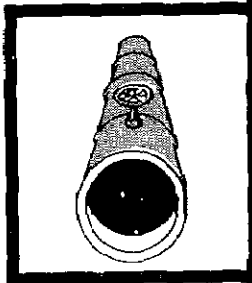
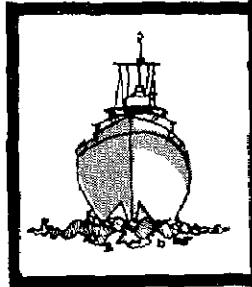
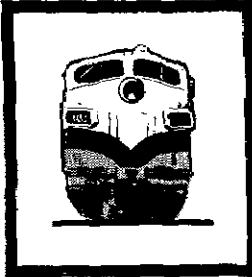
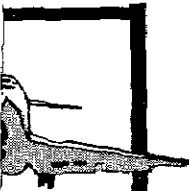


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NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

RAILROAD/HIGHWAY ACCIDENT REPORT

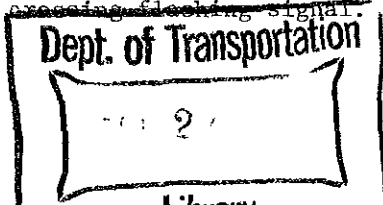
SEABOARD COAST LINE/AMTRAK
PASSENGER TRAIN/PICKUP TRUCK COLLISION
PLANT CITY, FLORIDA
OCTOBER 2, 1977

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TECHNICAL REPORT DOCUMENTATION PAGE

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16 Abstract At 8:25 p.m., e.d.t., on October 2, 1977, westbound Seaboard Coast Line/Amtrak passenger train No. 57 struck a northbound pickup truck at a grade crossing in Plant City, Florida. The collision occurred when the pickup truck proceeded past the railroad crossing flashing signals onto the track and into the path of the train which was traveling at 70 mph. The 10 occupants of the pickup truck were killed; neither the crew of the train nor its 30 passengers were injured. The National Transportation Safety Board determines that the probable cause of this accident was the failure of the pickup truckdriver, who was under the influence of alcohol, to stop short of the railroad tracks in response to the warnings of an approaching train and an activated railroad crossing flashing signal.			
17. Key Words: Railroad/highway grade crossing; Blood Alcohol Level (BAL); railroad flashing warning signals; pickup truck; Alcohol Safety Action Program (ASAP); Operation Lifesaver; selective law enforcement; traffic safety program; automatic (active) grade crossing gates; Amtrak passenger train; railroad advance warning signs; diagnostic inspection team; fire; high-speed passenger train grade crossing protection.		Library Distribution Statement This document is available to the public through the National Technical Information Service, Springfield, Virginia 22151	
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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

RAILROAD/HIGHWAY ACCIDENT REPORT

Adopted: December 8, 1978

SEABOARD COAST LINE/AMTRAK PASSENGER TRAIN/
PICKUP TRUCK COLLISION
PLANT CITY, FLORIDA
OCTOBER 2, 1977

SYNOPSIS

At 8:25 p.m., e.d.t., on October 2, 1977, westbound Seaboard Coast Line/Amtrak passenger train No. 57 struck a northbound pickup truck at a grade crossing in Plant City, Florida. The collision occurred when the pickup truck proceeded past the railroad crossing flashing signals onto the track and into the path of the train which was traveling at 70 mph. The 10 occupants of the pickup truck were killed; neither the crew of the train nor its 30 passengers were injured.

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the pickup truckdriver, who was under the influence of alcohol, to stop short of the railroad tracks in response to the warnings of an approaching train and an activated railroad crossing flashing signal.

INVESTIGATION

The Accident

About 8:25 p.m., e.d.t., on October 2, 1977, Amtrak passenger train No. 57, consisting of a locomotive and six cars, was en route on its regular schedule from Chicago, Illinois, to St. Petersburg, Florida. As the westbound train passed through Plant City, Florida, the engineer was operating the train controls on the right side of the locomotive cab and the fireman was seated on the left. The flagman and baggagemaster were riding in the baggage-dome car, and the conductor was in the dining car. The traincrew reported that the weather was clear and visibility down the track was excellent.

When the train reached the whistle board, 1,800 feet east of the crossing, the engineer began to sound the standard crossing signal. The speed of the train was about 70 mph. Its fixed and oscillating headlamps on the front of the locomotive were illuminated, and the railroad crossing flashing signals at the crossing were operating and clearly visible.

Simultaneously, a 1971 Ford pickup truck was traveling north on Turkey Creek Road at an estimated speed of 50 mph. The truckbed was covered with a metal box-type cover. Eight persons occupied the truckbed and two persons occupied the cab.

The fireman and engineer of the train saw the truck approach the tracks when the train was about 600 feet from the crossing. (See figure 1.) At that time, the engineer began sounding a series of short blasts of the train horn. When the train was 100 feet (1 second) from the crossing, the engineer realized that the truck would not stop and he set the train brakes in emergency application. The truck moved onto the track without stopping and was struck in the middle on the right side. (See figure 2.) The front of the locomotive penetrated the truck cab just ahead of the "B" pillar. The truck wrapped around the front of the locomotive, and the metal box-type cover was torn off. Fire erupted immediately and the truck was still aflame on the front of the train when the train stopped 2,640 feet from the point of impact. The two occupants of the truck cab remained within; six of the eight occupants in the bed of the truck were ejected and strewn along the south side of the track for a distance of 332 feet.

According to witnesses who were in an automobile that had entered the roadway just behind the truck, the railroad crossing flashing signals had begun to operate and the train horn had sounded while they were waiting for the truck to pass their driveway about 1,145 feet south of the crossing. (See figure 1.) After the automobile had entered the roadway, it followed behind the truck at a distance of at least 500 feet. The witnesses saw the truck's brake lamps illuminate momentarily just before it reached the tracks; however, they noticed no deceleration of the truck. The roadway exhibited no evidence of precrash braking. According to the witnesses, the truck was being driven in a normal manner; there was no weaving or erratic movement as it approached the crossing.

Injuries to Persons

<u>Injuries</u>	<u>Driver</u>	<u>Passengers</u>	<u>Traincrew</u>
Fatal	1	9 (truck)	0
Nonfatal	0	0	0
None	0	30 (train)	5

Operator Information

The 39-year-old engineer was employed by the Seaboard Coast Line Railroad (SCL) for over 4 years. He was promoted to engineer in 1976. The train was being operated in accordance with SCL operating rules.

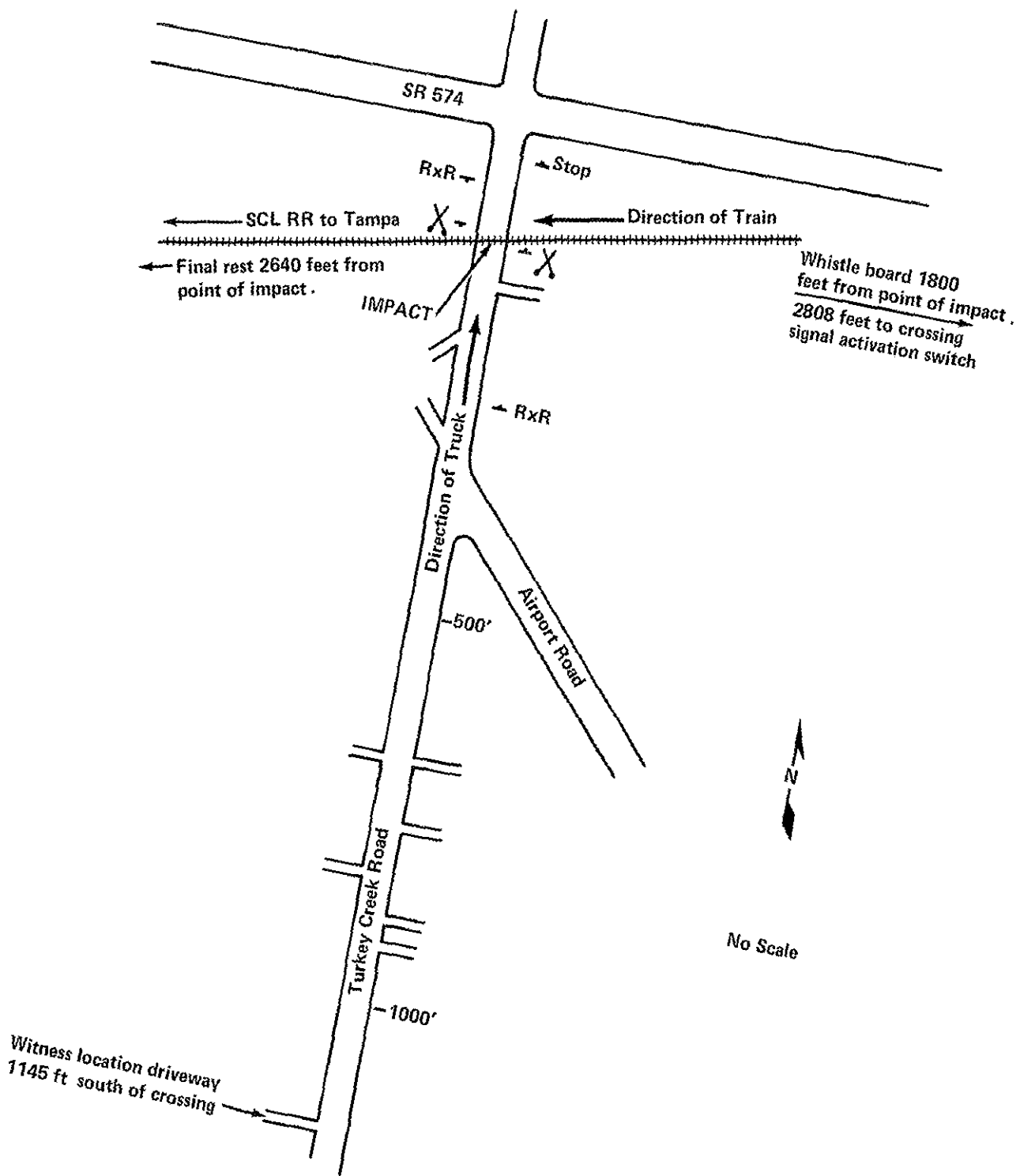


Figure 1. Accident diagram.



Figure 2. Pickup truck on front end of the locomotive.

The 28-year-old truckdriver lived in Dade City, Florida, with her husband and two sons. Among those killed in the crash were her mother, two sons, a brother, and a sister.

The driver's Florida chauffeur's license had been suspended since January 1977, because she had failed to renew a liability insurance policy on her automobile after the policy had been canceled for nonpayment. She should not have been driving any motor vehicle while her chauffeur's license was suspended.

She was first licensed in 1965. Her traffic record noted one violation in 1971 for excessive speed, but there were no accidents. A review of local law enforcement records revealed no notations on the driver. The driver's license was restricted, which required that she wear glasses while operating a vehicle. According to a witness, the driver was seen wearing her glasses about 15 minutes before the accident.

Reportedly, she had resided and worked in the area all her life, and she was familiar with the Turkey Creek Road grade crossing. The driver had received no formal driver training. On two occasions, she had reportedly assisted her husband in driving a tractor-semitrailer unit on long trips.

The driver's husband stated that up to about 2 months before the accident he and his wife drank a 6-pack of beer every couple of nights and about two 6-packs on weekends. He also stated that to his knowledge she had not consumed any beer within the 2-week period preceding the accident. During postaccident interviews, a bartender in Dade City reported that the driver "used to drink beer pretty heavily, 6 to 8 per night, but in the last 2 months or so she hasn't been in the bar more than two times." The owner of a bar in Bushnell, Florida, advised that between late 1976 and June 1977, the driver visited her bar as frequently as 2 to 3 nights per week and "drank heavily but never looked or acted drunk."

Another interviewee reported that she had driven the truck between 3:30 p.m. and 8:15 p.m. on the day of the accident and that she had been a passenger in the truck from Dade City to Plant City. The truck and its occupants had left this witness' home in Plant City about 15 minutes before the accident for the return trip to Dade City. The witness stated that she saw the driver consume at least seven 12-ounce cans of beer during the 5 hours immediately preceding the accident.

Vehicle Information

The truck - The truck was a 1971 Ford, F-100 pickup with a 302 CID V8 engine and a C-4 automatic transmission. A metal box-type cover with plastic windows was installed on the truckbed. There were no seats in the truckbed. The occupants in this area were seated on the floor and on miscellaneous clothing and cargo. Rearview mirrors were mounted

outside on the door pillars. The cab of the truck was not air-conditioned, but was equipped with a radio. It could not be determined if the radio was on at impact.

The truck and cover were destroyed in the collision and fire. (See figures 3 and 4.) A postcrash inspection revealed that the cab windows were down. The front-axle brakeshoes were badly worn, and the rear lining on the shoes of both front wheels were completely worn through. The rear-axle brake lining rivets were just beginning to contact the brakedrum. A person who had driven the truck 6 hours before the accident stated that "it drove good," and noted no mechanical problems.

There was no evidence to suggest precrash steering, drivetrain, or tire defects.

The train - The train equipment was owned by Amtrak and operated by SCL traincrews. It consisted of one locomotive and six passenger cars. The locomotive, a model SDP-40F, was equipped with one fixed and one oscillating headlamp, a forward-facing, five-chime external horn, and a left-side-mounted single bell. The unit was also equipped with an electronic speed-recording device. The device, which was tested and found to be accurate, showed the locomotive's speed to be about 70 mph (102.7 fps) just before impact.

There was minor damage to the front end of the locomotive. Some cars sustained minor sheet metal damage; no other damage was noted. (See figure 5.) The airbrakes, track sanding equipment, horn, bell, and lights of the locomotive were inspected by Federal Railroad Administration (FRA) and Safety Board personnel; all were found to be in operating condition.

Highway and Track Information

Turkey Creek Road is a north-south, 2-lane, bituminous-surfaced roadway that runs from Florida State Route 60 north to Florida State Route 574 and beyond. The roadway is not a Federal-aid highway. The road crossed the SCL mainline in Plant City at grade, 168 feet south of the centerline of State Route 574. (See figure 1.) The crossing had been designated crossing number "U.S. Dot AAR 624-329L." The 24-foot-wide roadway widened slightly to about 26 feet as it crossed the single track. The northbound road had a 1-percent negative grade but leveled somewhat at the crossing. (See figures 6 and 7.)

The crossing was in good condition and was not rough. A stop sign for northbound traffic was located on the right shoulder of Turkey Creek Road, 100 feet north of the center of the track at the intersection of State Route 574. Traffic usually slowed as it approached the tracks in anticipation of the stop at the State Route 574 intersection.

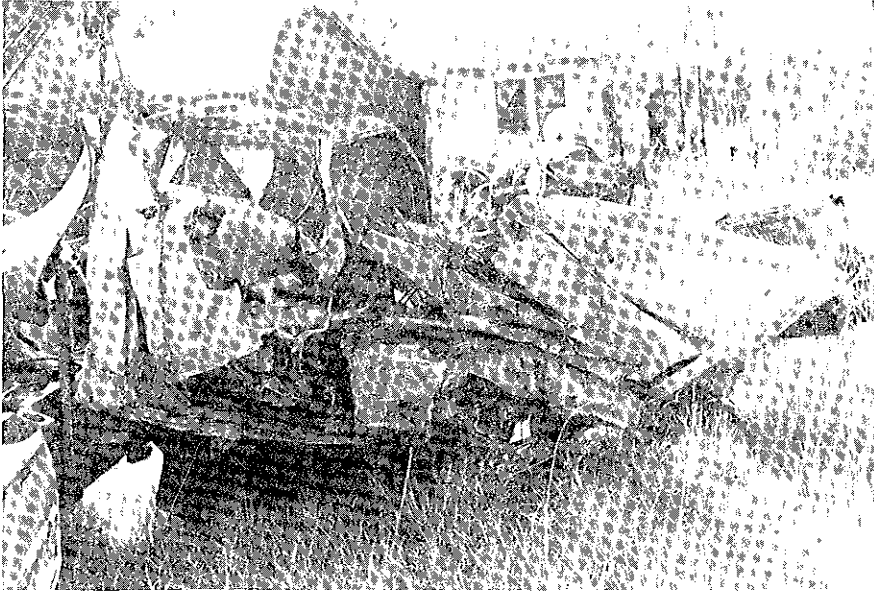


Figure 3. Right side - pickup truck cab.

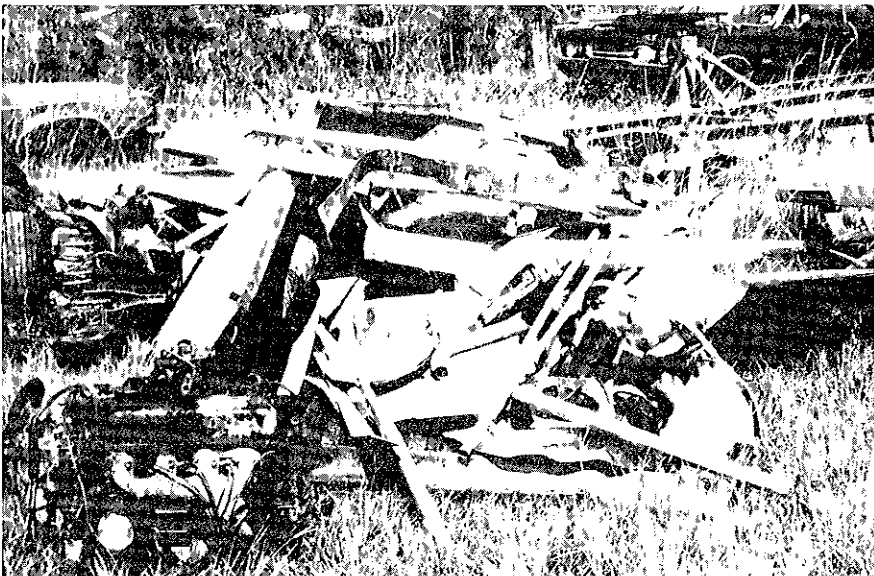


Figure 4. Pickup truckbed.

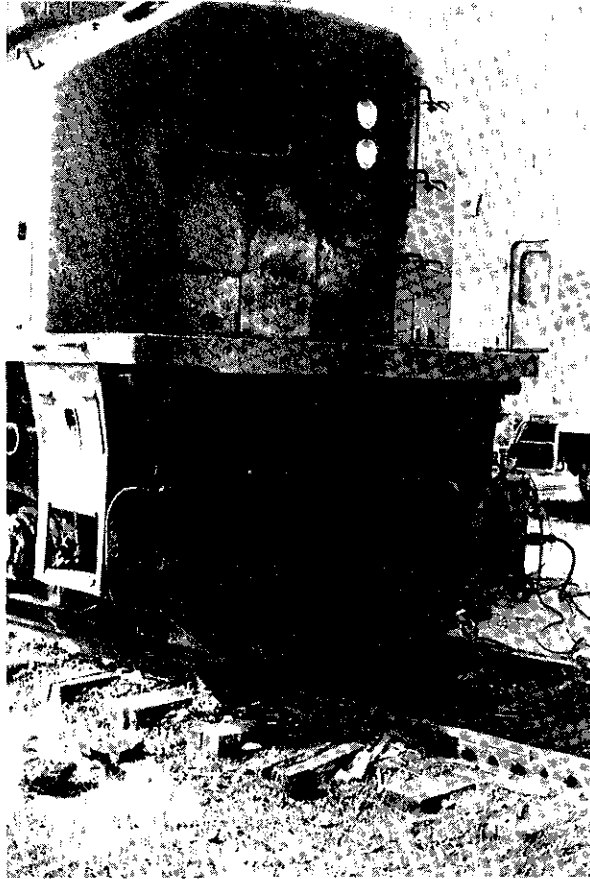


Figure 5. Damage to front of locomotive.

The posted speed limit for Turkey Creek Road was 45 mph. Reflectorized, 36-inch-round, advance railroad warning signs were on the northbound and southbound approaches to the crossing. On the northbound approach, the warning sign is 202 feet south of the crossing on Turkey Creek Road. There were no crossing-related advance pavement markings painted on the pavement for the northbound approach. The Manual on Uniform Traffic Control Devices (MUTCD) Part VIII, issued April 1, 1977, requires the placement of pavement markings where signals are operating and the placement of a railroad advance warning sign 250 feet in advance of crossings in urban areas. The 1975 traffic count for Turkey Creek Road was 4,450 vehicles per day.

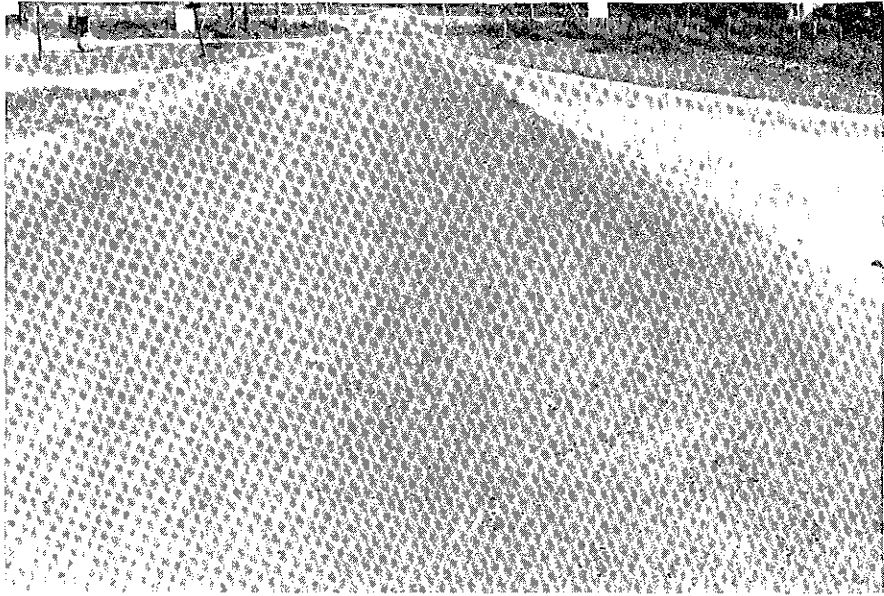


Figure 6. View to the north of Turkey Creek Road from 400 feet south of grade crossing.

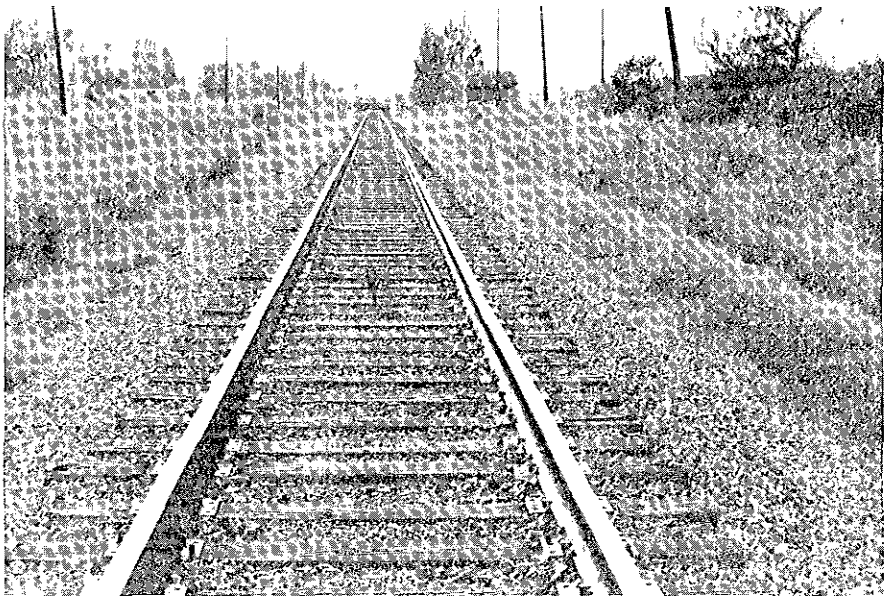


Figure 7. View to the west of SCL railroad tracks from 600 feet east of crossing.

The single railroad track is straight for more than 3,000 feet east of the crossing and has less than a 0.4-percent descending grade at the crossing. The maximum authorized track speed for passenger trains is 79 mph at this location. This rail corridor had been used in high-speed passenger service since the late 1930's.

Standard reflectorized crossbuck signs accompanied the railroad crossing flashing signals and were installed on both sides of the track. The railroad crossing flashing signals were clearly visible for more than 1/2 mile when approaching from the south. The flashing signals were activated when the train passed over a track section located 2,808 feet east of the crossing. At 70 mph, the train would have activated the flashing light signals 27.4 seconds before impact. Florida traffic code section 316.054, "Obedience to Signal Indicating Approach of Train," requires that "whenever any person driving a vehicle approaches a railroad grade crossing where a clearly visible electric or mechanical signal device gives warning of the immediate approach of a railroad train, the driver of such vehicle shall stop within 50 feet but not less than 15 feet from the nearest rail of such railroad and shall not proceed until he can do so safely."

The terrain in the approach to the crossing is such that northbound Turkey Creek Road traffic cannot see westbound trains until vehicles pass a stand of trees about 400 feet from the crossing. (See figures 6 and 8.) Although trains may be obscured during daylight, at night the oscillating and fixed headlamps on the lead locomotives of westbound trains are clearly discernible before the train becomes visible, because the beams reflect off objects surrounding the tracks.

Over a 30-day period immediately before the accident, an average of four passenger trains and eight freight trains traversed the crossing daily.

The Florida Department of Transportation (DOT) reported that since 1971 there had been four train-involved accidents at the crossing. Those accidents had resulted in two fatalities and two injuries. The flashing light signals were installed before 1971.

In July 1977, a diagnostic team composed of Florida DOT, SCL, and Amtrak personnel was established to evaluate grade crossings in the Jacksonville/Tampa, Florida, high-speed corridor. The team had recommended that the Turkey Creek Road crossing be given first priority for the installation of crossing gates and cantilever flashing lights. According to the Florida DOT, preparations for the installation of gates, bells, and cantilever lights at the crossing have been finalized, except for the crossing device maintenance agreement between the city of Plant City and the Florida DOT.

Accident figures, released by the FRA in its Annual Report for 1976, indicate that crossings with active gates have the lowest fatality

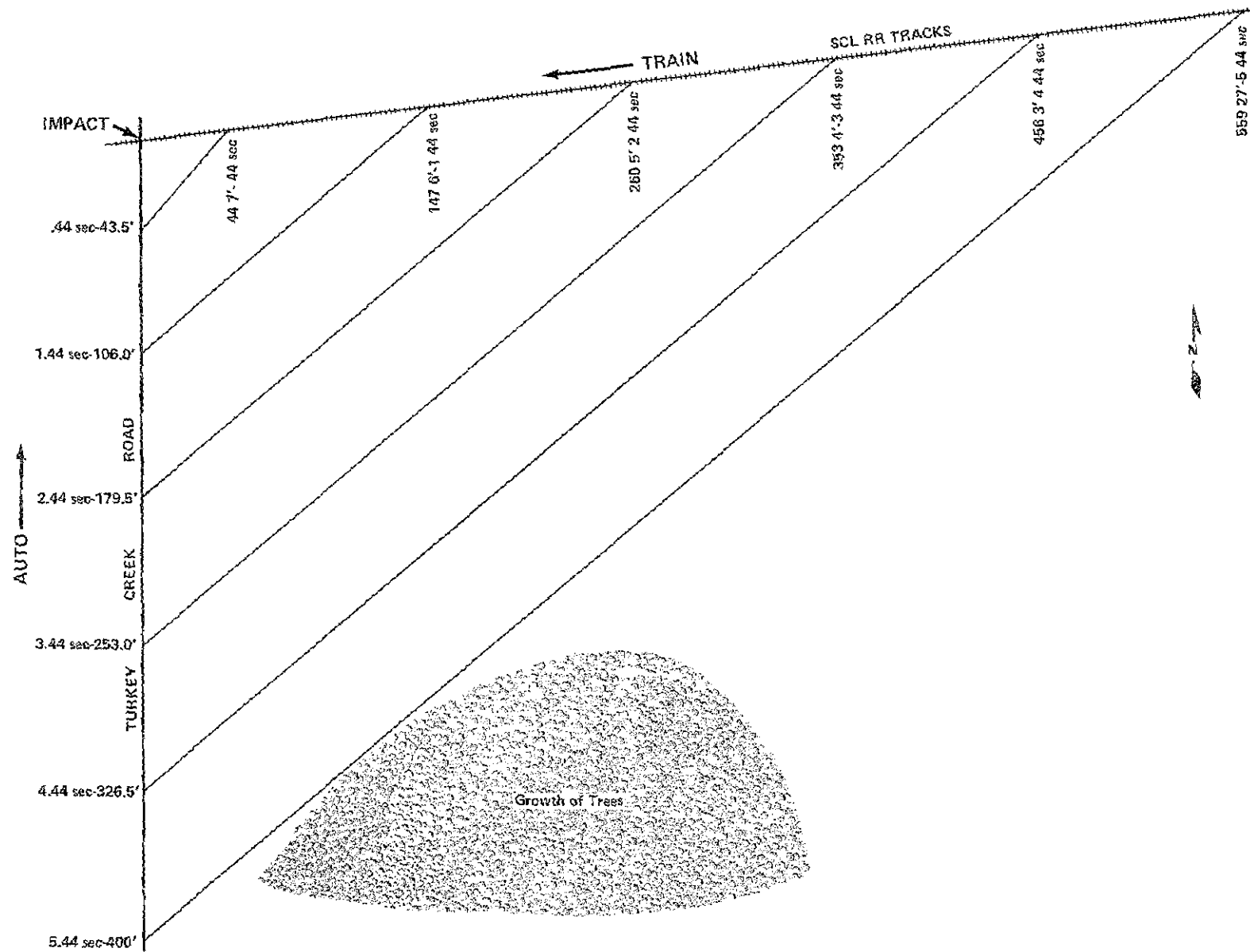


Figure 8. Time vs. distance traveled during which train was visible to truckdriver.

rate per number of units in operation of all train-activated devices -- 1 fatality per every 164 gate devices as compared to 1 fatality per every 107 gate devices for flashing lights and 1 fatality per every 56 gate devices for warning bells.

In California, where an active State grade crossing program has been in operation for several years with State and Federal financing, fatalities have decreased from levels in excess of 100 fatalities per year to current levels in the low 60's. This reduction in fatalities is directly related to the installation of active gate protection at 900 hazardous crossings from 1971 to 1976.

Survival Aspects

The Plant City Police Department was notified of the accident at 8:30 p.m. and arrived on the scene at 8:35 p.m. The Department cleared the site and conducted the local investigation.

When the train stopped, the truck was fully engulfed by fire and wrapped around the front of the locomotive. The traincrew's efforts to extinguish the fire were unsuccessful. The Dover-Turkey Creek Volunteer Fire Department's 1,000-gallon pumper and rescue unit arrived at the site about 15 minutes after the accident. The fire was extinguished within 2 minutes.

Medical and Pathological Information

The last known physical examination of the driver was conducted on November 30, 1976, by a doctor in Belleview, Florida. She took the examination as a prerequisite for a truckdriving job she was seeking with an interstate motor carrier. The examining physician found that she met the minimum physical qualifications (when wearing corrective lenses) required by the Federal Motor Carrier Safety Regulations (FMCSR). ^{1/} She had no known hearing difficulty. Her weight was recorded as 160 pounds.

The driver made four additional visits to another doctor in August and September 1977. On August 17, 1977, her doctor prescribed valium 5 mg to treat nervous tension. She stated that she had been drinking up to one case of beer on weekends. There is no evidence that she had taken any of the prescribed valium on the day of the accident. On September 19, 1977, tests for diabetes were negative.

On October 3 and 4, the Hillsborough County Medical Examiner's Office performed autopsies on the driver and cab passenger. The Medical Examiner's report showed the cause of death of the driver to be "multiple injuries, severe" caused by "blunt trauma." The driver had also been

1/ 49 CFR 390 through 397.

burned over 100 percent of her body. Toxicological tests on the driver showed a blood alcohol content of 0.14 percent. ^{2/}

The Medical Examiner's report on the remaining truck occupants recorded the cause of death for each to be "multiple injuries, severe," caused by "blunt trauma."

Other Information

The Jacksonville/Tampa High-Speed Passenger Train Corridor -- The safety problem associated with high-speed, high-density rail passenger service has been recognized and documented by the National Transportation Safety Board. A 1976 Safety Board report ^{3/} concluded that high priority should be afforded safety improvements at grade crossings on high-speed passenger train corridors.

The Jacksonville to Tampa corridor traverses 240 miles of track and contains 271 public crossings at grade, or 1.13 crossings per mile of track. By comparison, on the entire Amtrak system there are 0.61 public crossing per mile. Statistics also reveal that while the crossing accident ratio on the overall Amtrak system is 1.06 per 100 miles of track, it averages 6.9 per 100 miles of track in the corridor. Although Amtrak operates in 46 States, 17.8 percent of all grade crossing accidents involving Amtrak trains during calendar years 1975, 1976, and 1977 occurred in Florida.

During the 1976-1977 fiscal year, the Florida DOT reported ^{4/} that automatic railroad crossing flashing signals were installed at 116 grade crossings at a cost of about \$4 million. Their goal had been 175 to 200 installations per year. During fiscal year 1975-1976, 132 signal installations were completed. The Florida DOT report points out that their main delay in completing installation of grade crossing protection was not administrative, but rather reluctance by a major railroad carrier to commit additional signal personnel to the program, because funds were available only for short-term periods. The carrier had 201 installations pending when Florida DOT released the report. However, since that time, the carrier has added installation crews to expedite grade crossing protection throughout the State.

^{2/} Florida Statute 316.028 states that a blood alcohol level of 0.10 percent or more is prima facie evidence of driving while under the influence of alcohol.

^{3/} "Railroad/Highway Accident Report: Collision of Crown-Trygg Construction Company Truck With an Amtrak Passenger Train, Elwood, Illinois, November 19, 1975." (NTSB-RHR-76-2.)

^{4/} "Annual Report, Title 11 Safety Improvement Program, 1976-1977," Florida Department of Transportation Safety Office, September 9, 1977, p. 28.

Amtrak's Board of Directors had authorized \$404,000 to improve rail-highway safety and train operating efficiencies between Lakeland and Tampa, which included the Turkey Creek Road crossing. The funding was contingent upon a Railroad Reimbursement Master Agreement being signed between Amtrak, the Florida DOT, and SCL. The agreement was signed in June 1978 by all parties. This project also was expected to include financial participation by the Federal Highway Administration and affected local entities of Government. It was anticipated that at least 44 grade crossings would receive safety treatment. This separate and distinct program was not intended to interfere with or preempt grade crossing safety improvement priorities established by the State-administered hazard-index utilized under the Federal-Aid Safety program. The planning of construction projects proposed in the agreement is underway.

On August 22, 1978, the Safety Board sent letters commending the State of Florida, the SCL Railroad, the Florida DOT, and the National Railroad Passenger Corporation (Amtrak) for the cooperative and expeditious manner in which the protocol phase of the program was developed and concluded. The letters urged that the principals implement the program in the same manner.

An Amtrak official stated that he does not perceive the accident problem at grade crossings to be one involving solely the type or number of warning devices installed. Rather, he believed it to be a combination of a lack of driver awareness, recognition of and adherence to the warning messages conveyed, and a lack of effective enforcement of grade crossing traffic control devices.

In January 1976 Amtrak established a full-time position in the State of Florida solely to carry out the education phase of the Operation Lifesaver program throughout the State. The first four States to adopt the Operation Lifesaver Program -- Idaho, Nebraska, Kansas, and Georgia -- reduced their grade crossing fatalities by about 52 percent in the first year. A number of other States, including Florida, have implemented only the public education segment. The most significant results, however, have been recorded by those States that implemented a comprehensive program including three disciplines -- education, engineering, and enforcement.

Greater Tampa (Florida) Alcohol Safety Action Project -- Beginning in 1971, the National Highway Traffic Safety Administration (NHTSA) implemented a broad national alcohol countermeasure program by funding about 35 demonstration projects in States, counties, and cities throughout the Nation. The Alcohol Safety Action Projects (ASAP) were aimed at providing a systematic, community approach to the drunk driver problem. The major aims of the program were to distinguish the "social drinker" from the "problem drinker," then, to educate the "social drinker" and to rehabilitate the "problem drinker."

Tampa, which is located in Hillsborough County, implemented an ASAP in 1972. The Tampa ASAP was phased out in 1976, and some of its programs were absorbed by the local government and by private agencies. The project was closed when Federal funds were stopped. The final evaluation report on the Federally funded Tampa ASAP concluded that "after five years of ASAP countermeasure activity there has been a significant decline in the proportions of drunk drivers on the road and the decline had not had a noticeable effect on A/R (alcohol related) accidents." 5/

The truckdriver resided in a county bordering Hillsborough County. There is no evidence to suggest that the driver was ever exposed to the ASAP or that any of the programs extended into areas she routinely traversed.

Nationally, NHTSA has claimed for eight of the ASAP programs that it examined "a small but significant reduction in fatalities has occurred which can be attributed to ASAP's at those eight projects for two full years of operations...." 6/ After an examination of the same eight ASAP's and 20 others, a paper by Paul L. Zador of the Insurance Institute for Highway Safety said that "NHTSA erroneously concluded that the eight ASAP's it analyzed were effective because the agencies' measurement found 'a significant change' ...in the relation between daytime and nighttime fatal crashes that followed the introduction of ASAP's. "Actually," the paper reports, the "decrease in the proportion of nighttime fatal crashes was equally present both in the ASAP and comparison areas. It is, therefore, not justified to conclude that ASAP's were responsible for the changed relationship between nighttime and daytime fatal crashes." 7/

In rebuttal a paper by Penelop, Johnson, Levy, and Voas 8/ criticizes Zador's paper and provides counterarguments which, in turn, support the NHTSA's favorable report on the promises offered by lessons learned through 5 years of ASAP demonstration programs. It is time that the final report be disseminated and that NHTSA get on with the development of a nationwide alcohol countermeasure program.

Ongoing selective traffic enforcement programs in four Florida counties are directed toward the reduction of accidents at high-risk locations. Beginning in October 1978, the emphasis of the program was shifted to apprehending alcohol-involved drivers. The counties involved included those in three of the most populated areas of the State.

5/ Westra and Reis, "An Analysis of Total Project Impact (Tampa ASAP) 1976 - Final Report," University of Southern Florida, Tampa, Florida, 1977, (DOT HS-062-1-080.)

6/ Insurance Institute for Highway Safety, "To Prevent Harm," Washington, D.C., 1978.

7/ Zador, Paul L., "Statistical Evaluation of the Effectiveness of Alcohol Safety Action Projects," Accident Analysis and Prevention, Vol. 8, No. 1, February 1976, pp. 51-66.

8/ A Critique of the Paper "Statistical Evaluation of the Effectiveness of Alcohol Safety Action," Accident Analysis and Prevention, Vol. 8, pp. 67-77. Pergamon Press 1976.

There was no evidence of any law enforcement effort in the general vicinity of the accident related to violations of grade crossing warning signals. The local police could produce no records to indicate any such enforcement. They confirmed that any such enforcement was at best minimal.

Florida Traffic Safety Programs -- Alcohol was involved in about half of the traffic fatalities in Florida, and about 40 percent of the alcohol-involved drivers in fatal accidents had a blood alcohol level of .20 percent or higher. These numbers are based on data routinely supplied by county medical examiners to the State.

The 1977 Florida Legislature passed legislation that makes attendance at "Driving While Under the Influence of Alcohol (DWI)" counterattack schools mandatory for all drivers who have had their driving privilege revoked or suspended before the privilege can be restored. Currently, 46 approved DWI schools are operating within Florida; over 150,000 persons have attended.

Personnel have been added to the Florida Department of Public Safety to implement a campaign against drivers who continue to operate motor vehicles after their driving privilege had been revoked or suspended. More emphasis on public information and education on alcohol and driving is planned for both the general public and school-age persons. In September 1979, the program is expected to reach students from the first through the sixth grades.

Other programs are being considered while those that are ongoing are being evaluated. A Driver/Occupant Task Force has been established by the State as an advisory arm of the Florida Bureau of Highway Safety. Its highway safety mission is to identify specific traffic problems and recommend solutions. Members of the task force include persons from State and local governments and from the private sector. Alcohol and the driver is of major concern to the task force.

ANALYSIS

The Crash

Based on witnesses' observations, the driver had at least 15 seconds in which to perceive and react to the flashing signal light. Further, based on witnesses' observations and time versus distance estimates, the driver could have seen the train clearly when her vehicle was still 400 feet from the crossing. At this point, the truck and train were 5.45 seconds from the impact point. From this point to the point of impact, the truckdriver could see the locomotive intermittently, but could see the oscillating headlight beam constantly. At the estimated 50 mph, 5 mph above the posted speed, the truck was traveling at 73.5 fps. The train, traveling at 70 mph or 102.9 fps, would have been 559.27 feet from the crossing. (See figure 2.) The engineer said that he did not realize that the truck was not going to stop until the locomotive was within 100 feet (1 second) from the crossing. At that point it was impossible for the train to have slowed enough to miss the truck.

However, if the truckdriver required 2.5 seconds to perceive and identify the train and react to its approach, the truck would have traveled about 183 feet. This would have left the truckdriver about 217 feet in which to brake the truck to a stop. Considering a tire-to-road coefficient of friction of .60, the truck should have been able to stop in about 141 feet. If this braking was performed, the truck would have stopped about 76 feet short of the tracks. The time and distance available provided no opportunity for hesitation on the part of the truckdriver. Except for a momentary application of the brakes before impact, the driver did not execute any visible evasive maneuvers to avoid the oncoming train. Therefore, if the driver did see the flashing railroad lights and the train, she chose to ignore them.

There is no evidence to indicate that the truckdriver was habitually irresponsible behind the wheel of a motor vehicle. Her traffic record was good. The license had been suspended for insurance reasons. She was familiar with the crossing and its surroundings. Since she had driven the truck successfully most of the day, she was probably familiar with it. There is no evidence that any of the passengers were distracting her. Although postcrash inspection of the truck's brake system revealed that the brakes were marginal, wear indications on the brake drums suggest that the system was functioning.

Toxicological analysis at autopsy revealed that the driver had a blood alcohol level of .14 percent, significantly greater than the .10-percent level considered by Florida law to be prima facie evidence of driving while under the influence of alcohol. Based on the blood alcohol level, the witnesses' statements about alcohol consumption before the accident, and the driver's disregard for the flashing red railroad signal, the train's horn, and the locomotive's oscillating and fixed headlights, the Safety Board concludes that the driver was under the influence of alcohol to the extent that her ability to make sound judgments was impaired.

Alcohol and the Driver

As a result of its investigation of an accident at Baker, California, on March 7, 1968, ^{9/} the Safety Board recommended that the National Highway Safety Bureau (NHSB) of the Federal Highway Administration (now the National Highway Traffic Safety Administration) develop a program to produce a sense of individual responsibility in the general public with regard to driving while under the influence of alcohol.

A 1969 Safety Board Special Study ^{10/} recognized that a driver's likelihood of causing a traffic accident begins to increase noticeably

^{9/} "Highway Accident Report: Interstate Bus/Automobile Collision, Interstate Route 15, Baker, California, March 7, 1968" (SS-H-3).

^{10/} "Alcohol Problems and Transportation Safety: The Need for Coordinated Efforts," February 20, 1969, NTSB - Special Study.

at .04 percent, at .06 percent it is 4 times as great, at .10 percent it rose to 6 times as great, and at .15 percent it climbed to 25 times as great. The Safety Board recommended that the NHSB emphasize studies and programs on alcohol in transportation safety.

In March 1970, the Office of Alcohol Countermeasures was established in the NHSB. The ASAP's demonstration program evolved from that office and became the NHTSA focal point in developing and implementing methods through which persons who drink and drive could be identified and rehabilitated.

The evaluation report on the Tampa ASAP concluded, "There was definite evidence that exposure to problem driver classes alone had no effect on the recidivism of problem driver clients, and although there was no definite evidence of treatment effectiveness for clients referred to group schools, the data suggested that the combination of short term didactic and group therapy plus problem drinker classes may reduce recidivism among those clients completing both modalities." Significantly, the report stated that only slightly more than one-half of the clients referred to the group plus school combinations successfully completed both. Hopefully, the Florida 1977 legislation will correct this situation.

The Crossing

The MUTCD-required pavement markings were not present on the northbound approach to the crossing. The advance railroad crossing warning sign was installed 202 feet in advance of the crossing instead of 250 feet as required. The purpose of these markings and signing is to provide the motorist with as much advance notice of the presence of the crossing as possible. While it probably wouldn't have made any difference in this particular accident, they should be installed and properly located for the general good.

In a 1977 report, 11/ the Safety Board extensively examined driver disregard for warning devices at railroad/highway grade crossings. One study cited in the report revealed a 46-percent driver compliance rate in response to flashing signals. 12/ Partially in recognition of this disregard for flashing light signals, the report stated that some States have decided to install both flashing light signals and gates at new installations. A California study 13/ completed in 1975 claims that

11/ "Railroad/Highway Accident Report: Collision of Chicago, Rock Island, and Pacific Railroad Company Freight Train With an Automobile, Des Moines, Iowa, July 1, 1976" (NTSB-RHR-77-2).

12/ "Evaluation of Safety at Railroad/Highway Grade Crossings," Technical Report, Joint Highway Research Project, Purdue University, August 1967.

13/ "The Effectiveness of Automatic Protection in Reducing Accident Frequency and Severity at Public Grade Crossings in California." California PUC, Reprinted by DOT, FHWA, 1975, p. 18.

the advantage of automatic gates over railroad crossing flashing signals is their ability to deter driver attempts to cross the tracks when a train is approaching and posing a definite hazard. For economic reasons, however, most States will install gates at existing crossings with flashing light signals only on high-speed rail corridors and at locations with a high accident history. The report concluded that a nationwide effort to achieve a higher degree of respect for flashing light signals at grade crossings is necessary.

In response to Safety Board recommendation H-76-2 questioning the "effectiveness of traffic control systems currently in use at railroad crossings, considering their ability to warn and achieve appropriate reactions from impaired drivers," the Federal Highway Administration reported that a recent study ^{14/} concluded that:

- "1. Accident expectancy at crossings where active devices are installed is reduced when compared to crossings with passive devices (signs only). Considering an accident expectancy of 100 at passive crossings (a) installation of flashing light signals would reduce this to 33; (b) the addition of automatic gates would reduce it further to 13."
- "2. With respect to imparting traffic information to warn impaired drivers and achieve an appropriate response, their study found that the ratio of impaired drivers to unimpaired drivers in fatal grade crossing accidents was smaller than that of driving while under the influence of alcohol drivers to unimpaired drivers in other highway accident environments. ^{15/}"

On the basis of this finding, it concluded that no special traffic controls or warning systems are warranted for the alcohol impaired driver. "It is reasonable to expect that active warning devices will more effectively alert this group of drivers as they do for all classes of drivers."

In this instance, reflectorized, automatic gates may have been the necessary attention-getting device which would have influenced the truckdriver to brake the truck to a stop short of the crossing.

Operation Lifesaver

The Safety Board supports and promotes Operation Lifesaver, which incorporates three primary elements of highway safety: education, engineering, and enforcement. The Board has made several recommendations to support

^{14/} California Public Utilities Commission Study "Effectiveness of Automatic Protection in Reducing Accident Frequency and Severity at Public Grade Crossing in California," June 30, 1974.

^{15/} Ibid.

the program. ^{16/} Amtrak has already worked on program development in States without programs and is encouraging expansion in those States with minimal ongoing efforts. The National Safety Council is developing a nationwide Operation Lifesaver program.

Following this accident, the Florida Highway Patrol and Amtrak mounted special efforts to present Operation Lifesaver to the population along the corridor. As of May 5, 1978, the Amtrak Operation Lifesaver specialist had presented the program to over 14,000 persons. Additionally, meetings called by the Florida DOT have resulted in planning for an Operation Lifesaver Program which will incorporate all involved agency and industry persons.

On March 29, 1978, Amtrak reported that since Operation Lifesaver began in Florida on October 1, 1976, the number of Amtrak rail-highway crossing accidents has decreased 52 percent. Those communities to which this program has been brought have experienced a reduction in fatalities at grade crossings. The Operation Lifesaver project as a total program appears to be a safety countermeasure worthy of a nationwide effort.

Enforcement is an important element of Operation Lifesaver and of all other traffic safety programs. There are always those persons who cannot be reached or who ignore educational efforts, and those who enjoy risktaking. These are the human factors which are influenced by law enforcement. Enforcement deters violations and encourages compliance by those who would not do so otherwise.

Directly contributing to the accident were failure to stop for an activated flashing light signal and driving while under the influence of alcohol. Nationally, these two rank high on the list of laws frequently violated. Statistics reveal that only 46 percent of the drivers respond to flashing railroad signals, ^{17/} and 50 percent of all fatal accidents involve a driver who is under the influence of alcohol. ^{18/} In addition, the driver was operating with a suspended license. A 1977 NHTSA study report ^{19/} indicates that "more than 50 percent of the drivers whose driving licenses are suspended continue to drive through the suspension." As the Safety Board has stated previously, greater emphasis needs to be placed on the enforcement of driver license suspensions at all levels of the criminal justice system and at all levels of government.

^{16/} "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," Recommendations H-77-25 through 31.

^{17/} "Analysis of Driver Reaction to Warning Devices at a High-Accident Rural Grade Crossing" by R. E. Russell, prepared for the Indiana State Highway Commission and the Federal Highway Administration, August 1974.

^{18/} Alcohol and Highway Safety - A report to the Congress from the Secretary of Transportation, August 1968, DOT No. 90-34, Washington, D.C. 20402.

^{19/} Traffic Offense Sentencing Processes and Highway Safety, Volume 1, Summary Report, DOT-HA-4-00970, April 1977, NHTSA.

The Safety Board recognizes that the resources of local and State law enforcement agencies are limited and that all traffic laws cannot be enforced all of the time. For years progressive law enforcement agencies have practiced selective enforcement wherein resources are assigned to high hazard areas to enforce law violations that significantly contribute to accidents, fatalities, and injuries. This practice is also advocated by Highway Safety Program Standard No. 15, Police Traffic Services, 20/ and its supporting manual.

Both the State of Florida and Plant City law enforcement agencies should review their selective enforcement programs to assure that the proper emphasis is placed on these two accident-producing violations.

Traffic Mix At Grade Crossings

The flashing signal light is activated when trains approaching the crossing reach a point 2,808 feet east or west before the crossing. The elapsed time between the activation of the signals and the time the train reaches the crossing is inversely proportional to the train's speed. A passenger train traveling at 70 mph would activate the signals 27.4 seconds before reaching the crossing. A slower moving freight train traveling at 20 mph (29.4 fps) would require 1.5 minutes to reach the crossing after activating the signals. The Association of American Railroads 21/ recommends that "where the speeds of different trains on a given track vary considerably under normal operation, special devices or circuits should be installed to provide reasonably uniform notice in advance of all movements over the crossing." This same guideline is contained in the new Part VIII, Section 8C-5, Manual on Uniform Traffic Control Devices, Federal Highway Administration (April 1, 1977). The Turkey Creek Road crossing was not equipped with such a device. Technology is currently available to provide for a uniform advance warning time regardless of the speed of the approaching train.

As a result of its investigation of a grade crossing accident in Sacramento, California, 22/ on February 22, 1967, the Safety Board concluded that "there are many grade crossings where railroad operating conditions cause wide variation in signal warning times, false warnings, and unclear and misleading warnings. This results in motorists becoming excessively familiar with low-risk conditions that may change quickly, creating a 'booby-trap' situation. Familiarity breeds contempt for

20/ Highway Safety Program Standard No. 15, Police Traffic Services, December 1974, NHTSA. (Chapter IV Part III B, page IV-11)

21/ "Recommended Practices for Railroad-Highway Grade Crossing Warning Systems," Bulletin No. 7, published by the Communication and Signal Section, Association of American Railroads, 1974.

22/ "Railroad/Highway Accident Report: Southern Pacific Railroad Company Fruitridge Road Grade Crossing, Sacramento, California, February 22, 1967."

such warning devices and may encourage the motorist to make unsafe decisions to cross in the path of oncoming trains." The Safety Board further recommended "that the Department of Transportation include in its current and future study and action programs and expedite review of the significant problem of booby-trap crossings which may cause grade crossing accidents."

The fact that there are twice as many freight trains as passenger trains operating through the Turkey Creek Road crossing might be a factor in this accident. The variance in warning times may have influenced the driver's attitude and judgment, especially in her impaired state.

CONCLUSIONS

Findings

1. From the time the train's horn was sounded and the flashing signal light activated, the truckdriver had at least 15 seconds in which to perceive the train and stop.
2. The truckdriver could have seen the train clearly when her vehicle was still 400 feet from the point of impact, or 5.45 seconds away.
3. The truckdriver had sufficient time and distance to perceive the train, react to it, and brake the truck to a stop short of the crossing. However, the available time and distance left no margin for hesitation on the part of the truckdriver.
4. The train was traveling within its speed restriction on the approach to the crossing; the truck was reported to be 5 mph in excess of the posted speed limit.
5. Although the brake lights on the truck were activated momentarily before the collision, there was no indication that the driver intended to stop in response to warnings.
6. There was no evidence to indicate that either the train or truck experienced mechanical difficulty before the collision.
7. It was not possible for the train to be brought to a stop short of the crossing in the 1 second available.
8. The warning system at the crossing would have been enhanced by physical barriers, such as automatic crossing gates.
9. The driver was under the influence of alcohol to the extent that her ability to make sound judgments was impaired.

10. The mix of train traffic at the grade crossing may have adversely affected truckdriver's judgment of the proximity of the approaching train.
11. High priority should be given to safety improvements at rail/highway grade crossings on high-speed passenger train corridors.
12. All parties, both Government and industry, must combine their efforts to assure the systematic, appropriate safeguards at crossings on high-speed rail corridors.
13. Law enforcement agencies should review their selective enforcement programs to assure the proper emphasis is placed on failure to obey activated railroad signals, driving while under the influence of alcohol, and driving with a suspended license.

Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the pickup truckdriver, who was under the influence of alcohol, to stop short of the railroad tracks in response to the warnings of an approaching train and an activated railroad crossing flashing signal.

RECOMMENDATIONS

As a result of this investigation, the National Transportation Safety Board recommended that the Federal Highway Administration, the Federal Railroad Administration, Amtrak, the Seaboard Coast Line Railroad Company, and the Florida Department of Transportation:

"Cooperate to take necessary corrective action to reduce the high frequency of railroad/highway grade crossing accidents along the 240 miles of track between Jacksonville and Tampa, Florida. (Class II, Priority Action) (H-78-71)"

-- the city of Plant City, Florida:

"Cooperate with the Florida DOT and the Seaboard Coast Line Railroad to bring about the installation of the recommended reflectorized, lighted, automatic gates and cantilever flashing light signals and uniform warning signal timing devices at the Turkey Creek crossing in Plant City. (Class II, Priority Action) (H-78-72)"

"Install the required advance pavement markings on Turkey Creek Road on both approaches to the railroad/highway grade crossing. (Class II, Priority Action) (H-78-73)"

"Relocate the advance railroad/highway grade crossing warning signs on Turkey Creek Road 250 feet before both approaches to the grade crossing as required by the Manual on Uniform Traffic Control Devices. (Class II, Priority Action) (H-78-74)

"As part of its Operation Lifesaver program, emphasize in its selective traffic law enforcement program grade crossing warning signal violators and those who drive while under the influence of alcohol or drugs. (Class I, Urgent Action) (H-78-75)"

-- the National Highway Traffic Safety Administration:

"Evaluate and report to the Safety Board those alcohol counter-measures that the NHTSA found to be practical and effective for the reduction in the number of alcohol-involved drivers. (Class II, Priority Action) (H-78-76)"

-- the State of Florida:

"Encourage State-level participation in and high-priority implementation of an effective and continuous Statewide Operation Lifesaver railroad/highway grade crossing and selective law enforcement programs. (Class II, Priority Action) (H-78-77)"

-- the Florida Department of Transportation:

"Insure that the improvement plans for upgrading the Turkey Creek Road railroad/highway grade crossing, as well as all crossings on the 240 miles of track between Jacksonville and Tampa, Florida, include provisions for uniform warning times for various train speeds in conformity with the American Association of Railroads and the Federal Highway Administration guidelines. (Class II, Priority Action) (H-78-78)"

-- The Seaboard Coast Line Railroad Company:

"Cooperate with the city of Plant City, to expedite the installation of the recommended reflectorized, lighted automatic railroad/highway grade crossing gates and cantilever light signals at the Turkey Creek crossing in Plant City. (Class II, Priority Action) (H-78-79)"

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JAMES B. KING
Chairman

/s/ ELWOOD T. DRIVER
Vice Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ PHILIP A. HOGUE
Member

December 8, 1978