



Death in the line of duty...

A Summary of a NIOSH fire fighter fatality investigation

August 14, 2000

Motor-Vehicle Incident Involving Amtrak Train Claims Life of Career Fire Fighter/Engineer - North Carolina

SUMMARY

On March 17, 2000, a 31-year-old male career fire fighter/engineer (the victim) died after the apparatus (Truck 1) that he was driving collided with an Amtrak train at a railroad crossing. The victim was returning to the station after his apparatus, along with others, was cancelled when the alarm was determined to be false. Responding in addition to Truck 1 were Squad 1, Engine 2, Engine 11, Engine 1, Squad 3, and Battalion Commander (BC-1). Engine 2, the first unit on the scene at a commercial structure, determined the alarm was false and cancelled all responding units. Engine 1 was returning to the station with Truck 1 and Squad 1 following when Truck 1 and Squad 1 turned onto another road. Truck 1, followed by Squad 1, stopped behind a civilian vehicle on the west side of a railroad crossing consisting of three sets of tracks. The safety gates at the crossing were down, the warning lights were activated, and a freight train was moving slowly on the tracks. Squad 1 decided to take an alternate route back to the fire station. The freight train stopped after it cleared the crossing to wait for a

signal ahead. Truck 1 started to go around the first safety gate and over the track (see Diagram). Witness #1, in a vehicle behind Truck 1, saw a tanker car at the end of the freight train that obstructed the northbound view of the tracks, and he heard a train whistle. Witness #2, waiting in a vehicle on the east side of the crossing, saw a southbound Amtrak train approaching. He also saw Truck 1 driving around the first safety gate, so he honked his horn and flashed his headlights to warn the driver of the Amtrak train. Truck 1 continued around the safety gate and traveled into the path of the train, which struck the truck's left front corner and the bucket of the aerial ladder. The victim was ejected, landing behind the truck's left rear dual wheel. He was killed instantly.

NIOSH investigators concluded that, to minimize the risk of similar incidents, fire departments should

- **ensure fire fighters follow standard operating procedures (SOPs) and State motor vehicle codes for safely driving and operating emergency vehicles during emergency response and non-emergency travel**



Similar Amtrak Train Approaching Approximate Point of Impact

The **Fire Fighter Fatality Investigation and Prevention Program** is conducted by the National Institute for Occupational Safety and Health (NIOSH). The purpose of the program is to determine factors that cause or contribute to fire fighter deaths suffered in the line of duty. Identification of causal and contributing factors enable researchers and safety specialists to develop strategies for preventing future similar incidents. To request additional copies of this report (specify the case number shown in the shield above), other fatality investigation reports, or further information, visit the Program Website at:

<http://www.cdc.gov/niosh/firehome.html>

or call toll free **1-800-35-NIOSH**



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- ***ensure that all fire fighters who ride in emergency fire apparatus are wearing and belted securely by seat belts***
- ***consider attending an “Operation Lifesaver” education program in communities where there is a volume of railway traffic***

INTRODUCTION

On March 17, 2000, a 31-year-old male career fire fighter/engineer (the victim) died after the apparatus (Truck 1) that he was driving collided with an Amtrak train. The victim was returning from a false alarm. On March 20, 2000, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On March 31, 2000, two Safety and Occupational Health Specialists from the NIOSH, Division of Safety Research, investigated this incident. Meetings were conducted with a Chief Inspector from the U.S. Department of Transportation/Federal Railroad Administration (FRA), a Trainmaster representing the railroad, and a representative from the State Fire Marshal's office. Interviews were conducted with the city fleet maintenance mechanic, the Assistant Chief and a Battalion Commander of the department, and other fire fighters in the incident. Copies of photographs, training records, department SOPs, police report, witness statements, death certificate, and the FRA incident report were obtained. Photographs were taken of the incident site and the vehicle. The department involved in the incident serves a population of 126,000 in a geographic area of 60 square miles. The department has 10 fire stations and is comprised of 210 uniformed fire fighters. The incident occurred at a railroad crossing consisting of three sets of railroad tracks (see Photo #2) located approximately 1.6 miles from the fire station. The weather at the time of the incident was clear and dry and the temperature was approximately 57° F. Truck 1, a 1993 Pierce Arrow, had a 100-foot

ladder with an aerial platform. The vehicle's gross weight was 68,000 lbs. State law requires all city fire apparatus to be inspected annually by a certified inspector. Truck 1 had been inspected in December 1999. Maintenance records were reviewed and appeared to be adequate. The department requires all new fire fighters to complete Level I and Level II fire fighting training as recommended by the National Fire Protection Association (NFPA). In addition, all new fire fighters are required to be certified emergency medical technicians (EMT-D) and to have taken a Hazardous Materials Awareness and Operations course. The department also requires all fire fighters to have 240 hours of yearly refresher training. The victim had a current Class B driver's license. *Note: A Class B license is required by the State Department of Motor Vehicles for any single vehicle with a gross weight rating of at least 26,001 lbs.* The department requires drivers to have a Class A or B driver's license, Department of Insurance Emergency Vehicle Operations certification and driver/operator pumps/aerial certification, 2 years of active duty with the department, and the written approval of the personnel supervisor and the Battalion Commander. The victim's training records were up to date and sufficient. He had 12 years of career fire fighting experience with the department, 7 of those years as a certified driver. He also had 4 years of prior volunteer fire fighting experience.

INVESTIGATION

On March 17, 2000, Central Dispatch received a call for a commercial fire alarm. At 1811 hours, a fire fighter/engineer (the victim) from Station 1 responded in Truck 1 to the call approximately 2 miles from the station. Also responding from Station 1 and following behind Truck 1, per department protocol, was Squad 1 with two fire fighters. Additionally responding were Engine 2, Engine 11, Engine 1, Squad 3 and Battalion Commander 1 (BC-1). Engine 2, the first unit on the scene at 1816 hours, was advised by an occupant of the building



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that the alarm was false due to a malfunction of the system. At 1818 hours, Engine 2 cancelled all responding units. Squad 3, Engine 11, BC-1, Engine 1, Truck 1, and Squad 1 discontinued their response at 1818 hours and returned to their stations. En route to their station, Engine 1 observed Truck 1 followed by Squad 1. Truck 1, and Squad 1 turned onto another road to take a different route. Returning to their station, Engine 11 saw the train crossing warning lights ahead and decided to take an alternate route to avoid the train. Truck 1, followed by Squad 1, was returning to the fire station and came to the railroad crossing. The railroad crossing consisted of three tracks numbered from east to west: Yard Lead, No. 2 Main Track and No.1 Main Track (see Photo #2). The crossing was equipped with flashing lights and crossbucks mounted on cantilever signals with safety gates mounted on ground mast signals equipped with bells (see Photo #1). Truck 1 came to a complete stop on the west side of the tracks behind a civilian vehicle which was waiting at the railroad crossing. The warning devices were operating with the safety gates down and lights and bells activated. A freight train was moving north on the No.1 Main Track. Squad 1 noted the train and the delay so the driver of Squad 1 flashed his headlights to the victim to let him know they were going to make a left turn and take an alternate route through a residential area to avoid the freight train. The victim acknowledged by waving his hand out the window. *Note: The department had a policy for backing fire and rescue vehicles which stated that drivers should avoid backing a vehicle whenever possible. When backing was necessary the use of a spotter (or guide) was required. If one was unavailable, the driver should exit the vehicle and perform a 360-degree visual check around the vehicle prior to backing.* As Squad 1 proceeded on the alternate route, at an intersection a fire fighter riding as a passenger looked down the tracks and saw Truck 1 still waiting behind the civilian vehicle waiting for the freight train to pass. *Note: It*

is not known what happened prior to the incident to the civilian vehicle in front of Truck 1, whether it turned around or went around the safety gates ahead of Truck 1. The freight train had 103 cars. It was heading slowly northbound on No.1 Main Track to switch to the north end of the yard. The freight train cleared the crossing and stopped, awaiting a signal. Note: The event recorder of the lead locomotive for the freight train indicated that the train came to a stop at approximately 1825 hours. A civilian (Witness #1) in a vehicle directly behind Truck 1 watched the fire truck start to go around the first safety gate and over the track. Note: During interviews, it was suggested that on occasion in the community where this incident occurred, as well as other places in the United States, motorists would disregard the railroad crossing safety gate by going around it. This practice was done because of past instances when trains would trip and activate the crossing safety gate and warning devices although they had cleared the intersection. The activations would occur because of trains stopping and waiting during switching operations within the approach control circuits. The crossing safety gates and warning devices would be activated for long periods of time (e.g. half an hour to several hours), perhaps giving motorists the impression of false activation. At the time of this incident the crossing warning system circuitry detected train occupancy and did not allow the gates to be raised or the flashing lights to be extinguished if rail equipment was occupying any part of the approach circuits. On April 5, 2000, new grade crossing control equipment was installed. The newly installed equipment detects train occupancy and the speed of the approaching rail equipment to make a calculated determination of proper warning time. If a train stops short of the grade crossing, the control equipment will allow the gates to be raised and the flashing lights to be extinguished. The new equipment was installed



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as part of a scheduled program of signal system upgrades. There is no indication that the department condoned going around railroad safety gates or that drivers engaged in that practice prior to this incident. Witness #1 stated that a tanker car on the end of the freight train obstructed the northbound view of the tracks; however, he could hear a train whistle. Note: Inspection of Truck 1 after the incident revealed that the mechanical levers which raise and lower the driver's manually operated window were in the raised position and the control knob of the air conditioning system was at the maximum position with the fan control set on low. Another civilian (Witness #2) was waiting in his vehicle across the tracks on the east side of the railroad crossing. He reported seeing an Amtrak train heading southbound on the No. 2 Main Track. Note: The Amtrak train consisted of two locomotives, four mail cars, one baggage car, three coaches, two sleepers, one dining car, and six roadtrailers. Witness #2 stated that as Truck 1 moved forward to go around the first safety gate, he started honking his horn and flashing his headlights to warn Truck 1 about the oncoming Amtrak train. Truck 1 continued traveling through the railroad crossing. The engineer on the Amtrak train reported that he did not see Truck 1, only a flash of white just prior to impact. Note: Manufacturer specifications indicated that the white aerial platform in the stored position on Truck 1 extended 5 feet, 4 inches beyond the front bumper of the truck cab. The Amtrak train made contact with the bucket of the aerial ladder and the left front corner of Truck 1 (see Diagram and Photo #3). After impact Truck 1 continued to travel and came to rest approximately 74 feet south of the point of impact and west of the No.1 Main Track. The Amtrak train listed eastward on impact but did not derail. It continued to travel with the lead locomotive stopping approximately 459 feet south of the point of impact (see Photo #4). The victim was ejected from Truck 1 and came to rest at the back of Truck

1's left rear dual wheel approximately 61 feet south of the point of impact, and approximately 10 feet west of the No.1 Main Track. The event recorder data from the Amtrak train revealed the train speed was 30 mph and the emergency brake application was initiated at approximately 1829 hours. None of the Amtrak passengers or crew members were injured. Witness #1 called 911 to report the incident. Engine 11, Engine 1, Squad 1, Squad 3, Squad 5, Rescue-1 and BC-1 were dispatched at 1831 hours, and at 1832 hours the county emergency medical service (EMS) was also dispatched. Squad 1 responded to the incident with two fire fighters and arrived on the east side of the railroad tracks at 1834 hours. They conducted a quick size-up and radioed all responding units the location of Truck 1 and which side of the tracks to approach. Rescue-1 arrived on the scene at 1835 hours with two fire fighters and blocked the street on the east side of the tracks. At 1836 hours, the county EMS arrived. Squad 1 turned around to get to the west side of the tracks and while en route, the county EMS advised on the radio that the victim was dead. Fire fighters from Squad 1 and Rescue-1 walked up to Truck 1, which was sitting parallel to the railroad tracks. The front of Truck 1 was facing south and the 100-foot ladder was estimated to be angled at 45 degrees from the truck bed. They found the victim and reconfirmed that he had no pulse. Engine 1 arrived on the scene with a Lieutenant and a fire fighter. The Lieutenant stayed at the engine and assisted the police department with securing the area. Engine 11 arrived on the scene with a Captain and three fire fighters. The Captain from Engine 11 checked under Truck 1 to investigate a leak and found it was from a broken water line on Truck 1. Fire fighters from Engine 1 and Engine 11 laid a 5-inch supply line from a hydrant to Engine 1 and stood by. BC-1 arrived on the scene and a fire fighter from Rescue-1 advised him of the situation. At 2003 hours the county EMS transported the victim to the local hospital.



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CAUSE OF DEATH

The medical examiner listed the cause of death as multiple blunt force injury from the fire truck/train collision.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Fire departments should ensure fire fighters follow standard operating procedures (SOPs) and State motor vehicle codes for safely driving and operating emergency vehicles during emergency response and non-emergency travel.^{1,2,3,4}

Discussion: Following SOPs for safely driving fire department vehicles during emergency response and non-emergency travel should include specific criteria for maintaining appropriate vehicle speed, crossing intersections, traversing railroad grade crossings, and using emergency warning devices. Such procedures for emergency response and non-emergency travel should emphasize that the safe arrival and the return of fire department vehicles is the first priority. The motor vehicle code in the state where the incident occurred addresses issues related to railroad crossings in a regulation entitled *Obedience to Railroad Signals*. The regulation states that whenever any person driving approaches a railroad grade crossing, the driver of the vehicle shall stop within 50 feet, but not less than 15 feet, from the nearest rail of railroad and shall not proceed until he can do so safely. Some requirements that apply are (1) a clearly visible electrical or mechanical signal device gives warning of the immediate approach of a railroad train; and (2) no person shall drive any vehicle through, around, or under any crossing gate or barrier at a railroad crossing while the gate or barrier is closed or being opened or closed. The department in this incident has SOPs for vehicle response safety. One of the items within vehicle safety addresses travel across railroad crossings during emergency and non-emergency travel. Drivers are required to come to a complete stop at all unguarded

grade crossings and are to assure that it is safe to proceed before crossing. Drivers are also required to use caution when approaching and crossing any guarded railroad crossing during emergency response or non-emergency travel. The department's policy did not address the issue of going around railroad safety gates. The department also has a policy regarding the backing of fire and rescue vehicles which directs drivers to avoid backing fire and rescue vehicles whenever possible. When backing is necessary, the department requires the use of a spotter (or guide) to help direct the driver. If a spotter (or guide) is unavailable, the driver should exit the vehicle and perform a 360-degree visual check around the vehicle to locate obstacles before backing. It is believed that since the victim did not have a spotter (or guide), he did not attempt to back Truck 1 so he could take an alternate route to avoid the train.

Recommendation #2. Fire departments should ensure that all fire fighters who ride in emergency fire apparatus are wearing and belted securely by seat belts.^{1,4,5}

Discussion: Fire fighters make many life-and-death decisions during a tour of duty, and one of the most important is snapping on a seat belt after climbing aboard an emergency apparatus that has been called to respond. The fire department involved in this incident had an SOP which required the use of seat belts while riding in fire department vehicles. Also, a memorandum, dated May 23, 1999, to all department safety officers from the city where the incident occurred reminded all city employees that the use of seat belts is required by city policy as well as the State of North Carolina in the operation of vehicles. The victim was not wearing his seat belt and was ejected from the truck.

Recommendation #3. Fire departments should consider attending an "Operation Lifesaver" education program in communities where there is a volume of railway traffic.⁶



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Discussion: Operation Lifesaver is a nonprofit, nationwide public education program designed to eliminate collisions, deaths, and injuries at highway-rail intersections and on railroad rights-of-way. It is sponsored cooperatively by a wide variety of partners, including federal, state, and local government agencies, highway safety and transportation organizations, and the nation's railroads. Highway-rail grade crossings present a unique traffic environment for motorists. According to the Operation Lifesaver Program, driver inattention and impatience are the most common factors contributing to collisions between motor vehicles and trains. Operation Lifesaver strives to increase public awareness about the danger at places where roadways cross train tracks and on railway rights-of-way. The 27-year-old program is having an impact on drivers. Since the program began in 1972, the Federal Highway Administration has credited Operation Lifesaver and its safety partners with saving 10,000 lives and preventing 40,000 injuries. Information can be obtained about Operation Lifesaver by calling 800-537-6224.

REFERENCES

1. National Fire Protection Association [1997]. NFPA 1500, Standard on fire department

occupational safety and health program. Quincy, MA: National Fire Protection Association.

2. National Fire Protection Association [1998]. NFPA fire department occupational health and safety handbook. Quincy, MA: National Fire Protection Association.

3. North Carolina Motor Vehicle Code, NCRC 20-142.1, Obedience to Railroad Signal.

4. U.S. Department of Transportation, Federal Rail Administration, Memorandum-R3-04-2000, April 24, 2000.

5. Dunn V [1992]. Safety and survival on the fireground. Tulsa, OK: PennWell.

6. Operation Lifesaver, Alexandria, Virginia, www.oli.org

INVESTIGATOR INFORMATION

This investigation was conducted by Nancy T. Romano and Kimberly L. Cortez, Safety and Occupational Health Specialists, NIOSH, Surveillance and Field Investigations Branch, Division of Safety Research.



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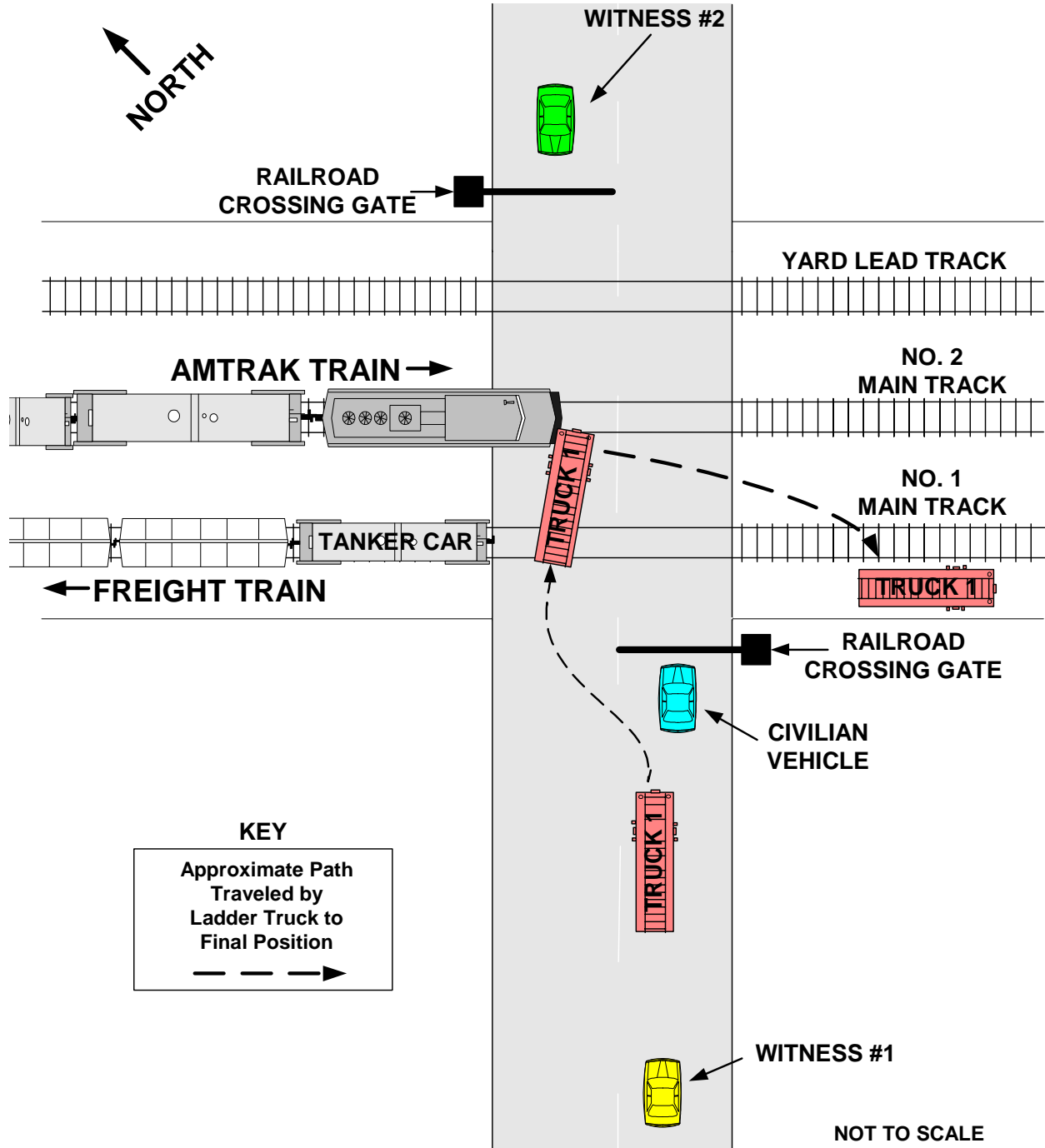


Diagram. Aerial View

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Photo #1. Railroad Crossing Gate at Incident Site.

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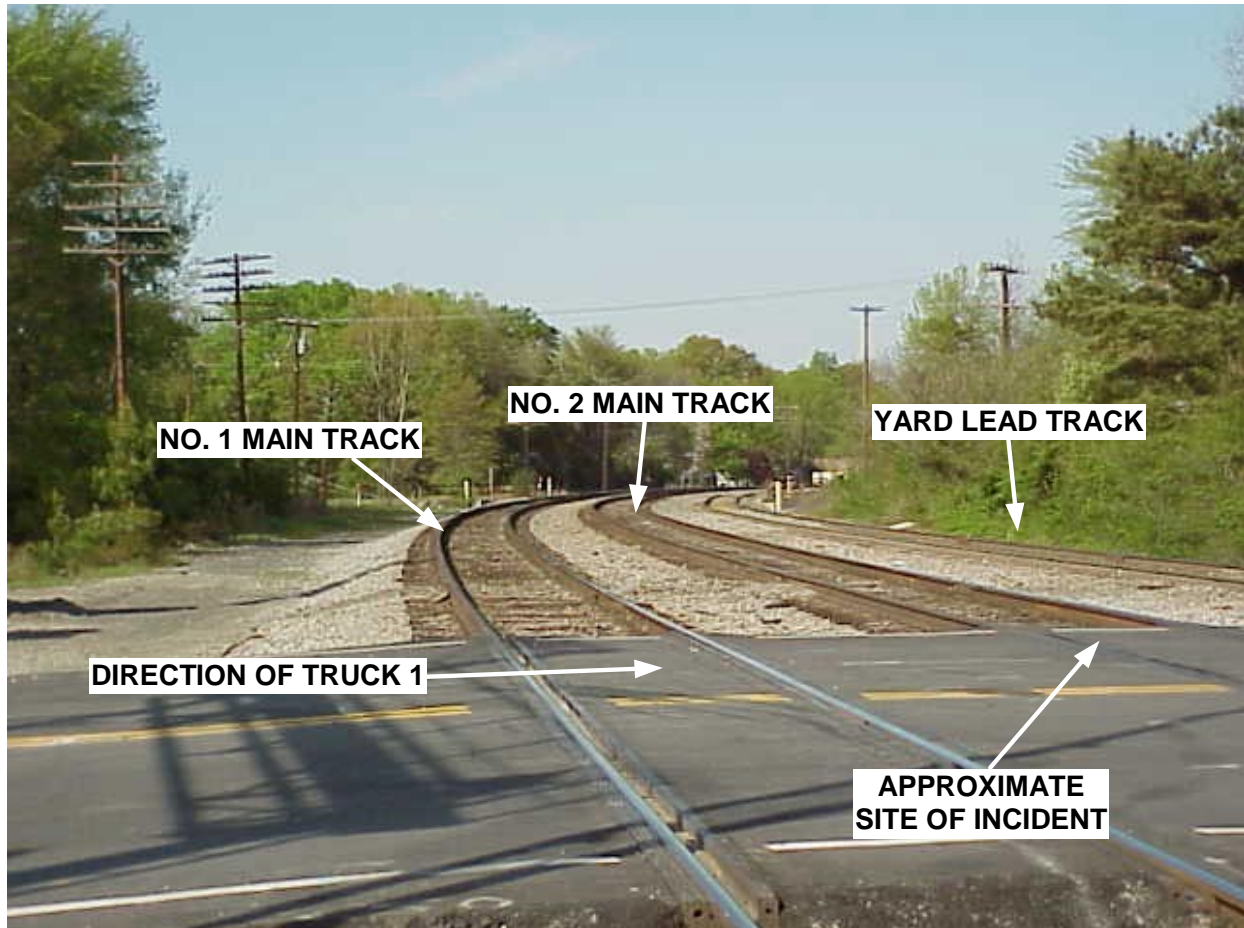


Photo #2. Highway-Grade Crossing Where Incident Occurred

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Photo #3. Ladder Truck (Truck 1) Involved in This Incident.

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Photo #4. Amtrak Train Involved in This Incident.