in the "Operation Lifesaver" program, and the incidence of grade crossing accidents in the State has been reduced markedly in recent years. The number of incidents has been reduced from 606 in 1980 to 398 in 1983. In this program, the State has had the support of the railroads, Amtrak, and various organizations of public safety officials. The program has been supported by the Illinois Association of Chiefs of Police and the Illinois State Police. Considerable work has been done to promote the program throughout Illinois. On June 7, 1979, the Illinois Commerce Commission's manager of the Operation Lifesaver program made a presentation covering the program to the Police Chiefs Association of Will County.

3/ For more information, read Railroad/Highway Accident Report--"Collision of a Crown-Trigg Construction Company Truck with an Amtrak Passenger Train at Elwood, Illinois, November 19, 1975" (NTSB-RHR-76-2).



The ICG has a "near-miss" program under which train crewmembers are encouraged to report narrowly averted collisions at grade crossings. Such reports are said to be channeled to supervisory officers and the railroad's special police agents.

Will County is near the greater Chicago metropolitan area and is criss-crossed by numerous heavily traveled railroad lines as well as by a substantial highway system. ICG alone has three main lines that cut across the county. When questioned by Safety Board investigators, the sheriff of Will County and some of his key personnel stated that they had never heard of Operation Lifesaver or of the ICG's "near-miss" reporting program. However, the sheriff was familiar with a similar "near-miss" program promoted by the Joliet-based Elgin, Joliet and Eastern Railroad. The police chief of Wilmington similarly stated that he was unaware of either the Operation Lifesaver or ICG programs.

A spokesman for Marquette Motor Service Terminals, Inc., said that the company was not aware of Operation Lifesaver or the ICG's "near-miss" program.

## **ANALYSIS**

### **The Accident**

Calculations based on tests of train No. 301's speed recorder tape revealed that the train was being operated at 82 mph—3 mph faster than the maximum allowable speed of 79 mph—at the time of the accident. Except for the overspeed, the train was being operated in compliance with applicable rules and regulations. The fireman, a qualified engineer who was operating the locomotive, sounded the locomotive whistle as prescribed by ICG operating rules. The flashing light signals at the crossing were activated by the locomotive when it was 3,100 feet from the crossing, and the lights flashed for about 25.5 seconds before the locomotive struck the truck. The truckdriver stated after the accident that he did not see the crossbuck warning signs, the flashing light signals, or the train, and that he did not hear the train whistle. If the truck approached the crossing at 40 to 50 mph as indicated by the enginecrew, the flashing light signals would have been visible to the truckdriver for at least 14.5 seconds and possibly for as long as 18 seconds. Postaccident tests and calculations indicated that even when traveling at 55 mph, the truck could have been stopped in as little as 328 feet, allowing 1.5 seconds for perception and reaction of the truckdriver. The truckdriver could have seen the train when the truck was at least 328 feet from the crossing. By this point, the truck already had passed the standard advance roadside warning sign, the point from where the flasher lights could first be seen, and the advance warning sign painted on the road surface.

In a little more than 3 1/2 hours after leaving the MMS Chicago terminal, the truckdriver had traveled about 160 miles. En route he had made two stops during which more than half of the merchandise in his truck was unloaded. If the unloading consumed an hour as was estimated, the truckdriver would have had to maintain an average speed in excess of 60 mph to cover the 160 miles in the available time. The incentive system used by MMS to compensate its truckdrivers may have contributed to the truckdriver's tendency to speed on the delivery job. The truckdriver's driving record indicates that he had been cited three times for speeding off the job.

The fireman and engineer noted that the truck closely followed an automobile onto the crossing. The truckdriver may have been intending to pass the automobile after exiting a curve as they approached the crossing. The enginecrew estimated that the speed of the motor vehicles was 40 to 50 mph at the crossing, significantly below the speed at which the truck probably had been traveling. The lack of evidence that the truckdriver attempted to brake the truck reinforces these suppositions. If the truckdriver had been

alert to the imminence of the crossing and had seen the crossbuck warning signs, and the flashing light signals, he would have had ample opportunity to stop short of the tracks, even if he had been exceeding the speed limit.

The train left Joliet about 3 minutes late. The long, level, straight stretch of track between Elwood and Wilmington afforded a good opportunity to make up the 3 minutes. The fireman had made a check of the speed indicator, and he knew that the indicated speed was less than the train's actual speed. Therefore, he knew that he was exceeding the allowable speed by several miles per hour. However, it is impractical to assign any causal weight to the fact that the train exceeded the prescribed speed. The crucial point is that the flashing light signals were indicating the approach of the train when the truckdriver arrived at the point where he could first see them, and he apparently never perceived them.

### Train Speed

It is significant that the ICG crewmembers have been disciplined for operating Amtrak trains at excessive speed only following accidents or when State of Illinois inspectors detected speed violations while responding to citizen complaints. Locomotive speed tapes had not been reviewed. As a result of its investigation of the Amtrak passenger train derailment on the ICG's Alton District track at Springfield, Illinois, in 1980, in which train speed was determined to be a factor, 4/ the Safety Board issued Safety Recommendation R-81-61 asking the ICG to:

Take immediate action to determine that train and engine service employees of the Alton District are fully conversant with and comply with timetable speed restrictions. . . .

The ICG replied that it performed field efficiency tests related to speed restriction compliance and that:

Rules compliance activity on a continuing basis by our supervisory personnel is more than adequate to be certain that train and engine service employees are fully conversant with and complying with timetable speed requirements. . . .

Based on ICG's response, the Safety Board placed the recommendation in a "Closed--Acceptable Action" status.

As a result of the Springfield accident, the Safety Board also issued Safety Recommendation R-81-67 asking that Amtrak:

In cooperation with the Illinois Central Gulf Railroad, develop a program of close surveillance of the operation of its trains on ICG's Alton District which includes the compliance of train crews with speed restrictions and signal aspects, as well as the monitoring of locomotive speed recorder tapes.

4/ Railroad Accident Report--"Derailment of Amtrak Passenger Train No. 21 on the Illinois Central Gulf Railroad at Springfield, Illinois, October 30, 1980" (NTSB-RAR-81-5).

Amtrak replied that:

In Amtrak's agreements with the carriers, the right to control the operation has clearly been reserved by the carriers, including rule compliance and speed enforcement. Amtrak does not have the staffing required to enforce compliance with operating rules on over twenty carriers; however, Amtrak compensates the Illinois Central Gulf Railroad (ICG) for a full-time dedicated manager whose primary function is monitoring the operation of Amtrak trains on the ICG.

In 1982, Amtrak informed the Safety Board that it had begun a cooperative program with the ICG to monitor locomotive speed and event recorder tapes and enginecrew performance for Amtrak trains operating between Chicago and St. Louis to insure compliance with operating rules. Based on Amtrak's response, the Safety Board placed Safety Recommendation R-81-67 in a "Closed—Acceptable Action" status.

During its investigation of the Wilmington accident, Amtrak officials informed the Safety Board that Amtrak and the ICG were complying with the program. However, while Safety Board investigators were at Amtrak's locomotive facility in Chicago for testing of the locomotive speed recorder involved in the accident, they found that, in fact, the program was not being complied with because the speed tapes being removed from the locomotive units were not being reviewed.

The Safety Board is concerned that Amtrak's reluctance to monitor the speeds of its passenger trains may result from its desire to maintain its train schedules. The Board is aware also that the ICG and Amtrak's other contractor railroads are given bonuses for maintaining on-time performance of trains. As a result of the Springfield accident, the Safety Board issued Safety Recommendation R-81-68 asking Amtrak to:

Make route and schedule studies to determine that Amtrak trains can be safely operated over the ICG's Alton District on the existing schedules.

In its initial response to this recommendation, Amtrak replied that it,

...has never encouraged a carrier to violate speed restrictions. In every case, on-time performance is secondary to rule and speed compliance. All passenger train schedules contain 5% to 10% recovery time for contingencies, and therefore, it is not necessary to exceed speed restrictions to operate on time even when modest delays are encountered en route.

Safety Recommendation R-81-68 ultimately was placed in a "Closed—Acceptable Action" status after Amtrak's Operations Audit department conducted 10 performance checks over this line and determined that, indeed, the trains could be operated safely over the Alton District on the existing schedules.

The fact remains that, for whatever reason, the enginecrews of Amtrak locomotives do violate speed restrictions. There is no incentive for the contractor railroads to monitor and enforce speed restrictions if, by doing so, the receipt of Amtrak's on-time performance bonuses may be jeopardized. Moreover, since the operating contract provides that the contractor railroad is not liable for the costs of an accident, another incentive for safe operation is negated. Since Amtrak is government-subsidized, the costs of train accidents, as well as the performance bonuses, are borne by the public at large.

Amtrak should establish a nationwide program of aggressive monitoring of locomotive speed recorder tapes to detect noncompliance with speed restrictions and should take action to eliminate this unsafe practice by traincrews on its contractor railroads.

### Train Routing

The availability of another route with fewer grade crossings raises the question of whether Amtrak adequately considered safety in the selection of this route. The route of Amtrak train No. 301 and other Amtrak passenger trains between Joliet and Mazonia is over track with 22 intersections of public roads, only 1 of which is grade separated. A parallel track available to Amtrak, known as the Pequot Cut-off, has only 15 intersections of public roads, 3 of which are grade separated. None of the passenger trains stops between Joliet and Mazonia to pick up or discharge passengers. Since ICG track in the cut-off is paired with an adjacent ATSF single-track main line over which the ATSF operates Amtrak trains, the ICG and Amtrak could reroute their trains and have the benefit of a more efficient double-track operation by the two railroads along with the added safety of trains encountering only 12 public roads at grade. Based on these facts and the circumstances of the Wilmington accident, and because the use of the available parallel track would reduce the risk of train encounters with highway vehicles, the Safety Board believes that Amtrak should, if at all possible, reroute its passenger trains over the Pequot Cut-off.

### Survival Aspects

The Amtrak service attendant onboard train No. 301 had been trained in postaccident emergency response and assisted many passengers in the evacuation. Amtrak instituted its emergency training program for its service personnel in response to Safety Recommendation R-71-7 issued by the Safety Board following its investigation of an accident in Franconia, Virginia, on January 27, 1970. 5/ Amtrak increased its attention to the training as a result of Safety Recommendation R-79-36 issued by the Safety Board following its investigation of an accident in Seabrook, Maryland, on June 9, 1978. 6/ Amtrak also has instituted a yearly refresher training program in emergency procedures for onboard employees in response to Safety Recommendation R-83-24 issued by the Safety Board as a result of its investigation of an accident in Emerson, Iowa, on June 15, 1982. 7/ Safety Recommendations R-83-71 through -73, issued by the Safety Board as a result of its investigation of an accident in Gibson, California, on June 23, 1982, 8/ also concerned emergency training programs for supervisory and onboard service personnel. Amtrak's heightened awareness of emergency training programs has resulted in more effective assistance to passengers during emergencies.

The Safety Board also has had occasion to point out deficiencies in the crashworthiness of Amtrak cars. As a result of its investigation of an accident in

5/ Railroad Accident Report—"Richmond, Fredericksburg and Potomac Railroad Company Train No. 10/76, Franconia, Virginia, January 27, 1970" (NTSB-RAR-71-1).

6/ Railroad Accident Report—"Rear End Collision of Conrail Commuter Train No. 400 and Amtrak Passenger Train No. 60, Seabrook, Maryland, June 9, 1978" (NTSB-RAR-79-3).

7/ Railroad Accident Report—"Derailment of Amtrak Train No. 5 (The San Francisco Zephyr) on the Burlington Northern Railroad, Emerson, Iowa, June 15, 1982" (NTSB/RAR-83/02).

8/ Railroad Accident Report—"Fire Onboard Amtrak Passenger Train No. 11, Coast Starlight, Gibson, California, June 23, 1982" (NTSB/RAR-83/03).

Collinsville, Oklahoma, on April 5, 1971, 9/ the Safety Board issued Safety Recommendation R-72-27, which recommended that Amtrak,

... correct ... injury-causing features ... as passenger cars are reconditioned, and in the future, apply system safety principles to the acquisition, design, construction, and renovation of passenger cars.

As a result of its investigation of an accident in Salem, Illinois, on June 10, 1971, 10/ the Safety Board issued Safety Recommendation R-72-34, which recommended that Amtrak,

... correct ... injury-causing features ... as passenger cars are renovated or rebuilt. Purchase specifications for future passenger cars should be established ... to insure that interiors are designed to minimize impact-type injuries. ...

Both recommendations later were classified as "Closed—Acceptable Action" after Amtrak informed the Board that it was requiring improved safety features for new type passenger cars being manufactured and was making improvements to reduce injury-causing interior features of existing cars.

As a result of its investigation of an accident in Melvern, Kansas, on July 5, 1974, 11/ the Safety Board issued Safety Recommendation R-75-5, which recommended that Amtrak,

... require the installation of the latest practical crashworthiness features when rolling stock is renovated or when new cars and locomotives are purchased.

Amtrak informed the Safety Board on July 21, 1976, that new equipment it could be ordering in the next several years "will be provided with the latest crashworthiness features." However, an analysis of the injuries sustained by persons involved in the Wilmington accident and riding in these new cars indicates that, despite Amtrak's attention to this problem, some of the sources of injuries present in previous Amtrak accidents have not been eliminated or controlled and continue to pose a threat to passengers and employees. Based on the issuance of the more comprehensive Safety Recommendation R-84-40 in this report, Safety Recommendation R-75-5 has been placed in a "Closed-Superseded" status.

An example of an injury-producing mechanism which persists is the rotation of seats in an accident. Many of the seats in the coaches involved in the Wilmington accident were found rotated after the accident, even though the seats had been fitted with modified seat-locking devices. The installation of these devices resulted from Safety

9/ Railroad/Highway Accident Report—"Atchison, Topeka and Santa Fe Passenger Train No. 212 Collision with Stillwater Milling Company Motortruck at 116th Street North Grade Crossing, near Collinsville, Oklahoma, April 5, 1971" (NTSB-RHR-72-1).

10/ Railroad Accident Report—"Derailment of Amtrak Train No. 1 While Operating on the Illinois Central Railroad, near Salem, Illinois, June 10, 1971" (NTSB-RAR-72-5).

11/ Railroad Accident Report—"Derailment of an Amtrak Train on the Tracks of the Atchison, Topeka and Santa Fe Railway Company at Melvern, Kansas, July 5, 1974" (NTSB-RAR-75-1).

Recommendation R-79-72 which the Safety Board issued following its investigation of an accident in Edison, New Jersey, on April 20, 1979. 12/ The Board recommended that Amtrak,

*... require that the seats of all Amfleet equipment are maintained in proper condition to insure that the seats are locked securely in place.*

Amtrak responded on April 15, 1980, that it had developed an anti-rotating device that "will insure that the seats on Amfleet equipment are locked securely in place" and that installation of the devices would begin shortly. Following its investigation of an accident in Dobbs Ferry, New York, on November 7, 1980, 13/ the Safety Board issued Safety Recommendation R-81-58, which recommended that Amtrak,

*Install an adequate locking device on rotating seats which will prevent undesired rotation in accidents.*

Amtrak responded that installation of the devices on its coaches was continuing. Based on this response, Safety Recommendation R-81-58 was placed in a "Closed--Acceptable Action" status.

One of the passengers injured in the Wilmington accident was pinned under a seatframe. As a result of the Dobbs Ferry accident, the Safety Board issued Safety Recommendation R-81-57, which recommended that Amtrak,

*Establish a retrofit schedule to provide skirts at the bottom of seats to prevent leg injuries because of leg entrapment.*

The recommendation was placed in a "Closed--Unacceptable Action" status after two responses from Amtrak that "locking devices on rotating seats will minimize leg injuries."

Another source of injury identified in the Wilmington accident and in previous Amtrak accidents was luggage which fell onto passengers from the overhead luggage racks, which were not equipped with luggage retention devices. On February 3, 1971, the Safety Board issued Safety Recommendation R-71-6, which recommended that the FRA:

*... institute immediate regulations requiring all future new and rebuilt passenger cars be equipped with secured seats and luggage retention devices.*

The FRA initially responded that it would begin a study in this area, and based on an evaluation of the study, it would determine the need for regulations. The date for completion of this study was extended several times, and the Board has never received a final copy of the study.

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12/ Railroad Accident Report--"National Railroad Passenger Corp. (Amtrak) Head-end Collision of Train No. 111 and Plasser Track Machine Equipment, Edison, New Jersey, April 20, 1979" (NTSB-RAR-79-10).

13/ Railroad Accident Report--"Head-end Collision of Amtrak Passenger Train No. 74 and Conrail Train OPSE-7, Dobbs Ferry, New York, November 7, 1980" (NTSB-RAR-81-4).

On April 22, 1982, the FRA published in the Federal Register a notice of a general safety inquiry into rail passenger equipment. Section 14 of the Federal Railroad Safety Authorization Act of 1980 added a new subsection to section 202 of the Federal Railroad Safety Act mandating the issuance of initial rules, regulations, orders, and standards as may be necessary to insure the safe construction, maintenance, and operation of rail passenger equipment. On June 2, 1982, the Safety Board responded to the general safety inquiry advocating the development of rail passenger equipment safety standards and listing areas for safety improvements identified in the Board's analyses of major rail passenger accidents.

On January 17, 1984, the FRA published in the Federal Register a notice of a special safety inquiry on rail passenger equipment. Section 102 of the Rail Safety and Service Improvement Act of 1982 amended section 202 of the Federal Railroad Safety Act of 1970 to require the issuance of any necessary rules relating to rail passenger equipment and a report to Congress. Although the FRA concluded in its January 1984 Report to Congress on Railroad Passenger Equipment Safety that rail passenger service has compiled an excellent record, it did indicate that the interior of passenger cars merited additional study and that among the subjects to be addressed are design and securement of seats, luggage retention, and interior contouring.

In the January 17, 1984, notice regarding the special safety inquiry, the FRA stated that it would be undertaking five safety initiatives, one of which is to publish recommended guidelines on the flammability and smoke emission characteristics for materials to be used in all new and rebuilt passenger cars. <sup>14/</sup> The Safety Board believes that the FRA also should issue recommended guidelines for secure seats and luggage retention devices, once it completes its studies in this area, and the Board urges the FRA to do so. As a result of the issuance of the more comprehensive Safety Recommendation R-84-40 in this report, Safety Recommendation R-71-6 has been placed in a "Closed--Superseded" status. The Safety Board believes that Amtrak should equip its passenger coaches with luggage retention devices even if not required to do so by Federal regulation.

A final injury-causing feature uncovered by the investigation was that equipment in the food service car was not well secured and came loose during the accident.

Equipment designers and crashworthiness experts have known for years how to protect passengers from injuries attributed to all of these causes. Safety analyses by competent passenger car designers can provide cost-effective corrections to deal with inadequately secured seats, unsecured luggage in overhead racks, and inadequately secured dining car equipment.

Although it was not a factor in the severity of the injuries, the Safety Board notes that the underfloor batteries which provide emergency power were damaged, rendering them inoperative. As a result, it was necessary to manually open the power-operated sliding end doors of the cars. Because of the attitude of the cars, this action was extremely difficult. Had the accident occurred in darkness, evacuation of both the injured and uninjured would have been much more difficult. Following its investigation of the Emerson accident, the Safety Board issued Safety Recommendation R-83-25, which recommended that Amtrak,

<sup>14/</sup> The other four initiatives were (1) a final rule extending coverage of FRA Track Safety Standards to include all track used for commuter service; (2) a final rule amending FRA Power Brake Standards to preserve the inspection and testing requirements for passenger car brake equipment; (3) a joint FRA-industry examination of emergency procedures; and (4) the 1984 special safety inquiry.

Evaluate and modify, as necessary, emergency lighting systems in passenger-carrying cars to better protect the functioning of emergency lights in emergency situations.

Amtrak replied that,

the emergency lighting systems on Amtrak equipment are designed to provide a minimum of two hours of acceptable illumination when the primary power source is interrupted. . . Protection is provided by battery power and the circuits are well protected; however, submergence in water will cause any emergency lighting system to become inoperative in a short period of time.

The Safety Board responded by urging Amtrak to reconsider the full intent of the recommendation, stating that "passenger-carrying cars should contain self-powered emergency lights, independent of the train's power sources, that will function in emergency situations even in the event it becomes submerged in water." The Board currently is awaiting a further response from Amtrak on this recommendation, which is being held in an "Open--Unacceptable Action" status. The circumstances of the Wilmington accident show that the batteries are not well protected. Amtrak in evaluating the emergency lighting systems should specifically concern itself with relocating the emergency power system batteries to an area of the car where they might be less susceptible to damage in an accident.

Although Amtrak's F-40PH diesel-electric locomotive units are, for the most part, used over railroads with a maximum allowable speed of 79 mph or less, the overspeed devices on these units are set to function at 104 mph. As a result, there is no overspeed protection under that speed. Amtrak should modify its locomotive overspeed protection so that it limits operation to speeds only nominally in excess of those allowed.

### Operation Lifesaver

On November 16, 1977, as a result of its investigation of an accident in Des Moines, Iowa, on July 1, 1976, <sup>15/</sup> the Safety Board made recommendations (H-77-25 through -30) to the National Safety Council, the Association of American Railroads, the National Highway Traffic Safety Administration, the Federal Highway Administration, the Federal Railroad Administration, and the International Association of Chiefs of Police, encouraging them to develop, implement, and evaluate a nationwide Operation Lifesaver program directed to reducing accidents at railroad/highway grade crossings. The program, which began in 1972 and initially caught on only in a few western States, now is supported by 43 States, many railroads, and numerous safety organizations. Since 1977, the fatality toll from accidents at crossings has dropped from nearly 1,200 to 600. The State of Illinois participates in the program, and the marked reduction of 32 percent in the number of grade crossing accidents in Illinois since 1980 attests to the effectiveness of the Illinois Commerce Commission's Operation Lifesaver activities.

One of the primary ways that Operation Lifesaver has been effective has been in making all parties--drivers, railroads, and law enforcement personnel--aware of the risks at crossings and how to reduce the risks. It is surprising that neither the trucking company nor the sheriff of Will County and some of his key personnel had heard of

<sup>15/</sup> Railroad/Highway Accident Report--"Collision of a Chicago, Rock Island and Pacific Railroad Company Freight Train with an Automobile, Des Moines, Iowa, July 1, 1976" (NTSB-RHR-77-2).



Operation Lifesaver or the ICG's "near-miss" program. Also, the police chief of Wilmington was unaware of Operation Lifesaver or the ICG's "near-miss" program. Truckdrivers and law enforcement personnel are essential ingredients in a successful Operation Lifesaver program. The Operation Lifesaver program manager in Illinois and the ICG's key person in the program should contact appropriate county and municipal officials of areas through which the ICG operates, including the sheriff of Will County and the police chief of Wilmington, and encourage them to participate in Operation Lifesaver.

### **Emergency Response**

The prompt, effective response by the Wilmington police and rescue squads is an excellent example of the value of a good emergency disaster response plan. Emergency response drills, a vital part of any program, made the activity more effective and more easily controlled because key personnel knew their roles and carried them out. The mutual aid agreement with Will County proved fortunate for the passengers on the train.

## **CONCLUSIONS**

### **Findings**

1. Amtrak Train No. 301 was running about 82 mph, which exceeded the maximum allowable train speed of 79 mph for passenger trains, when it struck the truck.
2. The truck averaged a speed of more than 60 mph in the 160 miles it traveled before being struck by the train.
4. Even though the face of the railroad whistle post sign for the crossing was obliterated by rust. The fireman sounded the prescribed whistle signal approaching the crossing.
5. The flashing light signals at the crossing were flashing for about 25.5 seconds before the train struck the truck.
6. If the truckdriver had been alert, he could have seen the flashing light signals for at least 14.5 seconds and possibly for as long as 18 seconds before reaching the crossing, depending upon the actual speed of his truck between 40 to 50 mph.
7. If the truckdriver had been alert, he could have perceived the advance warning signs, flashing light signals, or the train in sufficient time to stop short of the tracks.
8. The Illinois Central Gulf Railroad was operating under an Amtrak incentive program which may have encouraged its employees to exceed the established train speed limits.
9. The truckdriver was operating under a company incentive program which may have encouraged him to exceed the posted highway speed limits.
10. There is an alternative rail route with fewer grade crossings available to Amtrak passenger trains operating between Joliet and Mazonia, Illinois.

11. Injuries to passengers were caused by interior design features of the cars which were known to Amtrak to have caused injuries in past accidents and which are correctable.
12. Neither the truckdriver, the sheriff of Will County, nor the police chief of Wilmington were aware of either Operation Lifesaver or the Illinois Central Gulf Railroad "near-miss" programs in Illinois.
13. The emergency response by the police and rescue squads from Wilmington was prompt and effective.

### Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the truckdriver for undetermined reasons to perceive the crossbuck warning signs, the flashing light signals, the approaching train, or the whistle of the approaching train and to stop his vehicle short of the tracks at the railroad/highway grade crossing.

### **RECOMMENDATIONS**

As a result of its investigation of this accident, the National Transportation Safety Board made the following recommendations:

--to the National Railroad Passenger Corporation (Amtrak):

Review the possible contribution of the on-time incentive program in encouraging contractor railroad operating practices which may cause a degradation of safety, and modify the program as appropriate. (Class II, Priority Action) (R-84-37)

Regularly review locomotive speed recorder tapes as they are removed from locomotives to detect noncompliance with speed restrictions, and require the contractor railroads to take action to eliminate speeding by traincrews. (Class II, Priority Action) (R-84-38)

Reroute passenger trains between Joliet and Mazonia, Illinois, onto track where there are fewer railroad/highway grade crossings. (Class II, Priority Action) (R-84-39)

Correct the identified design deficiencies in the interior features of existing and new passenger cars, which can cause injuries in accidents, including the baggage retention capabilities of overhead luggage racks, inadequately secured seats, and inadequately secured equipment in food service cars. (Class II, Priority Action) (R-84-40)

Modify the overspeed devices on Amtrak diesel-electric locomotive units so that the devices limit operation to speeds only nominally in excess of maximum allowable operating speeds. (Class II, Priority Action) (R-84-41)

Relocate the battery used in the emergency power system to an area of the car where it is less susceptible to damage in an accident. (Class II, Priority Action) (R-84-42)

Improve the cooperative program with the Illinois Central Gulf Railroad for monitoring enginecrew performance and enginecrew compliance with operating rules. (Class II, Priority Action) (R-84-43)

--to the Illinois Commerce Commission:

In company with the Illinois Central Gulf Railroad (ICG), meet with and solicit participation in the Operation Lifesaver program from the sheriff of Will County, the police chief of Wilmington, and other county and municipal officials in areas through which the ICG operates. (Class II, Priority Action) (R-84-44)

--to the Illinois Central Gulf Railroad:

In company with the Illinois Commerce Commission, meet with and solicit participation in the Operation Lifesaver program from the sheriff of Will County, the police chief of Wilmington, and other county and municipal officials in areas through which the ICG operates. (Class II, Priority Action) (R-84-45)

--to the Federal Railroad Administration:

Expedite the studies on the interior design of passenger cars, described in the January 1984 Report to Congress, and publish recommended guidelines for securing seats and for luggage retention devices. (Class II, Priority Action) (R-84-46)

**BY THE NATIONAL TRANSPORTATION SAFETY BOARD**

/s/ JIM BURNETT  
Chairman

/s/ PATRICIA A. GOLDMAN  
Vice Chairman

/s/ G. H. PATRICK BURSLEY  
Member

October 16, 1984

**APPENDIXES**

**APPENDIX A**

**INVESTIGATION**

**Investigation**

The National Transportation Safety Board was notified of this accident at 11:25 a.m. on July 28, 1983, by the National Response Center. Investigators were dispatched from the Board's Washington, D.C., Headquarters and the Board's Atlanta, Chicago, and Kansas City Field Offices. Parties to the investigation were the Illinois Central Gulf Railroad, National Railroad Passenger Corporation (Amtrak), Federal Railroad Administration, State of Illinois, and Marquette Motor Service Terminals, Inc.

**Depositions/Hearings**

No depositions were taken; a hearing was not held in conjunction with the investigation.

## APPENDIX B

### PERSONNEL INFORMATION

#### Truckdriver

The 23-year-old truckdriver was graduated from high school in June 1979 and worked for 3 years as a machine and forklift operator. On April 29, 1983, he completed a 2-month driver training course at the Trainco Truck Driving School in Chicago, Illinois. He was employed by Marquette Motor Service Terminals, Inc., on May 23, 1983.

#### Engineer

The 47-year-old engineer was employed by the ICG as a fireman in 1959. He was promoted to engineer in 1965. He had been suspended twice for violating maximum allowable speeds in 1980 while operating an Amtrak passenger train and an ICG freight train. He was last examined on ICG operating rules and timetable special instructions on May 19, 1982. He was required to wear corrective eyeglasses while operating a locomotive.

#### Fireman

The 43-year-old fireman was employed by the ICG as a brakeman in 1968. He transferred to service as a locomotive fireman in 1969 and was promoted to engineer in 1973. He had been discharged on January 30, 1981, for responsibility in connection with the October 30, 1980, derailment of an Amtrak train at Springfield, Illinois. He was last examined on the ICG operating rules and timetable special instructions on March 29, 1982. He was employed without any physical restrictions.

#### Conductor

The conductor entered railroad service as a clerk for ICG and transferred to the position of switchman in 1961. He was promoted to conductor in 1968 and was last examined on the ICG operating rules on April 19, 1982. He was required to wear corrective eyeglasses while on duty.

#### Flagman

The flagman entered railroad service as a brakeman for ICG in 1974 and was promoted to conductor in 1978. He was required to wear corrective eyeglasses while on duty.