U.S. Department of Transportation
Federal Railroad Administration

2006 RAILROAD EMPLOYEE FATALITIES:

CASE STUDIES AND ANALYSIS

Office of Safety
Washington, DC 20590

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OVERVIEW OF 2006 RAILROAD EMPLOYEE FATALITIES

EXECUTIVE SUMMARY

This document, entitled "2006 Railroad Employee Fatalities: Case Studies and Analysis," was developed to promote and enhance awareness of many unsafe behaviors and conditions that typically contribute to railroad employee fatalities, and is intended to assist railroad industry stakeholders in their efforts to prevent similar tragedies.

This document contains the following materials:

- Narrative reports which provide in-depth coverage of 2006's railroad employee fatalities, helping readers to visualize the accident scene and chain of events leading up to the fatalities, and the post-accident investigation process;

- ***Summaries, preceding each narrative report, which highlight important elements of each <u>individual</u> fatality, particularly the possible contributing factors (PCFs).*** This format allows the reader to walk through and analyze each fatality scenario, identifying ways the fatalities could have been prevented. PCFs are expressed as brief narrative statements such as "The rail cars that struck the Conductor were set in motion by a mismatch coupling."

  The summaries also list Selected Factors which identify where and when the individual fatalities occurred, particulars about the fatally injured parties (i.e. age, years of service, training, and certification where applicable), craft and positions of the other workers, and major activities of fatally injured employees at the time of the incidents;

- ***Overall findings for the 2006 fatalities (see Pages 2-7)*** which identify ***who*** the ***<u>majority</u>*** of fatally injured employees were (i.e. craft, job position, age group, and years of service); ***what*** most were doing at the time of the incidents; ***when*** most were fatally injured (i.e. time of year and time of day); ***where*** most incidents occurred (i.e. type of railroad); and most importantly, ***why*** most fatalities occurred in terms of ***PCFs***; and

- Bar and pie charts ***(Appendices A through I)*** which illustrate the above findings.

<u>COMPLEXITY OF FATALITIES</u>

Fatalities usually resulted from a chain of events or the errors of more than one individual, as revealed by the PCFs for each fatality. ***In 2006, approximately 72 percent of all fatalities had three or more PCFs. Approximately 43 percent had five or more PCFs. Fatalities ranged in complexity from only one PCF to six PCFs.***

As an example, Report FE-13-06 describes a complex fatal incident in which a Conductor was fatally struck by on-track equipment while attempting to apply a hand brake on moving equipment, during a switching operation. The incident involved the following six PCFs, which reveal several errors, including systemic problems, which resulted in the fatal incident:

- The Conductor violated a railroad operating rule by stepping between moving rail equipment in an attempt to make an adjustment;

- The rail cars that struck the Conductor were set in motion by a mismatch coupling;

- In non-compliance with railroad operating rules, the Conductor used a brake stick to apply a hand brake on a rail car with a bent brake wheel;

- The Conductor failed to apply a hand brake to both rail cars involved in the incident, in non-compliance with the railroad's operating rules, which require one hand brake for one car and two hand brakes for two cars;

- The Conductor had received no training by the railroad in the operation of the brake stick;
  and

- The railroad's efficiency testing did not include compliance with railroad rules regarding getting on and off equipment or use of the brake stick.

FINDINGS

WHO were most of the fatally injured employees?

- ***Craft: Transportation and Engine Employees***

  In 2006, Transportation and Engine (T&E) employees represented 50 percent of railroad employee fatalities, followed by Maintenance of Way (MOW) and Maintenance of Equipment (MOE) employees at approximately 21.5 percent each. In 2006, Signal and Train Control employees had no fatalities. Total fatalities included one fatality injured Patrol Officer, who was counted in the Other category.

  (See Appendix A, 3-D pie chart entitled "2006 Railroad Employee Fatalities By Craft.")

- ***Position: Conductors***

  In 2006, approximately 29 percent of all fatally injured employees were Conductors. Fatally injured Car Inspectors, ranking a close second, represented approximately

22 percent of the year's total fatalities, and Brakemen represented approximately 14 percent. Fatally injured employees also included an MOW supervisor, Patrol Officer, Spike Puller Operator, Ticket Agent, and Trackman.

(See Appendix B, stacked bar chart entitled "2006 Railroad Employee Fatalities by Craft and Position.")

- ***Experience: 21 years and over***

  Most fatally injured employees in 2006 (approximately 43 percent) were very experienced with 21 plus years. Employees with 0-5 years of experience and with 11-20 years each represented approximately 21.5 percent of the year's total fatalities. Employees with 6-10 years of experience represented approximately 14 percent.

  (See Appendix C, stacked bar chart entitled "2006 Railroad Employee Fatalities: Years of Service by Craft.")

- ***Age Range: 46-55 years***

  In 2006, 50 percent of all fatally injured employees were concentrated in the 46-55 year range, with employees in the 36-45 year range representing approximately 36 percent of the year's total fatalities. The remaining employees, with 26-35 years and 56-65 years, respectively, each represented approximately 7 percent of total fatalities.

  (See Appendix C, cluster bar chart entitled "2006 Railroad Employee Fatalities: Age Ranges by Craft.")

WHAT were most of the fatally injured employees doing when they were fatally injured?

- ***Activity: Switching***

  In 2006, approximately 43 percent of fatally injured employees were involved in switching, and approximately 14 percent were fatally injured while replacing cross ties. Other activities in which employees were fatally injured in 2006 included re-railing a derailed train, ticketing office duties, rail car repair, transport of ties, surveillance of a railroad station, and traveling to the job site.

  (See Appendix D, stacked bar chart entitled "2006 Railroad Employee Fatalities by Craft and Activity.")

WHERE did most of the railroad employee fatalities occur?

- ***Type of Railroad: Class I Freight Railroads***

  In 2006, approximately 64 percent of all railroad employee fatalities occurred on Class I freight railroads, approximately 29 percent on Class II and III railroads, and approximately 7 percent on commuter/passenger railroads. These railroad categories employed approximately 78 percent, approximately 11 percent, and approximately 11 percent of the nation's total railroad employees, respectively.

  (See Appendix E, 3-D bar [cylinder] chart entitled "2006 Railroad Employee Fatalities by Type of Railroad.")

WHEN did most of the fatalities occur?

- ***Season: Summer***

  According to the U.S. Naval Observatory, seasonal equinoxes for 2006 occurred as follows: spring, March 20; summer, June 21; fall; September 23; and winter, December 22.

  In 2006, approximately 43 percent of all fatalities occurred in the summer, approximately 36 percent in the fall, approximately 14 percent in the winter, and approximately 7 percent in the spring.

  (See Appendix F, pie chart entitled "2006 Railroad Employee Fatalities by Season of Year.")

- ***Time of Day: Day by a Large Margin***

  Data of the U.S. Naval Observatory, Astronomical Applications Department, provided the precise times for sunrise and sunset for the specific dates and locations of the fatalities. To distinguish fatalities which occurred during daylight from those which occurred during darkness, this analysis employs the definitions of "day" as at sunrise to sunset, and "night" as immediately after sunset until sunrise. In 2006, approximately 79 percent of the fatalities occurred during the day and approximately 21 percent during the night.

  (See Appendix F, pie chart entitled "2006 Railroad Employee Fatalities by Time of Day.")

WHY did most of the fatalities occur?

- ***Major three PCF Categories in descending order:***

  Train Operation and Human Factors
  Miscellaneous Contributing Factors
  Mechanical and Electrical Failures

- ***Most PCFs: Train Operation/Human Factors[1]***

  - In 2006, 50 percent of all PCFs to the year's fatalities were Train Operation/Human Factors, followed closely by approximately 46 percent which were Miscellaneous Contributing Factors[2].

  - In 2006, the remaining approximately 4 percent of all PCFs were Mechanical and Electrical Failures. Specifically, they included a coupler mismatch (high/low), and unsafe equipment (i.e. a cutting torch that was too short to repair the track safely).

(See Appendix G, 3-D pie chart entitled "2006 Railroad Employee Fatalities: Major Possible Contributing Factor Categories.")

<u>Break-down of Train Operation & Human Factors</u>

- ***Of all the Train Operation & Human Factors in 2006, two sub-categories predominated: General Switching Rules; and Improper or Lack of Hand, Train, or Radio Signals, at approximately 21 percent each.***

  General Switching Rules included unsafely riding rail equipment during a switching operation; stepping between moving equipment to make an adjustment; failure to keep a careful lookout (for rail equipment on adjacent tracks and close clearances) while riding the step of the locomotive; and failure to provide the Engineer with car lengths or distance to travel.

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1 Train Operation and Human Factors included non-compliance with general switching rules; improper or lack of hand, train, and radio signals; train handling problems; employee's condition; improper use of brakes; speed; Miscellaneous Factors/MP&E (placing oneself under rail equipment unsafely secured), and Miscellaneous Human Factors/Track (fouling the track with rail equipment or one's person).

2 Miscellaneous Contributing Factors included unprepared employees, highway accident factors, systemic problems, homicide, environmental conditions, and grade crossing accident factors.

Improper or lack of hand, train, and radio signals included failure to stop the movement after receiving an unclear radio communication; failure to sound the train horn upon approaching rail equipment ahead on the same track; improper use of hand and radio signals; failure to initiate an emergency radio transmission, and radio communication losses during a switching operation.

- The sub-categories, Train Handling Problems and Miscellaneous Human Factors, Track, each ranked second at approximately 17 percent each.

  Train handling problems included failure to stop within ½ the range of vision short of Roadway Workers and rail equipment occupying or fouling the track; failure to stop the movement when the Conductor disappeared from sight; stopping rail equipment abruptly without advising the Machine Operator following the movement; and failure to maintain a safe distance behind other moving, on-track equipment.

  Miscellaneous Human Factors, Track included failure to stay outside the fouling limits of a hump yard track; leaving cars or engines standing where they would foul equipment on adjacent tracks; fouling the track while standing in front of moving equipment; and fouling the track while unsafely dismounting rail equipment.

- Employee's Condition and Improper Use of Brakes each ranked third at approximately 8 percent each.

  Employee's condition included impairment by alcohol and marijuana, and impairment by barbiturates.

  Improper Use of Brakes included use of a brake stick to apply a hand brake on a rail car with a bent brake wheel; and inadequate number of hand brakes applied.

- The remaining sub-categories, Speed and Miscellaneous Human Factors, MP&E, represented approximately 4 percent each of all Train Operation and Human Factors. Speed included a train exceeding the speed limit. Miscellaneous Human Factors, MP&E included placing one's body under rail equipment that was improperly and unsafely secured by blocking.

(See Appendix H, cluster bar chart entitled "2006 Railroad Employee Fatalities: Train Operation & Human Factors Involved.")

Break-down of Miscellaneous Contributing Factors

- ***Two sub-categories predominated: Grade Crossing Accident Factors at approximately 32 percent of all PCFs, followed by Unprepared Employees at approximately 23 percent, together over half of all Miscellaneous Contributing Factors.***

  Grade Crossing Accident Factors included a motorist's inattentiveness; high volume of truck traffic, increasing the likelihood of a collision; failure of a motorist to obey a STOP sign at a grade crossing; failure of a train crew to stop near a specific grade crossing, per the railroad's rules, and make sure all was clear before proceeding; the close proximity of the train's STOP sign to the previously mentioned grade crossing; and failure of a train crew to stop and provide a flag man to direct motorists at a specific grade crossing without functioning automated warning devices.

  Unprepared Employees included inadequate briefings, lack of training, and inadequate supervision.

- ***Ranking third, Highway Accident Factors, Systemic Problems, and Environmental Conditions each represented approximately 14 percent of all Miscellaneous Contributing Factors.***

  Highway Accident Factors included losing control of a vehicle, close or no clearance to walk along the driver's side of the vehicle, and speeding by the motorist.

  Systemic Problems included inadequate compliance monitoring of riding inside the end sills of ore cars, a common practice of the railroad's employees; inadequate compliance monitoring of radio transmissions; and inadequate efficiency testing that excluded getting on or off equipment and use of the brake stick.

  Environmental Conditions included unstable footing created by taconite pellets at the accident site; and poor visibility due to poor artificial lighting at night.

- The remaining fatality resulted from homicide, specifically a gunshot wound.

(See Appendix I, 3-D angled bar chart entitled "2006 Railroad Employee Fatalities: Miscellaneous Contributing Factors.")

INDIVIDUAL SUMMARIES AND REPORTS

(FE-01-06 THROUGH FE-24-06)

SUMMARY FOR FE-01-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Burlington Northern Santa Fe Corporation (BNSF)
Location: Tacoma, Washington
Region: 8

Month: February
Date: Feb. 7, 2006
Time: 2:09 p.m., PST

Data for Fatally Injured Employees(s)

Car Inspector
55 years old
25 years of service
Last rules training: July 21, 2005
Last safety training: Feb. 25, 2002
Last physical: Dec. 16, 2005

Data for All Employees (Craft, Positions, Activity)

Craft: Maintenance of Equipment

Positions:

BNSF Mechanical Crew No. 1
Fatally injured Car Inspector
Foreman

BNSF Mechanical Crew No. 2
Foreman
Car Inspector

Mountain Pacific Rail, Inc. Crew (Contractors)
Contractor Foreman
Contractor Mechanical Employee

BNSF Train QDENTAC1
Crew members not specified
(This was the train that derailed.)

SUMMARY FOR FE-01-06 CONTINUED
SELECTED FACTORS CONTINUED

Activity

A contractor crew, employed by Mountain Pacific Rail, Inc., was engaged in re-railing a derailed train while two BNSF crews provided oversight and guidance. The incident occurred during the jacking/lifting phase of the operation.

EVENT

A Car Inspector was fatally injured by a sudden, unexpected movement of on-track equipment while a derailed train was being re-railed by contractors, with oversight and guidance by BNSF staff.

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The fatally injured Car Inspector violated railroad operating rules when he placed his body under the rail equipment during the jacking/lifting process without first taking safety precautions such as making sure the equipment was supported by approved stands or blocking, the equipment had been lowered back onto the trucks with proper blocking from truck to car body, or the jacks were returned to their lowered position.

PCF No. 2

Investigation findings revealed that railroad operating rules, which required additional job briefings when work conditions changed, were not followed. This resulted in communication failure between the BNSF Mechanical Foreman, the MPR Foreman, and the fatally injured BNSF Car Inspector. Job conditions changed when the rail car would not sit back down in the bolster.

PCF No. 3

Investigators concluded that a longer cutting torch, at least 65 inches long, may have provided railroad workers the ability to cut the center pin while providing a safer placement for the fatally injured Car Inspector.

PCF No. 4

The fatally injured Car Inspector, on his own initiative, got the wheel truck into position next to the rail car, lit the torch, crawled under the rail car, and cut the center pin. The BNSF Mechanical Foreman failed to stop the Car Inspector in time to apply critical safety rules.

REPORT:	**FE-01-06**		
RAILROAD:	Burlington Northern Santa Fe Corporation (BNSF)		
LOCATION:	Tacoma, Washington		
DATE & TIME:	Feb. 7, 2006; 2:09 p.m., PST		
EVENT[1]:	A Car Inspector was fatally injured by a sudden, unexpected movement of on-track equipment during a jacking/lifting operation while a derailed train was being re-railed.		
EMPLOYEE:	Craft:	Maintenance of Equipment (MOE)	
	Occupation:	Car Inspector	
	Age:	55	
	Length of Service	25 years	
	Last Rules Training:	July 21, 2005	
	Last Safety Training:	Feb. 25, 2002	
	Last Physical:	Dec. 16, 2005	

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Feb. 7, 2006, at 7 a.m., the BNSF Mechanical Car Inspector went on duty at the car repair shop in Tacoma, Washington. Mechanical craft employees routinely start their work shift at 7 a.m. and end the shift at 3 p.m. The employee was part of a 2-man crew assigned to a repair truck (wheel truck) to make repairs to rail equipment not located in the repair shop. The crew's assignment was to travel to Centralia to make a repair. When passing Olympia, the crew members received a radio communication from Tacoma's Foreman Car Inspector about a derailment and were ordered to return to Tacoma.

At approximately 9:55 a.m., BNSF Train QDENTAC1 derailed one empty railroad car, CNA 712876 (B-end), while pulling westward into the Log Yard Lead at Tacoma**.** The derailment occurred on the geographic east end of the Log Yard near Switch No. 1 and Switch No. 2. The train comprised 31 empty auto racks on the head end of the train and 37 loaded inter-modal cars on the rear of the train. The train was 7,016 feet long, weighed 4,544 tons, and had four locomotives. The Log Yard is a storage yard located geographically south of the BNSF main track.

[1] "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

Heavy equipment was going to be needed to re-rail the car and at approximately 11:30 a.m., Mountain Pacific Rail Inc. (MPR), a contract company, was called to re-rail car CNA 712876. At approximately 1 p.m., personnel from MPR arrived at the Log Yard with their equipment and began the re-railing process. The wheel truck crew had been called to the location to assist other BNSF Mechanical Forces. *A general job briefing took place between the contractor crew and the BNSF crews***.** The contractor would re-rail the car and BNSF mechanical forces (two Foremen and two Car Inspectors) would stand by in case there were any problems with the re-railing job.

Using a tractor/boom machine similar to a D-8 Cat equipped with a side boom, the MPR attempted to re-rail the car. When lifted, the railroad car rolled toward the Cat in an eastward direction. The MPR maneuvered the rail car back into position, through the use of a pick-up truck and chain, which better positioned the rail car for lifting. At approximately 2 p.m., MPR personnel placed the B-end of the rail car back on the track. The contractor then encountered a problem: the car body center plate would not fit back down into the truck bolster bowl. Several attempts were made by moving the rail car from side to side, forward and back, without success. The rail car body was then raised upward between one and four inches, through the use of the tractor/boom, allowing the car body center plate to rise and clear the truck bolster bowl. At that point, the MPR Foreman, a BNSF Mechanical Foreman, and Car Inspector had a brief discussion about the center pin. The MPR Foreman and BNSF Mechanical Foreman were kneeling under the B end of the rail car body on the outside of axle 1 discussing the situation and how the rail car might shift. The Car Inspector went to the wheel truck and positioned it along side the B-end of the rail car. He then pulled out an Oxy/Acetylene torch setup. The employee lit the torch and assumed a position underneath the rail car between the L-2 wheel and the center sill above axle 2. The second BNSF Foreman, BNSF Mechanical Worker and MPR Worker were standing next to the wheel truck. The MPR truck driver was in the cab of the truck chained to the A end of the rail car and the MPR tractor/boom operator was at the controls of the machine.

At this time, the weather was cloudy, and the temperature was 50° F.

THE ACCIDENT

The MPR Foreman and BNSF Mechanical Foreman were kneeling under the B end of the rail car body on the outside of the axil, discussing the situation and how the rail car might shift. The two Foremen noticed the Car Inspector starting to cut the center pin. The MPR Foreman moved to tell the employee to stop, and the BNSF Foreman yelled to get the Car Inspector's attention. Before the MPR Foreman and the BNSF Foreman could warn the Car Inspector about the potential for the rail car to shift under stress, the employee cut the center pin. As soon as the pin was cut, a loud bang occurred, and the car body shifted approximately 12 to 18 inches, pinning the employee between the inside of the L-2 wheel and center sill of the car body. Workers realized something was wrong, and the MPR Foreman ordered the tractor/boom operator to move the machine forward, enabling the rail car body to shift in a northward direction. This allowed workers to pull the employee out from under the rail car. The second BNSF Mechanical Foreman called emergency 911 at 2:22 p.m., and an ambulance arrived on the scene at approximately 2:30 p.m. The Car Inspector was transported to St. Joseph's Hospital in Tacoma Washington where he was pronounced dead at 2:53 p.m. The cause of death was a blunt head injury with basilar skull fracture.

POST-ACCIDENT INVESTIGATION

Post-accident toxicological testing of the deceased was not performed because this accident did not meet 49 CFR, Subpart C, post-accident toxicological testing criteria. A blood alcohol test was performed by the Pierce County Medical Examiner; the results were negative.

BNSF has an in-house understanding at the Tacoma Mechanical Department that when a contractor is called to do work that would normally be done by craft employees, a Foreman or Supervisor from the railroad shall be present at the scene acting only in a passive role while the contractor actively performs the work. The railroad representative is an advisor to the contractor. On this date there were two Foremen accompanied by two Car Inspectors.

Rail car CNA 712876, a bi-level auto rack involved in the Feb. 07, 2006 incident at the BNSF Log Yard in Tacoma, Washington, was fitted with temporary wood blocks to keep the rail car supported on the truck and moved to the BNSF mechanical shop Tacoma, Washington. On Feb.14, 2006, BNSF performed a mechanical inspection on rail car CNA 712876 and examined the center pin. An FRA MP&E inspector was present during tear-down inspections of both (A) and (B) trucks.

Inspections revealed the rail car was equipped with Double Locking Center pins on both ends of the rail car. The portion of the center pin located in the car body center plate had a rectangle retainer through the top portion of the center pin with one bead of weld prohibiting the retainer from being dislodged from the center pin. The center pin was pushed up inside the car body center plate, requiring a 90-degree twisting of center pin to lock in place in the center plate sill housing.

The bottom portion of the center pin that rested in the truck bolster bowl of the rail car's truck had a slot through the center pin. A flat rectangle retainer with a spring clip bolted to the retainer held it in place when installed through the center pin. Installation of the retainer was done through the center ribs of the truck bolster below the center plate where a housing existed that allowed the center pin to rest in the truck bolster, preventing the pin from dropping down even if the retainers were not installed. The bottom retainer could only be installed or removed in a manner that was parallel to the truck bolster.

Inspection of both sides of the rail car revealed no stencils or decals indicating the rail car was equipped with double locking center pins.

The car was raised by floor jacks to the approximate height of two to four inches between the center plate of the car body and the bolster bowl of the truck. Wood blocking previously installed when the rail car was moved from the scene to the BNSF car shop was removed. Blocks were installed on each side of the truck bolster bowl between each side-bearing cage to obtain a better view of the center pin area. The Contractor Foreman in charge of the re-railing process on Feb. 07, 2006 was able to view the distance the rail car was raised off of the truck and verify it was the same height as on the day of the incident. The Contractor Foreman verified several times that the rail car was positioned at the approximate height he remembered. The distance between the center plate of the car body and the bolster bowl of the truck was approximately two to four inches. An inspection from each side of the B-end truck and the left and right sides of the rail car revealed several views of the center pin in the locked upper position. Directional views from the left and right sides of each side of the bearing cage on each side of the car looking towards the center pin may have provided for the use of a long-handled cutting torch. Measurements taken at the L-2 wheel position from the center pin and the outside edge of the rail car was approximately 60 inches.

Analysis and Conclusions

In violation of railroad operating rules, the fatally injured Car Inspector placed his body under the rail equipment during the jacking/lifting process without first taking safety precautions such as making sure the equipment was supported by approved stands or blocking, that the equipment had been lowered back onto the trucks with proper blocking from truck to car body, or that the jacks were returned to their lowered position. The fatally injured employee also violated railroaded operating rules prohibiting him from walking, standing, or working under a suspended load, and requiring him, when working near lifting operations, to keep clear of the swinging boom, counterweight, or cab.

Investigation findings revealed that railroad operating rules, which required additional job briefings when work conditions changed, were not followed. This resulted in a communication failure between the BNSF Mechanical Foreman, the MPR Foreman, and the BNSF Car Inspector. Job conditions changed when the rail car would not sit back down in the bolster. A job safety briefing between all parties would have been instrumental in preventing the fatal incident. Both BNSF Mechanical Foremen were terminated as supervisors and were given the opportunity to return to the mechanical department as craft workers.

A cutting torch at least 65 inches long may have provided railroad workers the ability to cut the center pin while providing a safer placement for the Car Inspector. Following the incident, BNSF purchased four cutting torches with handles over 60 inches in length.

The BNSF Car Inspector acted on his own initiative to get the wheel truck into position next to the rail car, light the torch, crawl under the rail car, and cut the center pin. The BNSF Mechanical Foreman did not stop the BNSF Car Inspector in time to apply critical safety rules.

APPLICABLE RULES

BNSF Railway Company Mechanical Rules and Policies
Effective Oct. 30, 2005, including revisions up to Dec. 14, 2005

S-1.0 Core Safety Rules

These rules provide a core of safe work practices for BNSF employees. The rules apply every day and in every job we do. They will guide and direct us in maintaining a safe work environment.

S-1.1 Job Safety Briefing

Employees must participate in a job safety briefing before beginning work and when work or job conditions change. The briefing includes a discussion of the general work plan, existing or potential hazards, and ways to eliminate or protect against hazards. Outside parties or contractors involved in the work area must be included in the job safety briefing.

S-10.1 Raising Equipment

When raising equipment:

Block the wheels before raising the end of the equipment.

Do not place any part of your body under or directly alongside the equipment at any time during the jacking/lifting process unless the equipment is (a) supported by approved stands or blocking, or (b) the equipment has been lowered back onto the trucks with proper blocking from truck to car body, or (c) or the jacks are returned to their lowered position.

Stands must be certified and stenciled with the rated capacity.

Use the proper tongs to remove or position center pins on the cars.

Use cushioning material between the jack and equipment to prevent slipping. Wood cushioning material must not exceed one inch in thickness. Do not allow metal-to-metal contact.

S-17.5 Restrictions Near Hoisting Equipment

S-17.5.1 Working Near Equipment

Do not walk, stand, or work under a suspended load. When possible, avoid walking, standing, or working under crane booms, or in close proximity to pile driver leads.

When working with or near lifting operations, keep clear of the swinging boom, counterweight, or cab.

SUMMARY FOR FE-03-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Burlington Northern Santa Fe Corporation (BNSF)
Location: Berwyn, Illinois
Region: 4

Month: March
Date: March 3, 2006
Time: 5:45 a.m., CST

Data for Fatally Injured Employee(s)

Ticket Agent
58 years old
40 years of service
Last rules training: None
Last safety training: October 2004
Last physical: Unknown

Data for All Employees and Others (Craft, Position, Activity)

Craft: Transportation and Engine

Positions:
Ticket Agent
Automobile Driver (not associated with the railroad)

Activity

A Ticket Agent was performing office duties as the time of the incident.

EVENT

A Ticket Agent was fatally injured when struck by a collapsing building.

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

An automobile driver lost control of his vehicle and crashed into the building where the Ticket Agent was working.

REPORT:	**FE-03-2006**	
RAILROAD:	Burlington Northern Santa Fe Corporation (BNSF)	
LOCATION:	Berwyn, Illinois	
DATE & TIME:	March 3, 2006; 5:45 a.m., CST	
EVENT[1]:	A ticket agent was fatally injured when struck by a collapsing building.	
EMPLOYEE:	Craft:	Transportation and Engine
	Occupation:	Ticket agent
	Age**:**	58
	Length of Service:	40 years
	Last Rules Training:	None
	Last Safety Training:	October 2004
	Last Physical:	Unknown

CIRCUMSTANCES PRIOR TO THE ACCIDENT

A Ticket Agent reported for duty at 5:30 a.m. on March 3, 2006. The was her scheduled reporting time at the Berwyn, Illinois train station. At the time of the accident, the employee was in her office performing her regular duties.

THE ACCIDENT

At approximately 5:45 a.m. on March 3, 2006, an out-of-control automobile struck the southeast corner of the train station. This impact caused the brick wall to collapse onto the employee, fatally injuring her.

POST-ACCIDENT INVESTIGATION

The Coroner's report stated the cause of death was multiple injuries. The driver of the automobile was subsequently arrested and charged for the incident. He was originally charged with leaving the scene of an accident. Other charges were pending as of this report.

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1 "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

Analysis and Conclusions

An investigation by the Berwyn Police Department and BNSF concluded that the driver lost control of the automobile and crashed into the train station, causing the employee fatality.

APPLICABLE RULES

There are no rules that applied to this incident.

SUMMARY FOR FE-04-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Lake Superior & Ishpeming Railroad Company (LSI)
Location: Palmer, Michigan
Region: 4

Month: April
Date: April 2, 2006
Time: 6:30 a.m., EST

Data for Fatally Injured Employee(s)

Conductor
51 years old
11 years of service
Last rules training: March 23, 2006
Last safety training: March 22, 2006
Last physical: Oct. 7, 1999
Last relevant efficiency test: None in previous three years

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

Tilden Mine Assignment Crew
Conductor
Locomotive Engineer
Student Locomotive Engineer

Activity

Switching

EVENT

A Conductor was fatally injured when struck by on-track equipment during a switching operation.

SUMMARY FOR FE-04-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Conductor fell off the car he was riding during a switching operation. Analysis of the train's event recorder revealed a decrease in speed from 9 ½ to 8.2 mph just prior to the fatal incident, which could have caused slack action on the east end of the train, possibly causing the Conductor to lose his hold on the car he was riding.

PCF No. 2

The Locomotive Engineer failed to comply with Federal regulations regarding radio communications when he failed to stop the switching movement after receiving unclear communications from the Conductor.

PCF No. 3

Of the seven Conductors randomly interviewed during the investigation, six stated they routinely rode inside the end sills of ore cars. However, railroad records clearly indicated no safety observations were conducted by railroad management for compliance with railroad safety rules regarding this activity.

PCF No. 4

Railroad management failed to adequately monitor radio transmissions for compliance with railroad operating rules and Federal regulations.

PCF No. 5

At and near the accident site, taconite pellets (imperfectly round balls of iron ore, about ½ inch in diameter), created unstable footing for the Conductor and may have contributed to the fatal incident.

PCF No. 6

Visibility at the time of the incident was not optimum. It was still dark, as sunrise did not occur until 6:28 a.m. There were mercury vapor lights on poles located in line about 225 feet apart. The line of poles was about 30 feet to the south of the site. In addition, there were two flood lights on the top of the pellet bin nearby. Although there was artificial lighting on 30 foot poles and atop a nearby ore bin, all attached reports indicate that the darkness prevented a clear and visible work area.

REPORT:	**FE-04-2006**	
RAILROAD:	Lake Superior & Ishpeming Railroad Company (LSI)	
LOCATION:	Palmer, Michigan	
DATE & TIME:	April 2, 2006; 6:30 a.m., EST	
EVENT[1]:	A Conductor was fatally injured when struck by on-track equipment during a switching operation.	
EMPLOYEE:	Craft:	Transportation and Engine
	Occupation:	Conductor
	Age:	51
	Length of Service:	11 years
	Last Rules Training:	March 23, 2006
	Last Safety Training:	March 22, 2006
	Last Physical:	Oct. 7, 1999
	Last Relevant Efficiency Test:	None in Previous Three Years

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The crew of the 11 p.m. Tilden Mine assignment reported for duty at the Eagle Mills, Michigan crew welfare building on April 1, 2006, at 11 p.m., EST. The crew comprised a Conductor, Locomotive Engineer, and Student Locomotive Engineer. All had been off duty at least 16 hours prior to that date and time. The three crew members held a job safety briefing at about 11 p.m., where they discussed the work to be done that evening. Neither the Locomotive Engineer nor the Student Locomotive Engineer took any exception to their fellow crew member's condition nor their fitness for duty.

The LSI Railroad utilizes a daily "Mark Up Board" wherein train and engine service employees request the assignment they desire for the following day. The assignments are then assigned according to employees' seniority. In the above sense, there are no "Regular Assignments" on the LSI. All three of the above employees were aware on March 31, 2006, that they would be working at 11 p.m.on April 02, 2006. The Conductor, Locomotive Engineer, and Student Locomotive Engineer had 11, 8, and 7 years experience, respectively. The LSI is a small

[1] "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

railroad with only 28 train and engine service employees. Therefore, they each had worked the Tilden Mine assignments many times, and were very familiar with the assignment as well as the physical characteristics of the trackage.

The crew made several switching movements at Eagle Mills Yard, made a trip to the Tilden Mine, located in Palmer, Michigan, and returned to Eagle Mills. At about 4 a.m., EST, on April 2, 2006**,** the crew coupled to 120 ore empties. The crew ascertained that the brakes were set and released on the rear car, and they departed at about 4:30 a.m. on the westward trip to Tilden Mine. The distance between Eagle Mills Yard and Tilden Mine is 7.7 miles. The Student Locomotive Engineer operated the train from Eagle Mills to Tilden Mine. The crew members had two locomotives, LSI 3003 and SI 3000. The 3003 was facing west, and the 3000 was facing east.

They pulled onto the “Main Line” at Tilden Mine. The Conductor uncoupled the 60 head cars, and they moved these 60 cars to pocket number one. At this time, the Locomotive Engineer relieved the Student Locomotive Engineer as the operator of the engine consist. He was now operating from the LSI 3000, which was the east locomotive, the locomotive closest to the cars. They then pulled the remaining 60 cars to the west, and stopped west of the west switch of the south stockpile track.

Both locomotives were equipped with a radio, and both worked properly. The Conductor carried a portable radio equipped with a remote microphone in the pocket of his overalls. He had the remote microphone affixed to his clothing in the collar area. The Conductor’s radio worked properly.

The Tilden Mine yard consists of 10 tracks, which basically run east and west, both compass direction and railroad direction. The fifth track from the south is the south stockpile track. The south stockpile track is 3,712 feet long. The grade is about 1.4 percent descending from west to east. There is a slight curve to the right (the south) about in the middle of the track. Near the east end of the curve, on the north side of the track, began a stockpile of taconite pellets, which are an imperfectly round ball of iron ore, about one-half inch in diameter. This material creates an unstable surface underfoot because of the product’s unique “marble like” configuration. This pile of taconite continued to the east end of the track where the ground is flat, and completely covered with these pellets.

The weather was clear, with 10 miles visibility, the temperature was about 28° F, and the wind was out of the southwest at about 5 mph. It was still dark out at the time of the accident. Sunrise was 6:28 a.m. There were mercury vapor lights on poles located in line about 225 feet apart. The line of poles was about 30 feet to the south of the south stockpile track. In addition, there were two flood lights on the top of the pellet bin nearby. The footing was poor, due to taconite pellets covering the ground. Although there was artificial lighting on 30 foot poles and atop a nearby ore bin, all attached reports indicate that the darkness prevented a clear and visible work area.

THE ACCIDENT

The crew's intention was to shove these 60 cars up to, but not couple onto, the standing cars on the east end of the track. After stopping west of the west south stockpile track switch, the Conductor lined the switch for the south stockpile track. He then radioed the Locomotive Engineer that it was OK to shove ahead 120 car lengths. He added the words, "I'm with you." The Locomotive Engineer stated that this meant that the Conductor was on the cars, prepared to shove ahead. At this point, the locomotives were on the west end, and the leading car of the shoving movement was the east car. The shoving movement would be from west to east. The crew referred to this as a "Shove ahead," because the locomotive that the Locomotive Engineer was operating was headed east. The east car of the 60 cars was LSI 1507. The "A" end was east.

The Locomotive Engineer began to shove east. According to the event recorder on locomotive LSI 3000, the time was 6:20 a.m. The Locomotive Engineer was at the controls of locomotive LSI 3000, on the right hand side of the locomotive in the direction of movement. This was the south side of the locomotive. The Student Locomotive Engineer was seated on the fireman's side of locomotive LSI 3000, on the left hand side in the direction of movement. This was the north side of the locomotive.

The next radio transmission from the Conductor was that there were 50 car lengths to go. The Locomotive Engineer acknowledged that transmission. The next radio transmission from the Conductor was that there were 15 car lengths to go. The Locomotive Engineer felt that this transmission came too soon after the "50 car lengths to go" transmission. He didn't feel he had traveled that far yet. Cognizant of this, the Locomotive Engineer continued shoving about six more car lengths, and attempted to call the Conductor on the radio. There was no response, and he tried to call him again. Still, he continued shoving the cars. Again he received no response, and finally stopped the movement. After stopping, the Locomotive Engineer attempted to call the Conductor several more times on the radio. He received no response. According to the event recorder on locomotive LSI 3000, the time of the stop was 6:25 a.m. The event recorder on locomotive LSI 3003 depicted the stop at 6:20 a.m.

The Locomotive Engineer got off the locomotive, and walked easterly along the cars, on the north side. He saw the Conductor's hard hat lying on the north side. He then crossed over to the south side, because he was nearing the stockpile of ore pellets on the north side. As he reached the end of the cars, he found the Conductor lying (more or less wedged) between the wheels of the east truck of the east car, LSI 1507. The Conductor's head and upper torso were north of the north rail, and the rest of his body between the rails. They were not severed, which strongly suggests his body was pushed by the rail car truck frame. The Locomotive Engineer checked the Conductor for a pulse. There was none. A Tilden Mine employee called the Student Locomotive Engineer on the radio and requested he call an ambulance. The Student Locomotive Engineer radioed the LSI Eagle Mills Yard to call an ambulance. Emergency responders arrived quickly, and the Conductor was pronounced dead at 6:35 a.m.

POST-ACCIDENT INVESTIGATION

The investigation determined that no one, mine workers or LSI employees, witnessed the accident. Therefore, the exact location of the deceased prior to the accident will remain unknown. Evidence at the scene and investigative theorems were used to determine the probable location and cause of the accident.

At the time of the incident, the deceased was wearing an orange reflective safety vest, zipped up. Under the vest he wore a wool-lined Carhart jacket. Under the jacket he had a fleeced flannel shirt jacket. Under the jackets, he wore denim Carhart bib overalls. He wore Red Wing steel-toed work boots, with a definite heel. He was wearing ear plugs and hard hat liner when he was found.

At a point about 558 feet west of where the deceased was found, there were two impressions in the taconite pellets between the rails. These impressions may represent where the Conductor's feet or knees hit the ground. However, there is no conclusive evidence of that. A piece of watch band was laying north of the north rail and about four feet to the east of the impressions. Next, between the rails, was a portable radio with remote microphone. Next, north of the north rail, was a pair of safety glasses. Next, between the rails, was a lantern. Next, between the rails, was a switch key. Next, about 10 feet north of the north rail, was a hard hat. Next, north of the north rail, was a watch face. Lastly, north of the north rail, was a glove. The distance between the two imprints and the glove was about 88 feet. Throughout the area where the above items lay were several pieces of body tissue.

From the point where the above items were found to where the deceased was found, there was a rut in the ore pellets on either side of the north rail. These marks might be described as a "furrow" and were consistent with the deceased's body becoming wedged between the wheels and pushed along by the moving car the entire distance. The locations of the personal items, worn or carried by the deceased previously mentioned, are consistent with his body movement.

FRA conducted an inspection of the two locomotives and 60 cars involved in the shoving movement. That inspection revealed a total of 51 defects. There were 12 Freight Car Safety Standards exceptions, 26 Locomotive Safety Standards exceptions, 10 Safety Appliance Standards exceptions, and three Brake System Safety Standard exceptions. One of the Safety Appliance exceptions was on LSI 1507, the car that the Conductor was presumably riding, but not known for sure. That exception was a side handhold bent inward, on the "A" end of the car, on the right side. The side handhold measured a 1-inch clearance, and the minimum clearance allowed is two inches, preferably two and one-half inches.

In conjunction with the interviews of the surviving employees, FRA completed a Circadian Rhythms Questionnaire. Later, a Schedule Worksheet was completed for the two surviving employees. A Schedule Worksheet was also completed for the deceased.

FRA also completed a "Prescription and Over-The-Counter-Drugs" Questionnaire for the two surviving employees. The completed questionnaires were sent to FRA's Drug and Alcohol Program Manager, and are not attached to this report.

LSI employees field-tested the radio equipment involved in the incident. The radios tested were the radios on locomotives LSI 3000 and LSI 3003, and the portable handset used by the deceased. All tested as working properly. LSI had all three radios tested by an outside communications company, and no problems were found with any of them.

Two LSI managers conducted a behavior and appearance check on the two surviving employees for impairment signs and symptoms of impairment. This check was done on April 2, 2006 at 8:50 a.m. Everything appeared normal for both employees, and the observance was recorded on a Cliffs Michigan Mining Company "Drug and Alcohol Test for Cause Checklist." (The LSI Railroad is owned by Cleveland Cliffs.)

The south stockpile track was constructed of 132-pound jointed rail, with even joints. The ties were steel. LSI took elevation measurements of the north and south rail of the south stockpile track. The measurements were taken from a point 30 feet east of where the Conductor was found, and extending west, 765 feet.

A post-mortem examination of the deceased's remains was conducted on April 3, 2006. The Cause of Death was depicted as "Cervical fracture and massive abdominal/pelvic trauma, secondary to train accident." The Manner of Death was depicted as "Accidental."

The deceased's remains were tested in accordance with 49 CFR Part 219, Subpart C, Post-Accident Toxicological Testing. The results were negative. Due to confusion, lack of familiarity with Subpart C, Post-Accident-Toxicological Testing, and the trauma of the moment, LSI managers made a number of errors in conjunction with the testing of the two surviving crew members. However, these errors did not affect the post-accident toxicological testing's findings, which were all found to be negative. Specifics about testing procedures follow: FRA testing kits were not used for the urine collection or shipment of the urine specimens. However, the urine specimens were shipped to the laboratory used by FRA for Post-Accident Toxicological Testing. Form FRA F 6180.74 (Federal Railroad Administration Post-Accident Testing Blood/Urine Custody and Control Form) was not used for the surviving crew members. No blood specimens were collected from the surviving crew members. Both the urine tests and breath tests for the surviving crew members were negative.

Analysis and Conclusions

Although the handling of the toxicological testing required by Federal regulations under Subpart C, Post-Accident Toxicological Testing was not in full compliance with these requirements, the results were negative for the three employees tested, which included the deceased. Drug and/or alcohol impairment was not a factor in this incident.

The Conductor was born on Sept. 8, 1954. He was employed by LSI on June 8, 1994 as a laborer on the ore dock. On Oct., 14, 1999, he transferred to the Mechanical Department. On July 25, 2004, he transferred into train service. He had no discipline record. He had sustained two personal injuries. On Nov. 15, 1998, he pulled a muscle, and on March 7, 2001, he had sore ribs. There is a record of one operational test for the Conductor during the period of 2004, 2005, and 2006 up to April 2. That test was on Jan.11, 2006.

The Locomotive Engineer was born on Oct. 3, 1953. He was employed by LSI on April 22, 1998, but had worked about 20 years on other railroads prior to coming to LSI. He went into engine service in 1999. He passed his vision and hearing tests to enter into engine service. On June 30, 2005, he was given a 30-day suspension for failure to comply with instructions. There is a record of one operational test for the Locomotive Engineer during the period of 2004, 2005, and 2006 up to April 2. That test was on Jan. 30, 2006.

The Student Locomotive Engineer was born on Oct. 15, 1976. He was employed by LSI on May 3, 1995 as a summer laborer. He was hired full time on Jan. 20, 1999. He was promoted to Conductor on Oct. 3, 2003, and entered engine service in March, 2006. There is a record of two operational tests for the Student Locomotive Engineer during the period of 2004, 2005, and 2006, up to April 2. Those tests were on June 30, 2005, and January 13, 2006.

Examination of records for 2004, 2005, and 2006 revealed that all three employees had received periodic training and testing on operating rules. All three achieved passing scores on the above tests. Also, all three had received training and passed various examinations in conjunction with Locomotive Engineer training. In addition to the above training and testing of the employees involved, LSI also provided documentation of various "Safety Blitzes," such as fire extinguisher training, CPR training, and records of Job Safety Briefings which are required by the railroad of all train crews as they come on duty. There is no evidence to suggest that the employees involved in this accident lacked training or qualifications.

FRA reviewed the LSI operational testing records provided by the railroad for years 2004, 2005, and 2006, which included April 2, 2006, the day of the accident. In 2004, there were 21 tests conducted on 19 employees. In 2005, there were 21 tests conducted on 23 of the 28 Train and Engine Service Employees. In October 2005, a new Transportation Manager came to the LSI, and placed more emphasis on the operational testing program. The records for 2006 indicate that 46 employees were observed between Jan. 4, 2006 and April 2, 2006. There were no failures.

Some of these observations were conducted on employees more than once, which is understandable given the number of employees employed by the railroad. Notwithstanding, the LSI records indicate that only six observations were conducted for compliance with getting on or off engines or cars, and no observations for riding the end sills of rail cars. Of the seven Conductors randomly interviewed during the investigation, six stated they routinely rode inside the end sills of ore cars. In fact, the new Efficiency Test Form implemented by the new Transportation Manager has a specific observation for this safety rule. The observation is listed under *C Tests - Train Crew Observation Tests,* and is indicated as TT #12 pg 31 = Riding Equipment - Part D. Yet, LSI records clearly indicate no safety observations were conducted for compliance with this safety rule in any manner. This lack of management oversight for conducting safety observations may be a possible contributing factor to this accident.

Furthermore, the radio procedure utilized by the Locomotive Engineer during the shoving movement may not have been in compliance with Federal regulations, specifically, 49 CFR Part 220.49. The regulations require that "If the instructions are not understood, the movement shall be stopped immediately..." The engineer stated two times that he did not think he had shoved the rail cars that far during the shoving movement. The first time from 120 cars to 50 cars, and then 50 cars to 15 cars in such a short time span. Clearly, the instructions from the deceased to the Engineer were questionable at the time of the radio transmissions. However, the Engineer continued to shove the cars. Moreover, he continued shoving the cars after two unsuccessful attempts to contact the deceased by radio. Finally, after no response from the deceased, the Locomotive Engineer stopped the movement.

The efficiency testing data provided by the LSI indicates that during 2004, 2005, and 2006, there were no failures related to radio procedures. The LSI operating rule for monitoring of the radio is indicated as GCOR Rules 2.0, 2.20. Again, this lack of management oversight for monitoring radio transmissions for compliance with LSI rules as well as Federal regulations may be a possible contributing factor to this accident.

The Circadian Rhythms Questionnaire for the surviving employees did not reveal any issues which contributed to this accident. The Schedule Worksheets for the three employees documented that during the 10 days preceding the accident, the deceased had worked six shifts. During the same 10 days, the Locomotive Engineer had worked four shifts, and the Student Locomotive Engineer had worked eight shifts. Based upon the above, there is no evidence that fatigue played a role in this accident.

The Locomotive Engineer commented that the Conductor seemed tired that evening. However, neither the Locomotive Engineer nor the Student Locomotive Engineer took any exception to the Conductor's fitness for duty or alertness that evening.

Both locomotives were equipped with Bach-Simpson event recorders. There is a difference of four minutes and nine seconds between the times for each locomotive. In addition, prior to the LSI acquiring the locomotives, a modification had been made to cause the diesel to burn cleaner. That modification involved how rapidly the throttle position increased the speed of the diesel. Later, LSI had Bach-Simpson install the event recorders. Because of that modification, Bach-Simpson told LSI that the throttle position data would be compromised. As a result, the only throttle positions that are depicted in the data for these locomotives is zero, one, 7, 8, and a?(Question Mark). In addition, the event recorders used do not show distance traveled. Because LSI does not operate over 20 mph, a distance requirement is not required. Nevertheless, the data for the two locomotives coincides for the most part. During the last eastward move, the speed reached a maximum of 11.8 mph. Because of the grade, that speed was reached with little or no throttle. In fact, the Locomotive Engineer used three applications of the train brakes, and periodic applications of the locomotive brakes to control the speed.

Analysis of the data from the event recorder of locomotive LSI 3000 indicated that at 06:23:47 the speed decreased from 9 ½ mph to 8.2 mph. This decrease in speed may have caused slack action on the east end of the train. The computation of distances based upon the speed and the time elapsed, suggest the slack action occurred about 617 feet from where the Conductor was found, and about 49 feet prior to where it is believed the Conductor hit the ground. (NOTE: this computation is not precise.) This slack action may have caused the Conductor to lose his hold on the car.

The LSI took elevation measurements of the south stockpile track. From those measurements, cross level variances were extrapolated. There were no FRA exceptions to cross level.

There was one safety appliance defect on the LSI 1507, insufficient side handhold clearance. This was the car that the Conductor was presumably riding. There is no evidence that this defect contributed to the accident.

APPLICABLE RULES

LAKE SUPERIOR & ISHPEMING RR CO
SAFE WAY MANUAL

MARCH 2001

REVISED JULY 2005

T-2Close Clearances

Departmental Safety Rules:

a. Always face in the direction of movement when riding cars, equipment, and locomotives
b. Stop movement and dismount before passing close clearances or other obstructions

T-7 Getting On and Off and Riding Cars, Equipment & Locomotives

Departmental Safety Rules:

a. Always face cars, equipment, and locomotives when mounting or dismounting.
b. Never step on the sliding center sill or cushion underframe device of any car. Keep off couplers and their components.
c. Always mount and dismount cars, equipment, and locomotives from the side, using the sill step and side ladder.
d. Mount and dismount moving cars, equipment, and locomotives only when permitted by special instructions or in an emergency.
e. Do not occupy the roof of cars.

T-12 Slack Action

Departmental Safety rules: none

Recommended work practices:

a. Always be prepared for unexpected movement due to slack action when riding on cars, equipment, and locomotives.
b. Remain seated when possible.

LAKE SUPERIOR & ISHPEMING RAILROAD COMPANY
TIMETABLE NO. 12
AND
SPECIAL INSTRUCTIONS
(INCLUDING GENERAL INSTRUCTIONS)
EFFECTIVE 12:01 AM APRIL 3, 2005
(EASTERN TIME)

D. **Getting on or off Cars and Engines:**

1. When practical to do so, employees must board or leave moving engines and cars on the engineer's side. Getting on or off engines or cars moving at any unsafe speed is prohibited.
***********(Indicates missing portions)
5. When riding steps or ladders of any equipment, have a firm grip with one hand before releasing the other hand.

H. **On or about Engines, Cars or Trains:**

3. When train is moving in yards or any place where it is known that it is likely to stop, reduce speed, or when slack action may occur, employees must have firm hand and foot holds and, if possible, must be seated in engines to avoid injury from sudden starts, lurches, or jerks.

5. Employees are prohibited from riding:

   B. On draw bars, brake beams, truck side frames, and brake wheels at any time. Employees may ride on end ladders and end sills of ore cars which are equipped with an air hose above the draw bar only for the purpose of controlling the movement through the use of air brakes.

6. When using ladders on cars or engines, employees must:

   A. Face the equipment.
   B. Keep feet turned slightly sideways.

C. Place maximum portion of ball of foot on ladder rung.
D. Hold body close to ladder.
E. Grasp a SEPARATE grab iron with EACH hand.

SUMMARY FOR FE-08-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Massachusetts Bay Commuter Railroad (MBAX)
Location: Gloucester, Massachusetts
Region: 1

Month: June
Date: June 22, 2006
Time: 3:10 p.m., EST

Data for Fatally Injured Employee(s)

Trackman
36 years old
7 years of service
Last rules training: May 31, 2005
Last safety training: March 16, 2006
Last physical: No Record
Last relevant efficiency testing: March 28, 2006

Data for All Employees (Craft, Positions, Activity)

Craft: Maintenance of Way (MOW)

Positions:

MOW Crew
(40 total MOW Employees)
16 Roadway Maintenance Machine Operators
Two Track Foremen
Remainder employees: Trackmen

Principal Employees
Fatally Injured Trackman
People Mover Operator
Clip Applicator Operator

Activity

Replacing cross ties

SUMMARY FOR FE-08-06 CONTINUED
SELECTED FACTORS CONTINUED

EVENT

A Trackman was fatally injured when struck by on-track equipment while replacing cross ties.

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The People Mover Operator failed to control the movement to permit stopping within ½ the range of vision short of Roadway Workers and rail equipment occupying or fouling the track. Following brake tests, investigators concluded that even with some oil on the rail, as had been observed by two MOW workers, the People Mover Operator had ample time to stop, avoiding the collision with the clip applicator.

PCF No. 2

The People Mover Operator did not sound the horn as he approached the clip applicator. (He told investigators that he could not find the horn.) It is possible that had the horn been sounded, the Trackman could have moved to a place of safety.

PCF No. 3

While the Clip Applicator Operator had not broken any operating rules and while his equipment was properly located at the time of the incident, the amount of alcohol estimated to be present in his body at the time of the incident suggests that he may have been adversely impacted in his ability to recognize an unsafe situation and take appropriate preventive action. In addition, depending on how recently he had used marijuana (he was positive at 84 ng/ml in urine), this drug as well may have contributed to any decrement in his judgment and/or performance.

REPORT: **FE-08-06**

RAILROAD: Massachusetts Bay Commuter Railroad (MBAX)

LOCATION: Gloucester, Massachusetts

DATE &TIME: June 22, 2006; 3:10 p.m., EST

EVENT[1]: A Trackman was fatally injured when struck by on-track equipment while replacing cross ties.

EMPLOYEE:

Craft:	Maintenance of Way
Occupation:	Trackman
Age:	36
Length of Service:	7 Years
Last Rules Training:	May 31, 2005
Last Safety Training:	March 16, 2006
Last Physical:	No Record
Last Relevant Efficiency Testing:	March 28, 2006

CIRCUMSTANCES PRIOR TO THE ACCIDENT

At 7:30 a.m., EST, on June 22, 2006, 40 MBAX Maintenance Employees reported for a regularly assigned shift at the commuter rail station in Manchester, Massachusetts (milepost 25.5). The 40-man gang was assigned duties replacing cross ties on the MBAX Gloucester Branch on Main Track No. 2.

The MBAX Gloucester branch begins at milepost 18.7 in Beverly, Massachusetts and extends geographically north and eastward, ending at milepost 35.3 in Rockport, Massachusetts. The Gloucester Branch consists of Main Track No. 1 and Main Track No. 2 with a maximum authorized speed of 65 mph for passenger trains. The timetable direction, which is used throughout this report, is east.

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1 "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

Shortly after reporting for duty, one of the two Foremen assigned to the gang gave a safety briefing, as required by the railroad. The Foremen discussed the daily safety rule and warned about fouling the adjacent track when getting on and off equipment. The gang was assigned 16 roadway maintenance machines. After the briefing, the Roadway Maintenance Machine Operators prepared their machines for the day's work.

At approximately 9:40 a.m., the Track Foreman was issued a NORAC Form D line 2 authority to operate east on Main Track No. 1 at Manchester. In accordance with Federal Roadway Worker Protection regulations, the Foreman then provided an on-track safety briefing explaining to the gang the limits of the Form D authority. The 16 roadway maintenance machines were then moved out of Manchester Yard onto Main Track No. 1.

At approximately 9:42 a.m., the Foreman was issued a NORAC Form D line 4 authority with Main Track No. 2 out of service between Manchester Crossover (milepost 25.6) and CP Wilson (milepost 31.0). The gang traveled east approximately 400 feet and crossed over to Main Track No. 2 at Manchester Crossover. They continued to travel east on Main Track No. 2 approximately 3 ½ miles, stopping at milepost 29.3 to start the tie replacement work. This work progressed eastward on Main Track No. 2.

During the tie replacement, the last three roadway maintenance machines involved in the work were a clip applicator, followed by a Kershaw personnel transport (people mover), and a Kershaw ballast regulator. The people mover is used to transport employees and supplies to and from the work location. **<u>Four Trackmen</u> were assigned duties setting clips on the tie plates ahead of the clip applicator.** The people mover was parked at milepost 29.3. **The <u>Ballast Regulator Operator</u> started working at the west end of the work location, replacing shoulder ballast from west to east.**

Each time the **Ballast Regulator Operator** arrived at the parked people mover, he would move it ahead to the clip applicator, then walk back to the ballast regulator and continue replacing ballast behind the gang working east. The process of moving the people mover ahead was a normal procedure which occurred several times throughout the course of the day.

At approximately 12:10 p.m., the gang stopped work for a 20-minute lunch period and then returned to work at 12:30 p.m.

At approximately 3:00 p.m., the tie replacement work had progressed eastward to milepost 30.1, 288 feet east of the Stanwood Avenue highway-rail grade crossing. Shortly after 3:00 p.m., the **<u>Clip Applicator Operator</u>** was the last of the Maintenance Machine Operators to arrive at this location and was waiting for the others ahead to move further east.

At some point prior to 3 p.m., the **<u>People Mover Operator</u>**, which was the second to last Maintenance Machine Operator in the group, moved east to milepost 30.0, which is 232 feet west of Stanwood Avenue crossing. The people mover was parked with the brakes applied and the engine at idle.

At approximately 3 p.m., the Ballast Regulator Operator, who was working west of Stanwood Avenue crossing, also finished working up to milepost 30.0, where the people mover had been parked earlier. This required the Ballast Regulator Operator to move the people mover east to the next machine ahead, which was the clip applicator. He boarded the people mover and began moving it east, where it entered a 2-degree, 35-minute curve on an 0.83 percent, descending grade. It continued to travel east on Main Track No. 2 for approximately 262 feet to the Stanwood Avenue crossing. According to an MBAX Foreman who observed the people mover pass over the crossing, the Operator approached the crossing slowly, waited for the crossing gates to come down, and then continued to proceed east.

According to the National Weather Service, the sky was overcast with no rain, the temperature was 81° F, and the wind was blowing from the south - southwest at 12 mph.

THE ACCIDENT

As the People Mover Operator passed over the Stanwood Avenue crossing, one of the four maintenance employees, assigned to set clips for the clip applicator, walked from the east end to the west end of the clip applicator and entered the gage of the track to get a clip from the rear of the machine. **As the Maintenance Employee stood behind the clip applicator, he was facing east with his back to the approaching people mover. The Clip Applicator Operator was sitting in the operator's seat facing east and was unaware of the approaching people mover. Immediately prior to the accident, the clip applicator was stationary with the engine in idle.**

The people mover passed over Stanwood Avenue crossing and traveled east 288 feet, striking the clip applicator and pinning the Trackman between the two machines. As a result of the impact, the clip applicator was shoved east about five feet. Three maintenance employees working east of the clip applicator jumped from the path of the clip applicator to avoid being struck.

Several Trackmen in the area heard the impact of the two machines and responded. As they arrived at the accident site, they found the people mover and the clip applicator locked together with a Trackman pinned between the two machines. Emergency calls were made to the **Train Dispatcher** by radio and emergency responders by telephone.

The Trackmen attempted to separate the two machines by pushing them, but they would not separate. At that point, the People Mover Operator stepped back from the scene and was then asked if he could operate the ballast regulator. The People Mover Operator responded that he was okay to move the ballast regulator and then took it to the West Gloucester Station. **Track jacks were then used to separate the two machines and free the injured Trackman. After**

the Trackman was freed, two of his co-workers applied pressure to his wounds to stop the bleeding.

When Gloucester Fire and Rescue arrived at the scene, they backed a truck onto Main Track No. 1 from Stanwood Avenue east to the accident location. The injured Trackman was moved west in the truck back to Stanwood Avenue crossing and was transferred into a waiting ambulance. He was then transported to Addison Gilbert Hospital in Gloucester, Massachusetts, where he was pronounced dead at 4 p.m. The People Mover Operator came back to the scene after the Trackman had been removed.

Emergency response personnel responding to the accident included Gloucester Fire and Rescue, the Gloucester Police, the Massachusetts State Police, and the MBTA Transit Police.

POST-ACCIDENT INVESTIGATION

According to the Massachusetts State Police, MBAX officials tested the brakes on the people mover on the day of the accident at the same location. The test was conducted under the same conditions that existed when the accident occurred, except that the speed during the test was estimated at between 10 and 12 mph. The speeds during this test were estimated because the people mover does not have a speedometer. There was some evidence of oil spotting on the rail. The people mover stopped at a distance of 26 feet, 2 inches. The horn was also tested at this time and found to be operating properly.

On June 23, 2006, FRA conducted an inspection of the equipment involved in the accident. Photographs were taken of the people mover at Manchester Yard. It was observed that the people mover was permanently attached to a trailer. The weight of the people mover was stenciled on the side of the machine at 22,000 pounds. MBAX officials estimated that the weight of the trailer was 8,000 pounds. The trailer was connected to the people mover with a draw bar and two air lines to supply air to the brakes on one of the two axles on the trailer. The brakes were inspected and showed no evidence of unusual wear. There was no evidence of any visible damage to the people mover as a result of the accident. According to the MBAX Maintenance Employee who initially operated the people mover to the work location on the day of the accident, the machine operated normally, and he took no exception to its condition. The people mover was in compliance with all applicable portions of the On-Track Roadway Maintenance Machine regulation.

Photographs were taken of the clip applicator which was located at Stanwood Avenue crossing adjacent to Main Track No. 2. The clip applicator was stenciled as weighing 4,700 pounds, a weight which exempts the machine from the requirements of the On-Track Roadway Maintenance Machine regulation.

On June 26, 2006, FRA investigators observed as MBAX officials conducted a second test of the brakes on the people mover. The test was conducted at 1:06 p.m., and the rail was dry with no evidence of oil on the rail. The brake test was near the location of the accident, east of Stanwood

Avenue crossing. The people mover was moved from Stanwood Avenue east, a distance of 118 feet at full throttle. The brakes were applied fully, and the people mover stopped in a distance of 29 feet, 7 inches.

FRA conducted 10 interviews of MBAX employees assigned to the production tie gang. These interviews revealed that the only witness to the accident was the People Mover Operator. All other members of the gang were working east of the accident location at the time of the accident. Four members of the gang who were working immediately east of the clip applicator heard the impact of the two machines. Three of those gang members had to jump from the track to avoid being struck by the clip applicator which was shoved east about five feet by the impact.

Six of the ten gang members interviewed stated that they had interacted with the People Mover Operator, the Clip Applicator Operator, and the deceased Trackman either during the job briefing or at some point prior to the accident. None of the six gang members took any exception to their physical condition. One gang member who was working near the clip applicator at the time of the accident observed seeing oil on the rail.

According to the People Mover Operator, the people mover was moved east to Stanwood Avenue crossing slowly. When the crossing gates came down, he continued moving the machine east. The throttle was set between 3/4 and full. He estimated his speed at 5 mph. He described the track from Stanwood Avenue east as being tangent with a slight descending grade. He also stated that there was vegetation, but it was not obscuring his view of the track. He said he could see quite a distance down the track; in fact, he could see the clip applicator which he estimated to be about 500 feet ahead. He couldn’t tell if it was standing or moving.

According to the People Mover Operator, as he approached the clip applicator, he applied the brakes on the people mover in sufficient time to stop short of the machine; however, the machine slid. He cut the throttle and dumped the air, but kept sliding. He stated he did not blow the horn because he could not find it. The people mover then impacted the clip applicator, pinning the Trackman between the two machines.

He stated that he observed oil on the rail after the accident occurred. He described this as a normal condition, as there were several other machines working ahead. The Operator said he took this type of track condition into account while moving the people mover and that on the day of the accident he was moving the machine without excessive speed and watching ahead.

According to the People Mover Operator, MBAX does have some operating rules that govern the operation of roadway maintenance machines. He stated that one specific rule requires stopping within one half the range of vision under normal conditions. The Operator stated that he wasn’t able to stop because the people mover was sliding due to track conditions.

49 CFR 214.313(a) states in part that each Roadway Worker is responsible for following the on-track safety rules of the railroad upon which the roadway worker is located.

On the day of the accident, the MBAX production tie gang was working with exclusive track occupancy on Main Track No. 2. MBAX Roadway Worker Protection Rule 321(d) and NORAC Operating Rule 133(d) require that all movements within out-of-service limits be made at restricted speed. NORAC Operating Rule 80(a) defines restricted speed and requires that Operators of roadway maintenance machines control their movements to permit stopping within one half the range of vision, short of other trains or railroad equipment occupying or fouling the track.

MBAX Roadway Worker Protection Rule 341(d) requires that a 10-foot clearance be maintained between two or more pieces of equipment unless otherwise instructed by the Employee-in-charge. Furthermore, MBAX Roadway Worker Protection Rule 341(e) requires that while equipment is in working mode, Roadway Workers must stay 10 feet from its working area unless otherwise specified by the Operator. According to the Clip Applicator Operator, the deceased did not notify him before he entered the10-foot zone behind the machine.

The People Mover Operator indicated that on the day of the accident, he was well rested and felt alert. He did not feel fatigued.

The People Mover Operator stated that he had 27 years of railroad service as a track inspector and Foreman for various railroads, including MBAX. He said that he had operated nearly all the different varieties of roadway maintenance machines and that he has operated the people mover nearly every day for approximately 10 years.

The People Mover Operator stated the he had received annual roadway worker protection training over the last 10 years; however, he also stated that he had received no formal training on operating roadway maintenance machines, only on-the-job training.

The Federal Roadway Worker Protection regulation requires that all Roadway Workers and Roadway Maintenance Machine Operators receive annual training. On August 15, 2006, FRA conducted a review of MBAX's annual roadway worker and roadway maintenance machine training program. The review determined that their program consisted of a power point presentation with 60 slides, four of which specifically addressed roadway maintenance machine training. Following the presentation, all participants were required to take and pass a 25-question test. The People Mover Operator, the Clip Applicator Operator, and the deceased Trackman all passed the required test.

In order for MBAX Maintenance Employees to become qualified to operate a specific roadway maintenance machine, they are required to receive on-the-job training. MBAX maintains a list of individuals who are designated as qualified to operate roadway maintenance machines. The list contains all of the railroad's roadway maintenance machines and each individual who is designated as qualified on each machine. MBAX qualification records indicated that the Clipper and the People Mover Operators were qualified to operate these machines. FRA's review of

MBAX's training and qualifications for Roadway Worker and Roadway Maintenance Machine Operators was in compliance with the Federal Roadway Worker Protection regulations.

On Sept. 1, 2006, FRA concluded a review of MBAX efficiency testing records for the time period of July 2003 through May 2006. The review included records for the Clip Applicator and the People Mover Operators, the two Production Tie Gang Foremen, and the deceased Trackman. The results of this review indicated that observations were conducted on all the maintenance employees. The records indicated that there were seven instances of non-compliance with MBAX Roadway Worker Protection rules and railroad operating rules. Two of these instances were recorded as a result of a collision that occurred on Nov. 1, 2004. The collision involved the People Mover Operator and occurred between two roadway maintenance machines. Although the collision occurred on November 1, 2004, the observations were not recorded until Nov. 26, 2004. There were two other instances of non-compliance recorded for the People Mover Operator on April 26, 2006. According to the Road Master who conducted these observations, these failures were entered into the database in error. The total number of tests conducted on these five individuals was 159, with eight valid failures.

Federal post-accident toxicological testing under 49 CFR Part 219 was performed on the deceased Trackman, since he was killed during an on-track movement. The results of this testing showed positive for a low concentration of marijuana in his blood. No urine or tissues from the deceased were tested by FRA.

Company post-accident toxicological testing was performed on the Clip Applicator Operator and the People Mover Operator, since neither performed Hours of Service Act functions. The test results of the Clip Applicator Operator showed positive at 0.025 percent for alcohol in breath and 84 ng/ml for marijuana metabolite in urine. The urine test results for the People Mover Operator indicated the specimen was negative, but it was significantly dilute.

After reviewing the accident investigation findings and the laboratory results, FRA alcohol and drug experts provided the following comments:

- Collectively, these findings are of significant safety concern. All three of these MOW workers tested positive for alcohol and/or illegal drugs, or provided a specimen that was so dilute that it was suspect.

- The deceased Trackman, the only person tested under Federal authority, had a parent THC level of 1.3 ng/ml in blood, but was negative (below cutoff) for the carboxyl metabolite. This finding suggests a residual level often found in persons who chronically and routinely use marijuana. However, this result provides insufficient toxicological evidence to determine whether the Trackman's previous use of marijuana caused a decrement of judgment or performance which contributed to his death.

- The Clip Applicator Operator tested positive on a company breath test for alcohol at 0.025 percent 90 minutes after this accident. Assuming that he had no opportunity to consume alcohol after the accident, his alcohol concentration should have been decreasing since the accident occurred. Using published values for the lower (0.009 percent/hour) and higher (0.029 percent/hour) extremes of ethanol elimination, his blood ethanol concentration would have been between 0.038 percent and 0.068 percent at the time of the accident. These extremes incorporate a 95 percent confidence level to the extrapolated value. Assuming also that the Operator did not consume alcohol while on duty, his estimated blood alcohol concentration was between 0.10 percent and 0.28 percent when he reported to work. This individual was also positive for marijuana metabolite at 84 ng/ml as measured in urine.

  While this Operator apparently did not break any operating rules and his equipment was properly located at the time of the accident, the amount of alcohol estimated to be present in his body at the time of the accident suggests that he may have been adversely impacted in his ability to recognize an unsafe situation and take appropriate preventive action. Although a urine test result does not reveal recency of use, it is also possible that the effects of his previous use of marijuana could have had an impact on his judgment and/or performance depending on when and how much of the drug he had used.

- The People Mover Operator provided a negative dilute specimen under employer authority. His specimen was diluted at a level that authorized his employer, under company policy, to call him back to provide another specimen to better assure the integrity of the test. To date, this Operator has not reported as required by the employer's Medical Review Officer for a re-collection of his specimen. The lack of a credible specimen and test result is a significant concern.

Analysis and Conclusions

Although the People Mover Operator indicated that there was vegetation along the right-of-way in the area of the accident, it was not obscuring his view of the track ahead. He stated that he could see quite a distance down the track and that he could see the clip applicator and the Trackman, estimated to be about 500 feet away.

On the day of the accident, the horn on the people mover was tested by MBAX officials. The test concluded that it was working as intended; however, the People Mover Operator did not sound the horn as he approached the clip applicator because he stated that he could not find it. It is possible that if the horn had been sounded, the Trackman could have moved to a place of safety.

It was determined that, because of its weight, the clip applicator does not fall under the requirements of the Federal On-Track Roadway Maintenance Machine regulation. However, FRA's inspection found no visible damage to the clip applicator as a result of the accident and found nothing that would have contributed to the cause or severity of the accident.

The people mover does fall under the requirements of the Federal On-Track Maintenance Machine regulation. FRA's inspection of this machine revealed that it was in compliance with all applicable portions of the regulation. Inspectors found nothing that would have contributed to the cause or severity of the accident.

FRA's investigation determined that the People Mover Operator received the required annual Roadway Worker Protection and roadway maintenance machine training. He was listed on MBAX's list of qualified employees to operate the people mover. In addition, it was determined that, during his 27 years of railroad service, the People Mover Operator had extensive experience operating the various roadway maintenance machines, including the people mover.

As a result of the brake tests that were conducted on the people mover, it can be deduced that on the day of the accident, the people mover, with a fully loaded trailer attached, would have needed a distance of approximately 26 to 30 feet to come to a stop. Both brake tests indicated that the People Mover Operator, even with some oil on the rail, had ample time to stop the machine prior to impacting the clip applicator, as he stated he had a clear view of the clip applicator and the deceased Trackman at least 500 feet prior to impact.

Although it was determined that the deceased Trackman violated MBAX's Roadway Worker Protection Rule 341(e), in that he did not notify the Operator prior to stepping into the 10-foot foul zone behind the machine, it was determined that his non-compliance did not play a role in the cause or severity of the accident. This rule is in place to protect maintenance employees from being struck by their own equipment. The clip applicator was stationary; therefore, it was not a threat to the Trackman. Although prior notification is required by the carrier, it would not have changed the position of the Trackman.

As stated above, collectively the findings of the post-accident drug and alcohol tests are a significant safety concern. All three of the MOW workers tested positive for alcohol and/or illegal drugs, or provided a specimen that may not have been consistent with human urine.

The deceased Trackman, the only person tested under Federal authority, had a parent THC level of 1.3 ng/ml in blood, but was negative for the metabolite. This finding suggests a residual level often found in persons who chronically or routinely use marijuana. However, this result provides insufficient toxicological evidence to determine whether the Trackman's previous use of marijuana adversely impacted his judgment or performance in a manner which contributed to his death.

Although there was some evidence that there was oil on the rail, the People Mover Operator stated that he considered this to be a normal condition and that he took this condition into account on the day of the accident by moving the people mover without excessive speed and by watching ahead. He also stated that he was aware of the restricted speed rule. These statements contradict another statement in which he said that he wasn't able to stop because the people mover was sliding due to track condition. FRA's investigation determined that the People Mover Operator was trained on MBAX's Roadway Worker Protection rules, as required by the Federal Roadway Worker Protection regulation.

The People Mover Operator did not comply with MBAX's Roadway Worker Protection Rule No. 341(d), which requires a 10-foot clearance be maintained between two or more pieces of equipment, unless otherwise instructed by the Employee-in-Charge. Further, it was determined that he did not comply with NORAC Operating Rule 133(d), NORAC Operating Rule 80, and MBAX's Roadway Worker Protection Rule 321(d), in that he was required to move at restricted speed and he did not control the movement of the people mover to permit him to stop within ½ the range of vision, short of the clip applicator occupying the track ahead, and the Trackman fouling the track ahead. The People Mover Operator's non-compliance with these rules is the probable cause of this accident.

49 CFR 214.313(a) states in part that each roadway worker is responsible for following the on-track safety rules of the railroad upon which the roadway worker is located. Therefore, the fact that the People Mover Operator did not comply with MBAX's roadway worker protection rules is also a violation of this Federal regulation.

APPLICABLE RULES

NORTHEAST OPERATING RULES ADVISORY COMMITTEE (NORAC) 8TH EDITION

EFFECTIVE JAN. 1, 2003

RULE 80. MOVEMENT AT RESTRICTED SPEED

Movements made at Restricted Speed must apply the following three requirements as the method of operation:

A. Control the movement to permit stopping within one half the range of vision short of:

1. Other trains or railroad equipment occupying or fouling the track;
2. Obstructions;
3. Switches not properly lined for movement;
4. Derails set in derailing position; and
5. Any signal requiring a stop signal.

AND

B. Look out for broken rails and misaligned track.

AND

C. Do not exceed 20 mph outside interlocking limits and 15 mph within interlocking limits. This restriction applies to the entire movement, unless otherwise specified in the rule or instruction that requires restricted speed.

RULE 133(D). OPERATION WITHIN OUT-OF-SERVICE LIMITS

The employee named in Form D line 4 is in charge of the out-of-service limits. ABS, CSS, DCS, and Interlocking rules do not apply within the out-of-service limits. All movements must operate at restricted speed. Interlocking switches within the out-of-service limits must not be operated without permission of the employee in charge.....

MASS BAY COMMUTER RAILROAD
ROADWAY WORKER PROTECTION MANUAL
(which refers to NORAC Operating Rules)
REVISED FEB. 13, 2006

NORAC DEFINITIONS AND ABBREVIATIONS

Restricted Speed: (See NORAC Rule 80 above)

RULE 321(D). REMOVING A TRACK FROM SERVICE

(See NORAC RULE 133(D) above).

RULE 341(D),(E). ROADWAY MAINTENANCE MACHINES (214.341)

MBAX has included in its on-track safety program specific provisions for the safety of roadway workers who operate or work near roadway maintenance machines. These provisions address...

D. When two or more pieces of equipment are working together, they must maintain a 10-foot clearance between each other unless otherwise instructed by the employee in charge; and

E. While equipment is in working mode, roadway workers must stay 10 feet from its working area unless otherwise specified by the Operator.

CODE OF FEDERAL REGULATIONS
PART 214 - RAILROAD WORKPLACE SAFETY
SUBPART C - ROADWAY WORKER PROTECTION

214.313(a) Responsibility of individual roadway workers.

(a) Each roadway worker is responsible for following the on-track safety rules of the railroad upon which the roadway worker is located.

SUMMARY FOR FE-09-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Burlington Northern Santa Fe Corporation (BNSF)
Location: Memphis, Tennessee
Region: 3

Month: July
Date: July 11, 2006
Time: 12:50 p.m., CST

Data for Fatally Injured Employee(s)

Car Inspector
52 years old
23 years, 10 months of service
Last rules training: April 13, 2006
Last safety training: Feb. 7, 2006
Last physical: May 9, 2003

Data for All Employees (Craft, Positions, Activity)

Craft: Maintenance of Equipment

Positions:

Fatally injured Car Inspector
Another Car Inspector
Car Shop Lead Man
Tower Yard Master

Activity

Searching for a defective rail car which the Car Inspectors were assigned to repair.

EVENT

A Car Inspector was struck by on-track equipment while searching for a defective rail car.

SUMMARY FOR FE-09-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The fatally injured Car Inspector failed to stay outside the fouling limits of a hump yard track.

REPORT:	**FE-09-2006**	
RAILROAD:	Burlington Northern Santa Fe Corporation (BNSF)	
LOCATION:	Memphis, Tennessee	
DATE & TIME:	July 11, 2006; 12:50 p.m., CST	
EVENT[1]:	A Car Inspector was struck by on-track equipment while searching for a defective rail car.	
EMPLOYEE:	Craft**:**	Maintenance of Equipment
	Occupation:	Car Inspector
	Age:	52
	Length of Service:	23 years, 10 months (BNSF 13 Years, 10 months, Trailer Train (TTX) 10 years)
	Last Rules Training:	April 13, 2006
	Last Safety Training:	Feb. 7, 2006
	Last Physical:	May 9, 2003

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On July 11, 2006, at 7 a.m., CST, two Car Inspectors went on duty at the BNSF Tennessee Yard, in Memphis, Tennessee. Both men were assigned to wheel truck 17174, a mechanical repair job, located in Memphis Yard. These positions required specialized training and an LCD driver's licence issued by the Tennessee Department of Transportation. The Car Inspectors had been working this job assignment for eight months.

After a safety briefing by the Car Shop Lead Man, the Car Inspectors were given their daily work assignments. Their first job was to retrieve a disabled alternate terrain vehicle (ATV) in the Memphis Yard. They loaded the disabled ATV onto their work truck and brought it back to the car shop. Once there, the Car Shop Lead Man told them to go to Yale Yard and re-rail a maintenance-of-way crane. After re-railing the crane, they returned to the shop about 11:30 a.m. for lunch.

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1 "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

After lunch, they set out to find and repair two different freight cars that were defective. About 12:15 p.m., they repaired one of the cars located behind the car shop at the south end of the Memphis Storage Track. This car had a defective hand hold. The other defective freight car was believed to be on Track No. 2051, which is a bowl track in the Memphis Hump Yard. This track parallels a service access road. They drove their work truck into the hump yard and parked on the access road beside two standing cars (AOK 181556 & FURX 124206). The cab of truck 17174 was facing south toward the hump tower. Both men departed the truck and walked north beside Track No. 2051, looking for a defective car with a bent uncoupling lever.

In the accident area, the access road is straight and is oriented north to south. The road surface is constructed of stone ballast and dirt and is about 26 feet in width. Due to vehicular traffic over the access road, most of the stone ballast had been pushed toward the field side of Track No. 2051, elevating the shoulder portion of the road bed several inches. The combination of dirt and stone has allowed some vegetation, mostly grass and weeds, to grow 6 to 10 inches within the track shoulder.

The weather at the time of accident was clear and sunny. The temperature was about 85° F.

THE ACCIDENT

The Car Inspectors, unable to find the defective car, headed back toward their wheel truck. As they approached the rear of the truck, one Car Inspector headed toward the driver's side while the other moved toward the passenger's side. As the passenger Car Inspector entered the truck, he looked up in the direction of the hump tower and noticed a rolling freight car traversing down Track No. 2051. He looked into the truck, but did not see the driver. He immediately yelled a warning to him that a car was just humped down Track No. 2051. Within seconds, the humped car (CEFX 30498), a loaded gondola, coupled onto the two empty standing cars parked next to their truck. The impact of the coupling moved the two standing cars northward about 60 feet, striking the driver. The other Car Inspector ran around the front of the truck and found the injured Car Inspector lying face down between the wheel truck and the tie ends. He immediately called the Car Shop Lead Man and reported the incident. He also called the General Foreman's office, whose staff called 911 emergency service for an ambulance. The Car Shop Lead Man was the first person to arrive at the accident scene.

A Memphis fire truck and ambulance arrived at the accident site about 1:15 p.m. The ambulance took the injured Car Inspector to the Regional Medical Center Emergency Room. While being transported to the emergency room, the Car Inspector went into cardiopulmonary arrest. The ambulance attendants administered CPR and arrived at the medical center at 1:40 p.m. The Car Inspector was pronounced dead at 1:44 p.m. by an on-duty physician.

POST-ACCIDENT INVESTIGATION

The Memphis Terminal Yard tracks are geographically laid out northwest to southeast. The BNSF timetable direction is North to South. Timetable direction is used for this report.
The Tennessee Yard has 54 class tracks, six intermodal tracks, and 14 departure yard tracks. Two main tracks lead into the yard from the north end, and two main tracks leave the yard from the south end. Tracks Nos. 2051 to 2055 are bowl tracks and are part of the hump yard. Freight cars released from the hump track by Crest Tower descend (south to north) into the bowl track. Cars humped onto Track No. 2051 are bad ordered cars destined for the car shop.

The Tower Yard Master in Crest Tower is responsible for directing freight cars from the hump track onto the bowl tracks. He can block out specific bowl tracks from humping operations by using a network program called Pro-Yard. Car department employees, when working a hump yard track, use the following procedure: They first notify the Crest Tower Yard Master about which track they will be working; the Yard Master applies a blocking device in the tower; then the car department employees set up temporary derails and blue flags for the appropriate track.

BNSF Crest Tower's list of cars and times they humped to Track No. 2051 on the day of the incident, July 11, 2006, follows:

BN 219278	10:00:48 a.m.
BN 453428	10:03:41 a.m.
TTPX 804672	10:27:44 a.m.
BN 621578	10:28:43 a.m.
AOK 181556	10:32:19 a.m.
FURX 824206	12:24:37 p.m.
CEFX 30498	12:48:46 p.m.
CSXT 224590	12:54:06 p.m.

The following information is the sequence of events beginning when wheel truck 17174 entered Memphis Hump Yard:

The AOK 181556 and FURX 824206 were 30-ton, covered gondolas. The Car Inspectors parked next to these two empty standing cars on Track No. 2051.

BN 219278, BN 453428, TTPX 804672, and BN 621578 were a cut of four standing cars first looked at by the Car Inspectors. These cars were positioned north of their vehicle on Track No. 2051. Not finding the defective car, they returned to their truck, walking on the service road. When the Car Inspectors reached the rear of the wheel truck, the deceased headed toward the driver's side and the other Car Inspectors headed toward the passenger's side.

CEFX 30498, a 124-ton, loaded gondola, was humped at 12:48:46 p.m. and observed by the passenger Car Inspector while he entered wheel truck 17174. This loaded car coupled onto AOK 181556 and FURX 824206. The impact of the coupling caused the cars to suddenly lunge northward about 60 feet, striking the Car Inspector. Car AOK 181556 had blood marks on the north end, right side of the No. 1 wheel and the BR sill step. After striking the Car Inspector, this gondola car stopped at about 40 feet. The injured Car Inspector managed to roll over and was positioned face down between the tie ends and the access road. His hard hat, safety glasses, and a bad order tag were found in the gage of the tack under the car. Additional blood marks were observed on the ties and rail under the gondola.

The CSXT 224590 covered hopper was humped six minutes after the incident, coupling onto CEFX 30498. This occurred while the other Car Inspector and Car Shop Lead Man were attending the injured Car Inspector. The impact from the coupling moved the standing cars several feet. Track No. 2051 was then blocked at 12:58 p.m. about 10 minutes after the incident by Crest Tower.

The width of the truck, including the mirrors, was 110 inches with the driver's side door, which was opened 129 inches. The door measured about 42 inches from the ground to the bottom of the door. The truck is equipped with a tool crest and welder, located near the cab. An inspection of the driver's side door on wheel truck 17174 revealed no fresh marks, scratches, or dents. The truck was covered with a light coat of dust.

Post-Accident Toxicological Forensic Testing, mandated by the Federal Railroad Administration (FRA), was conducted on the deceased. The results of the test were negative.

Analysis and Conclusion

A yard records inspection conducted by FRA revealed that open gondola HCSX 104, which had the bent uncoupling lever, was actually on Track No. 301 (track outside the car shop), not on Track No. 2051. A computer search of the BNSF yard records indicated that on the day of the incident, this car was located on Track No. 2051.

Post-accident interviews with the surviving Car Inspector indicated that the incident occurred when the deceased Car Inspector was walking around the back of wheel truck 17174, heading toward the driver's side door. He apparently stepped in front of two standing cars (AOK 181556 and FURX 824206) that were located on Track No. 2051 at the same time the humped car CEFX 30498 coupled on to them. The impact from the coupling shoved the two cars northward about 60 feet, striking the deceased, whose injuries were consistent with the witness statement. The deceased's injuries were on the left side of his body, indicating he was facing south. When car AOK 181556 struck the deceased, the impact threw the Car Inspector under the hopper car. The number one wheel of the car ran over the Car Inspector's left arm and leg, causing a near severance to both. There was also blunt force trauma to his left, mid-chest wall. After the impact, the deceased managed to roll over and was found face down between the tie ends and wheel truck 17174.

Based on the employee interviews and schedule information data provided by BNSF, the Fatigue Avoidance Scheduling Tool (FAST) software calculated that the Car Inspector's alertness level was 98 percent at the time of the incident. This alertness level was determined using the auto sleep function of the FAST software, due to the fact that specific sleep schedules were not available. This alertness level shows that the deceased Car Inspector was about two percent fatigued at the time of the incident.

There were no actual witnesses to the incident, and it is unclear why the deceased was in the foul of Track No. 2051. BNSF employees who were interviewed indicated that the wheel truck 17174 was not in the foul of Track No. 2051. The passenger Car Inspector said the driver never opened the truck door. No BNSF employee or supervisor said the Car Inspectors were performing inspections or work requiring them to have blue flag protection. What FRA has determined is that the deceased fouled Track No. 2051 and was struck by car AOK 181556.

SUMMARY FOR FE-11-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Union Pacific Railroad Company (UP)
Location: Atwater, California
Region: 7

Month: August
Date: Aug. 16, 2006
Time: 5:43 p.m., PST

Data for Fatally Injured Employee(s)

Maintenance of Way (MOW) Supervisor
47 years old
21 years of service
Last rules training: July 5, 2006
Last safety training: July 5, 2006
Last physical: June 20, 2006

Data for All Employees (Craft, Positions, Activity)

Craft: MOW

Positions:

MOW Supervisor
MOW Crew

Rental Truck Driver (not affiliated with the railroad)

Activity

Preparing to transport a bundle of rail ties

EVENT

An MOW Supervisor was fatally injured when struck
by a rental truck while preparing to transport a bundle of rail ties.

SUMMARY FOR FE-11-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The MOW Supervisor was walking along the driver's side of his truck, where there was close or no clearance regarding passing highway vehicles.

PCF No. 2

The Rental Truck Driver was driving at very high speed, which prevented him from stopping or maneuvering to avoid hitting the railroad employee.

REPORT: **FE-11-2006**

RAILROAD: Union Pacific Railroad Company (UP)

LOCATION: Atwater, California

DATE & TIME: Aug. 16, 2006; 5:43 p.m., PST

EVENT[1]: A Maintenance of Way (MOW) Supervisor was fatally injured when struck by a highway vehicle while preparing to move his dump truck to a better location for transporting a bundle of railroad ties.

EMPLOYEE:

Craft:	MOW
Occupation:	MOW Supervisor
Age:	47
Length of Service:	21 years
Last Rules Training:	July 5, 2006
Last Safety Training:	July 5, 2006
Last Physical:	June 20, 2006

CIRCUMSTANCES PRIOR TO THE ACCIDENT

Shortly before the incident, a Maintenance of Way (MOW) Supervisor, employed by UP, parked his company-owned dump truck on the right shoulder of Highway 99 near Atwater, California, at a point adjacent to the UP right-of-way (MP 146.2). His Crew was at this location, preparing to move a bundle of railroad ties. While planning the task, the Crew decided to use the front-end loader to load the bundle of ties into the dump truck; however, due to the terrain, they concurred it would be necessary to move the dump truck closer to the location where the ties were located. Therefore, the Supervisor left the Crew and walked towards the vehicle to relocate the dump truck to a point closer to the bundle of ties.

THE ACCIDENT

After walking to the rear of his truck, the Supervisor walked around the left rear fender (driver's side) and proceeded southward next to the vehicle, along the shoulder of the highway, towards the driver's door. As he walked towards his truck door, a rental truck, moving southward in the right lane of Highway 99 at a high rate of speed, struck him and the left front fender of his truck.

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[1] "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

After striking the victim and the vehicle, the rental truck Driver proceeded south and briefly stopped some distance away. He then sped off as the Crew attempted to get the license plate number of the vehicle. Law enforcement authorities subsequently apprehended the Driver.

POST-ACCIDENT INVESTIGATION

Emergency personnel from the Merced County Medical Group were summoned, and the paramedics attempted emergency resuscitation. However, the Supervisor expired and was pronounced dead at the scene.

The cause of death was multiple traumatic injuries incurred when struck by a motor vehicle. FRA's investigation comprised interviews with the MOW Crew and review of the police report.

SUMMARY FOR FE-12-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Florida East Coast Railway Company (FEC)
Location: Rockledge, Florida
Region: 3

Month: August
Date: Aug. 21, 2006
Time: 1:45 p.m., EST

Data for Fatally Injured Employee(s)

Conductor
45 years old
22 years of service
Last rules training: June 25, 2006
Last safety training: June 25, 2006
Last physical: Aug. 9, 1984

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

Train 915 (local road switcher)
Fatally injured Conductor
Locomotive Engineer
Utility Trainman
Qualifying Engineer

Train Dispatcher
GMC Tractor-trailer Driver (not affiliated with the railroad)

Activity

Switching

EVENT

A Conductor was fatally injured when crushed between the end of a rail car and a tractor-trailer truck during a switching operation.

SUMMARY FOR FE-12-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The crew members failed to comply with railroad operating rules requiring special safety precautions when rail cars not headed by an engine are moved over a high-way rail crossing at grade. The rules require that when a crossing does not have functioning, automated warning devices, a crew member, properly stationed on the ground, must provide warning signals to motor vehicle operators until the leading end of the movement has the entire crossing blocked. The crew member signals the motor vehicle operators when they may proceed through the crossing.

REPORT:	**FE-12-2006**	
RAILROAD:	Florida East Coast Railway Company (FEC)	
LOCATION:	Rockledge, Florida	
DATE & TIME:	Aug. 21, 2006; 1:45 p.m., EST	
EVENT[1]:	A Conductor was fatally injured when crushed between the end of a rail car and a tractor-trailer truck during a switching operation.	
EMPLOYEE:	Craft:	Transportation and Engine
	Occupation:	Conductor
	Age:	45
	Length of Service:	22 years
	Last Rules Training:	June 25, 2006
	Last Safety Training:	June 25, 2006
	Last Physical:	Aug. 9, 1984

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Aug. 21, 2006, following a statutory off-duty period, a train crew comprising a Locomotive Engineer, Conductor, and a Utility Trainman reported for duty at 4 a.m., EST at the FEC High Point Yard in Cocoa, Florida. The train crew was assigned to perform switching services on Train 915, their regular duty assignment. Train 915 is a local road switcher that switches for industries in and around Cocoa. Another Engineer, who was qualifying in the territory, was also assigned to Train 915. He reported for duty at 5 a.m. at High Point Yard and received a statutory off-duty period prior to reporting for duty. The Conductor had a job briefing with all crew members prior to commencing the day's work.

The train crew's first assignment was to switch cars at local industries that were near High Point Yard. The crew members returned to the yard and made up a train comprising one locomotive and seven rail cars. After performing an initial, terminal air brake test, the train departed the yard at 11:30 a.m., entering onto the main track at mile post (MP) 170.2. They operated the train southward to Old Cocoa Yard at MP 174 and added six high-side, gondola-loaded rock cars to

1 "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

the rear of their train. They then performed an intermediate air brake test, proceeded southward to MP 179.3, and switched cars at Southeast Wood Company.

About 12:30 p.m., the crew members proceeded onto the switching lead track, MP 179.4. With only the locomotive, they proceeded onto the WWG lead track and coupled to three empty gondola cars on the east of Nova Road and three empty gondola cars that were at WWG Asphalt Company. After making the coupling, the Conductor and Utility Trainman mounted the rear car. The Utility Trainman dismounted the car at Korbin Road, located 700 feet east of Nova Road. The Conductor stayed on the car until it cleared the switch on the lead track. He dismounted the car, relined the switch, and instructed the Engineer via radio to shove ahead and couple onto the standing cars on the switching lead track. After making the coupling, the Engineer pulled the train southward, clearing the industrial park switch. He relined the switch and mounted the rear car, which was a high-side, gondola car loaded with rock. Standing on the crossover platform, he instructed the Engineer via radio to back up for 12 car lengths. The locomotive was now shoving 17 cars.

The long hood of the locomotive was coupled to the lead car as Train 915 shoved westward. The assigned Engineer was in the Conductor's seat on the north side of the locomotive cab. The qualifying Engineer was at the controls on the south side of the cab operating the locomotive. The Utility Trainman was on the ground at Korbin Road flagging the crossing. Train 915 traversed Korbin Road at a recorded speed of 8 mph.

About the time the Train 915 crew started its shoving move, a 1994 GMC Tractor-trailer Driver departed northward from Trademark Medals Recycling Company onto Nova Road and proceeded toward the road crossing. The open top, 46-foot trailer was loaded with foam rubber scrap.

The accident area, Nova Road, is a 23-foot wide, asphalt paved, public roadway that extends northward from the Trademark Medals Recycling Company. The roadway crosses the industry track about 900 feet north of the recycling company. The road is tangent, and the grade is practically level. At the time of the accident, the roadway was covered with a layer of dirt and dust and was in disrepair with potholes and broken asphalt along the edges of the roadway. The DOT number for the crossing is 272918-B. The industrial track intersects Nova Road at a 90-degree angle and is tangent and practically level from the roadway eastward for 800 feet.

The method of operation on the track involved in the accident is governed by FEC Operating Rule 63, "Other Than Main Track," which states that trains using other than the main track must proceed at restricted speed. Restricted speed is speed that will permit stopping within one half the range of vision, short of a train engine, car, obstruction, stop signal, derail, or switch not properly lined, looking out for broken rail, but not exceeding 20 mph.

At the time of the accident, the sky was clear, and the temperature was 90° F.

THE ACCIDENT

As Train 915 traversed Korbin Road, the Conductor communicated via radio to the Engineer to shove eight cars to the next road crossing, Nova Road. He told the Engineer to shove six, then three cars to the crossing. The last radio communication the Engineer heard was "Blow the air, big hole the train."

Upon hearing the Conductor's instructions, the Engineer applied the emergency air brake. After the train stopped, the Engineer radioed the Utility Trainman, instructing him to proceed to the rear of the train to see what was wrong. The Trainman walked toward the rear of the train, inspecting the cars he passed. When he looked ahead, he observed a tractor-trailer lying on its side on the track they were traversing. When he arrived at the lead car, he saw the Conductor lying on the crossover platform of the car. He radioed the Engineer that the Conductor was badly injured and to call for assistance. The Engineer called the Train Dispatcher, informed him of the situation, and requested emergency medical help. The qualifying Engineer dismounted the locomotive and ran to the rear of the train to render assistance. The Trainman checked the Conductor for a pulse, but did not detect one.

The Brevard County Emergency Medical Service (EMS) was notified at 1:48 p.m. and dispatched three emergency responders to the scene. They arrived at 2:01 p.m. The Brevard County Medical Examiner, who also responded to the accident, pronounced the Conductor dead at the scene at 2:03 p.m. The Florida Highway Patrol was notified at 2:08 p.m. and dispatched two officers to the scene. They arrived at 2:24 p.m. The Conductor's body was transported via EMS to the Brevard County Medical Examiner's office in Rockledge, Florida.

The Utility Trainman and both Engineers were tested under Federal Railroad Administration (FRA) requirements.

POST-ACCIDENT INVESTIGATION

The investigation revealed that the Conductor rode the west end of FEC Car 15128 from the main track to the point of impact for 1,440 feet. This route took the Conductor over one highway-rail grade crossing that was protected by a crew member (Utility Trainman) and Nova Road Crossing where the collision occurred. The rail car was an open, high-side gondola car loaded with rock. The crossover platform is a 4-foot by 10-foot wide platform with a hand rail that extends the width of the car. The platform is located 46 inches from the ground.

A printout of the locomotive event recorder disclosed that the speed of the train prior to the impact was 8 mph. The Florida Highway Patrol estimated that the tractor-trailer was operating about 20 mph in a northward direction.

The rail car the Conductor was riding struck the center of the truck's 46-foot long trailer, turning the truck on its side. The truck was moved by the impact about 23 feet and landed on the north side of the track at a 45-degree angle. The Driver of the tractor-trailer was not injured. The

Driver was not charged with any state or local vehicle safety laws. According to the Florida State Traffic Crash Report, the Driver did not see the train as he was approaching the highway-rail grade crossing.

A review of the Conductor's personnel records disclosed he had 22 years experience in the transportation department for FEC and was a seasoned employee. The Conductor's hours of duty records indicated that he had worked as the Conductor on Train 915 for the previous 14 days, excluding his regularly assigned off days.

The DOT number for Nova Road is 272918-B. The Crossbuck Warning Sign was missing from the south approach to the railroad crossing at the time of the accident. There was a crossbuck warning sign in place on the north approach of the railroad crossing. On Sept. 18, 2006, an FRA Inspector revisited the accident site and observed that the railroad had replaced the crossbuck warning sign on the south approach to Nova Road.

Analysis and Conclusion

Based on the employee interviews and schedule information form, the Fatigue Avoidance Scheduling Tool (FAST) software calculated that the Conductor, Engineer 1, Engineer 2, and Trainman were at 84 percent, 84 percent, 83 percent, and 92 percent alert, respectively, at the time of the accident. These alertness levels were determined using the "auto sleep" function, due to the fact that specific sleep schedules were not provided.

These alertness levels show that the Conductor and both Engineers were moderately rested and about 16-17 percent impaired, or fatigued, at the time of the accident. The Trainman was more alert and found only to be 8 percent impaired.

FRA's Post-Accident, Forensic Toxicological Result Report indicated that cocaine metabolite (benzoylecgonine) was present in the urine of the Utility Trainman. The three other crew members' test results were negative.

The Conductor and Trainman on Train 915 failed to comply with FEC Operating Rule 103-A while performing a switching move.

The Brevard County Medical Examiner's report indicated the cause of death as Multiple Blunt Force Injuries.

APPLICABLE RULES

FEC Operating Rule 103-A

When cars not headed by an engine are moved over a highway-rail crossing at grade, a crew member, properly stationed on the ground, must afford warning signals to persons or operators of vehicles approaching the crossing until the leading end of the movement has the entire crossing blocked, and rail movements over the crossing will be made only on proper signal from that crew member.

These actions are not required if:

The crossing is provided with manual or automatic warning devices that are known to be working, or there is another employee stationed at the crossing and in contact with the involved Engineer.

FEC Operating Rule 63

Unless otherwise provided, trains and engines using other than the main track must proceed at restricted speed.

SUMMARY FOR FE-13-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Norfolk Southern Corporation (NS)
Location: Chicago, Illinois
Region: 4

Month: August
Date: Aug. 25, 2006
Time: 12:54 p.m., EST

Data for Fatally Injured Employee(s)

Conductor
43 years old
13 years of service
Last rules training: Feb. 8, 2006
Last safety training: Aug. 9, 2006
Last physical: Nov. 28, 2005
Last relevant efficiency training: July 25, 2006

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

NS Train Crew Assignment BR 17
Locomotive Engineer
Conductor
Brakeman

Train Master

Activity

Switching

EVENT

A Conductor was fatally injured when struck by on-track equipment while attempting to apply a hand brake on moving equipment, during a switching operation.

SUMMARY FOR FE-13-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Conductor violated a railroad operating rule by stepping between moving rail equipment in an attempt to make an adjustment.

PCF No. 2

The rail cars that struck the Conductor were set in motion by a mismatch coupling.

PCF No. 3

In non-compliance with railroad operating rules, the Conductor used a brake stick to apply a hand brake on a rail car with a bent brake wheel.

PCF No. 4

The Conductor failed to apply a hand brake to both rail cars involved in the incident, in non-compliance with NS Timetable 4, which requires one hand brake for one car and two hand brakes for two cars.

PCF No. 5

The Conductor received no training by NS in operation of the brake stick.

PCF No. 6

The railroad's efficiency testing did not include compliance with railroad rules regarding getting on and off equipment or use of the brake stick.

REPORT:	**FE-13-2006**	
RAILROAD:	Norfolk Southern Corporation (NS)	
LOCATION:	Chicago, Illinois	
DATE & TIME:	Aug. 25, 2006; 12:54 p.m., EST	
EVENT[1]:	A Conductor was fatally injured when struck by on-track equipment while attempting to apply a hand brake on moving equipment, during a switching operation.	
EMPLOYEE:	Craft:	Transportation and Engine
	Occupation:	Conductor
	Age:	43 years
	Length of Service:	13 years
	Last Rules Training:	Feb. 8, 2006
	Last Safety Training:	Aug. 9, 2006
	Last Physical:	Nov. 28, 2005
	Last Relevant Efficiency Test:	July 25, 2006

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Aug. 25, 2006, at 7:42 a.m., an NS train crew assignment BR 17 reported for duty at the NS Calumet Yard located in Chicago, Illinois. The BR 17 assignment consisted of three crew members: a Locomotive Engineer, a Conductor, and a Brakeman. All crew members arrived on time and prepared themselves for work at the main Calumet Yard office. All crew members were off duty in excess of the statutory requirements. Prior to commencing the day's work, the BH 17 crew received a job safety briefing from the Train Master. This safety briefing focused on the use of personal protective equipment, specifically the situations in which the use of hearing and eye protection is required. After completion of the job safety briefing, the Yard Master informed the BH 17 crew of work assignments for the day. The crew members reviewed their assignments and discussed among themselves how the work would be accomplished.

1 "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

The first assignment for the BH 17 crew was to switch out Yard Track 28. This was completed at approximately 11:45 a.m. The BH 17 crew members could not complete the second task assigned due to a blue flag being displayed on a track where they were going to switch. The crew members decided to proceed to their last assignment which was to switch out a group of 13 rail cars and one dead-in-tow locomotive.

To complete their switching assignment, the BH 17 crew members utilized two different tracks. The first track, where the cars were currently located, was referred to as the Derrick Track. The second track, where the cars would be organized, was called the Engine House Lead. The tracks are parallel to each other in a northwest to southeast direction. There are approximately 40-foot track centers between the two tracks until the Derrick Track merges into the Engine House Lead on both ends. These tracks are located near the Calumet Yard Car Shop, which is centered in the Calumet Yard Complex. The Engine House Lead has a slight 0.14 percent descending grade in a northwest direction. (The grade percentage was taken from the NS Calumet Yard Situation Survey Plan and Profile TRM-2006-8.)

The BH 17 crew members coupled NS Locomotive 6677, which was facing southeast, to 13 cars and one dead-in-tow locomotive on the Derrick Track. They then contacted the Train Master on duty and requested that a brake stick be delivered to their location. At Calumet Yard, NS rules require the use of a brake stick when applying hand brakes. The brake stick was delivered to the crew by the Train Master at approximately 12:30 p.m. The BH 17 crew held a job briefing and discussed how the 13 cars and the dead-in-tow locomotive would be switched and the responsibilities of each crew member during the switching.

A brake stick is a steel tube with a hook type shape, located at the point of the tube. The brake stick is approximately four feet in length and has telescoping capabilities to extend to approximately eight feet in length. The brake stick allows an individual to remain on the ground as opposed to climbing equipment to apply or release manual hand brakes.

The BH 17 crew began switching by placing the Derrick Track's head car, SOU 65785, a load of scrap rail, to the Engine House Lead. This movement was completed using train line air pressure. Once SOU 65785 was on the Engine House Lead, the Conductor used the brake stick to apply the hand brake on the car. The application of the hand brake was prior to the BH 17's locomotive cutting away from the SOU 65785. When BH 17's locomotive was uncoupled, the car's air brakes were applied. SOU 65785 was now left standing alone on the Engine House Lead with the hand brake and the air brakes applied. From this point forward, the event recorder data from NS Locomotive 6677 indicates that the BH 17 crew did not use train line air pressure during the remainder of its switching assignment. The crew proceeded back to the Derrick Track and coupled to the 12 cars and the dead-in-tow locomotive. At this point, the Conductor prepared the 12 cars and locomotive for switching by removing all hand brakes and bleeding the air from the cars.

Bleeding the air is a term used to describe the method for a total release of a railroad car's air brake system. A bleed rod is pulled to empty the car's main and emergency air reservoir. This action allows railroad cars to be moved freely, without air brake pressure applied to the wheels, unless an alternate method of securement is applied to the car, i.e. handbrake, chock, etc.

After the Conductor completed preparing the cars for movement, BH 17 pulled off the Derrick Track and proceeded back to the Engine House Lead. The last car on the Derrick Track, NS 292165, which was an empty covered hopper, was coupled to the SOU 65785 on the Engine House Lead Track. No hand brake was applied to the NS 292165. The two cars now stood coupled together, B end to B end, on the Engine House Lead with one hand brake which was previously applied to the SOU 65785 by use of the brake stick.

BH 17 returned to the Derrick Track and set out the dead-in-tow locomotive, NS 5227. The Conductor secured the locomotive. Afterwards, the Conductor uncoupled from the NS 5227 and began pulling southeast off the Derrick Track.

The Locomotive Engineer was operating NS Locomotive 6677, seated on the right side of the cab in a southeastern direction. The Brakeman was located on the northeast side of the Engine House Lead Track near the Derrick Track and the Engine House Lead switch. The Conductor was located on the ground between the Derrick Track and the Engine House Lead in the vicinity of the NS Locomotive 5227, which he had just secured on the Derrick Track.

The weather was mostly cloudy and hot with low humidity. The temperature was approximately 79° F. The wind was out of the southwest at approximately 10 mph.

THE ACCIDENT

After pulling in a southeast direction, the BH 17 cleared the Derrick Track Engine House Lead switch and was stopped by the Brakeman. The Brakeman then lined the switch for the Engine House Lead and requested "3-Step Protection" to manually open the knuckle of box car QC 75072. After opening the coupler, the Brakeman proceeded to cross over to the southwest side of the Engine House Lead. The Brakeman then released the "3-Step protection" to the Engineer, and hand signaled to the Conductor to take over control of the train's movement. The Conductor instructed the Locomotive Engineer of BH 17, via radio, to shove five car lengths to a coupling. The BH 17 Locomotive Engineer began to shove 11 cars in a northwest direction on the Engine House Lead. The Conductor continued to control the movement via radio and was counting the cars down to a stop. At this point, the 11 cars came in contact with the two cars standing on the Engine House Lead. However, the 11 cars failed to couple to the two standing cars. The momentum from the failed coupling started the two cars rolling free in a northwest direction. The Conductor then instructed the BH 17 Locomotive Engineer to shove an additional three cars to attempt another coupling.

Railroad rolling stock equipment is designated to have an A end and a B end. The B end is designated as the front end of the equipment and is identified by the location of the hand brake. The A end is the opposite end of the equipment. This does not include locomotives, as the nomenclature system of identifying ends are different.

Before coupling, a train service employee should make a request to the Locomotive Engineer not to move the locomotive until the request has been released by the requesting employee. This is after air brakes are set, the generator field switch is turned off, and the reverser is centered.

Shortly after the shoving movement commenced, the Brakeman assumed a squatting position in order to view the Conductor on the opposite side of the cars. The Brakeman did not observe the Conductor falling to the ground between the two rail cars, SOU 65785 and NS 292165. However, the Brakeman did observe the Conductor underneath the B end of the NS 292165 and witnessed the left wheels (Northeast side) of NS 292165 running over the Conductor. The Brakeman immediately contacted the Locomotive Engineer and instructed him to stop the train. The Brakeman requested the Yard Master, at approximately 1 p.m., to notify Emergency Services and the NS Police. Emergency response personnel arrived at the scene of the accident at approximately 1:15 p.m. The Chicago Fire Department, the Chicago Police Department, and the NS Police Department also arrived at the scene. The Cook County Coroner’s Certificate of Death indicates the Conductor was pronounced dead at the scene at 12:45 p.m.

POST-ACCIDENT INVESTIGATION

FRA Operating Practices and Motive Power and Equipment (MP&E) Inspectors arrived on the scene approximately two hours after the accident occurred. A mechanical inspection was completed on 13 cars and NS Locomotive 6677 by the MP&E inspectors. NS Locomotive 6677 was found to have broken cable insulation with exposed wires and an electrical cabinet cover removed. Two cars, NS 292165 and SOU 65785, were determined to be directly related to the accident. No mechanical exceptions were taken to NS 292165. However, SOU 65785 was found to have six defects. These exceptions were: a loose handhold on the B end, right side; a hand brake wheel with insufficient clearance (measured 1 inch); a hand hold with less than required clearance on the B end, left side at the top; a loose ladder on the A end, right side, bottom bracket; a loose ladder on the A end, top right, left brackets; a loose bottom hand hold; and an A end coupler height less than 31 ½ inches from the top of the rail (measured 31 inches). NS’s subsequent inspection of the equipment revealed no additional mechanical or operational defects with either car.

Hours of service records were reviewed for the Locomotive Engineer, Conductor, and Brakeman for a period of 30 days prior to the accident. The Locomotive Engineer and Conductor were regularly assigned to BH 17. This assignment has an on-duty time of 7:42 a.m., with rest days on Monday and Tuesday. The Locomotive Engineer and Conductor both received an off-duty period of 14 hours and 56 minutes prior to going on duty the day of the incident. The Brakeman worked BH 17 on 11 occasions in the previous 30 days. All other assignments within the 30-day period had an on-duty time between 7 a.m. and 8 a.m. (NS operates on Eastern Time). The Brakeman did not work the BH 17 assignment on the day prior to the accident. The Brakeman had an off-duty period of 13 hours and 42 minutes.

After the accident, the Locomotive Engineer and Brakeman were interviewed by NS management, Chicago Police, and FRA.

This accident qualified for testing under Title 49 Part 219, Subpart C - Post-Accident Toxicological Testing. The Locomotive Engineer's, Brakeman's, and Conductor's remains were tested under this authority. The results of these tests were negative.

Analysis and Conclusions

When BH 17 initially set the SOU 65785 to the Engine House Lead, the Conductor applied the hand brake using a brake stick. The car's air brakes were also applied. At a point between the uncoupling of BH 17's locomotive from SOU 65785, and the attempted coupling of NS 292165 to the QC 75072, the Conductor bled off the air brakes from SOU 65785. No evidence exists that demonstrates a failure of the braking equipment on the SOU 65785 or NS 292165. The cars were set in motion by the mismatch coupling which suggests the hand brake pressure applied with the brake stick to secure SOU 65785 was insufficient to hold both rail cars.

The Conductor used a brake stick to apply the hand brake on the SOU 65785, which had a bent brake wheel. NS Safety Rule 1100 prohibits employees from using a brake stick to apply a hand brake on a bent or broken hand brake wheel.

When the NS 292165 was coupled to the SOU 65785, the Conductor failed to apply a hand brake to the NS 292165. This is not in compliance with NS Timetable 4, which requires one hand brake for one car and two hand brakes for two cars.

The exact action the Conductor took prior to being struck is not known. NS Rule GR 14 states: "Employees must not stand on tracks in front of closely approaching equipment or step between coupled moving cars or engines for any reason, and adjustment must never be made to moving equipment."

Event recorder data was downloaded, reviewed, and analyzed by NS management. FRA investigators reviewed the results and took no exception to this analysis. FRA utilized this data along with a Situation Survey and Profile Plan provided by NS to determine the location of the SOU 65785 and NS 292165 prior to their movement. This analysis shows a mismatch coupling between the A end of the NS 292165 and A end of QC 75072 occurred.

Efficiency testing records for the Conductor were reviewed from the period of Jan. 1 to Sept. 7, 2006. The Conductor was tested 181 times; six rule violations were recorded. The rule violations resulted in one letter of caution, one START Program, and four verbal warnings issued to the Conductor. During this period, NS managers did not test the Conductor for compliance with NS Safety Rule 1071 (Getting On and Off Equipment) or Safety Rule 1100(f) 11 (Use of the NS Brake Stick).

The START Program is a progressive performance improvement program used by NS. Efficiency testing records for the Chicago Terminal were also reviewed for the same period. NS managers conducted 59,608 rule tests and recorded 952 rule violations. Of the 59,608 checks conducted in the Chicago Terminal, 2,177 were on rules applicable to this incident with 49 violations recorded.

The training records for the Conductor indicate he successfully completed an operating and safety rules class on Feb. 8, 2006. FRA requested documentation of the Conductor's training on the NS Brake Stick. The NS management stated the Conductor most likely received the training several years ago. The NS managers were unable to produce any training records pertaining to the brake stick.

No hand brake was applied to NS 292165 and an insufficient amount of hand brake pressure was applied to the SOU 65785. These two conditions caused the cars to be set in motion after the mismatch coupling occurred. Evidence indicates the Conductor's hand held radio was placed on the B end sill platform of the NS 292165. Therefore, it is reasonable to conclude that the Conductor was between the rolling equipment prior to being struck and knocked down by NS 292165. The probable cause of this accident was the Conductor stepping between the coupled, moving cars, which is in non-compliance with NS Safety Rule GR 14.

APPLICABLE RULES

NS System Section
Northern Region
Timetable No. 4 In Effect at 12:01 a.m.
June 23, 2006
Modified by Dearborn Division
Operations Bulletin #29, Section -1, Item 11
In Effect at 12:01 a.m.
June 23, 2006

109-1 HAND BRAKE REQUIREMENTS: Car(s) left standing must be secured with hand brakes as follows:

One car: One hand brake
Two cars: Two hand brakes
Three or more cars: Two hand brakes plus a sufficient number of additional hand brakes to secure the cut of cars.

Except when setting a car off on a line of road with a defective hand brake, only one additional car with a good hand brake applied will be required.

These instructions are in addition to any outstanding instructions issued by proper authority, but do not supersede special instructions at terminals and yards.

NS Dearborn Division
Northern Region
Timetable Supplement No. 4-A
In Effect at 12:01 am.
June 23, 2006

DB-S-1 100(f)-I. BRAKE STICKS: Brake sticks are located at the following locations:

Saginaw Yard, Lansing, Michigan - Yard Master's Office
Jackson Yard, Jackson, Michigan - Furnace Room
Botsford Yard, Kalamazoo, Michigan - Yard Master's Office
Hugart Yard, Grand Rapids, Michigan - Break Room
Warner Yard, Monroe, Michigan - Crew's Office
Wayne Yard, Wayne, Michigan - Yard Master's Office

Use brake sticks for applying/releasing hand brakes, pushing the EDT button, turning angle cocks and adjusting retaining valves. All crews must have a brake stick available to be used during their tour of duty. Avoid climbing on or off equipment when brake stick can be utilized. Do not mount cars during inclement weather or when ice or snow is present on ladders, steps, crossover platforms or safety appliances.

NS Dearborn Division
Northern Region
Chicago Superintendent's Notice #1
In Effect at 12:01 a.m.
Jan. 1, 2006

Item 5(a) - HAND BRAKES: The use of brake sticks is mandatory for all NS employees in NS yards.

NS Safety and General Conduct Rules
Effective Dec. 30, 2002

GR 14 Employees must not stand on tracks in front of closely approaching equipment or step between coupled moving cars or engines for any reason. They must not step between or immediately in front of standing cars or engines unless necessary in the performance of duty and then only after arranging for protection against the equipment being coupled to or moved.

Never make adjustments to moving equipment.

1071 — GETTING ON OR OFF EQUIPMENT: Employees must mount or dismount equipment only when such equipment is standing, except in an emergency.

1100(f) 11. - USE OF THE NS BRAKE STICK: Do not use the brake stick to operate bent or broken brake wheels.

SUMMARY FOR FE-14-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Alton and Southern Railway Company (ALS)
Location: East St. Louis, Illinois
Region: 4

Month: September
Date: Sept. 10, 2006
Time: 11:31 p.m., CST

Data for Fatally Injured Employee(s)

Conductor
44 years old
8 months of service
Last rules training: April 8, 2006
Last safety training: March 1, 2006
Last physical: Feb. 10, 2006

Data for All Employees (Craft, Positions, Activity

Craft: Transportation and Engine

Positions:

Yard Job YAS271
Conductor
Locomotive Engineer

Bowl Yard Master
Railroad Supervisor

Activity

Switching

EVENT

A Conductor was fatally injured when crushed between two locomotives during a switching operation.

SUMMARY FOR FE-14-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Conductor failed to keep a careful lookout in both directions for trains, engines, or cars on adjacent tracks, and for close clearances while he was riding the step of the locomotive.

PCF No. 2

The Locomotive Engineer and Conductor failed to comply, on several occasions, with railroad operating rules requiring railroad employees to immediately stop work and hold job briefings when changes occurred to the work plan or conditions changed.

PCF No. 3

Prior the fatal incident, the Conductor failed to provide the Engineer with car lengths or distance to travel.

PCF No. 4

The Locomotive Engineer failed to stop movement when the Conductor disappeared from sight while riding the step of the locomotive, just prior to the fatal incident.

PCF No. 5

In non-compliance with railroad operating rules, the crew members failed to communicate which moves would be made by radio communication, rather than hand signals. While using the radio, the Engineer also accepted hand signals, also in non-compliance. Throughout most of the switching operation, the Conductor used a combination of radio communication and hand signals. If the Conductor had been using radio communication, rather than hand signals, while he was riding the step of the locomotive, he may have been able to avoid being crushed by the two locomotives.

PCF No. 6

The crew members failed to comply with railroad operating rules prohibiting them from leaving cars or engines standing where they would foul equipment on adjacent tracks.

SUMMARY FOR FE-14-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS CONTINUED

PCF No. 7

When the Locomotive Engineer discovered the Conductor lying on the ground between the two locomotives, she failed to initiate an emergency radio transmission preceded by the word “emergency,” repeated three times, as required by Federal regulations and railroad operating rules. This resulted in a delay in summoning help for the Conductor which possibly could have saved his life.

REPORT:	**FE-14-2006**	
RAILROAD:	Alton and Southern Railway Company (ALS)	
LOCATION:	East St. Louis, Illinois	
DATE & TIME:	Sept. 10, 2006; 11:31 p.m., CST	
EVENT[1]:	A Conductor was fatally injured when crushed between two locomotives during a switching operation.	
EMPLOYEE:	Craft:	Transportation and Engine
	Occupation:	Conductor
	Age:	44 years
	Length Of Service:	8 months
	Last Rules Training:	April 8, 2006
	Last Safety Training:	March 1, 2006
	Last Physical:	Feb. 10, 2006

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Sept. 10, 2006, a Conductor and Locomotive Engineer reported for work at the ALS General Office Building in East St. Louis, Illinois, on Yard Job YAS271. The Conductor had been ordered to report for duty at 4:04 p.m., and the Engineer had been ordered to report at 4 p.m. The Conductor was called off the Conductors' extra board and the Engineer was called off the Engineers' extra board. Prior to reporting, the Conductor had been off duty for the required statutory off-duty period of eight hours. The Engineer received more than the statutory off-duty period prior to reporting. The duties of this yard job assignment were to move locomotives around within the yard and line them up for outbound trains. Both employees had experience working this yard job assignment, but not together. The Conductor last worked this job on July 2, 2006, and the Engineer last worked it on Sept. 3, 2006. The Conductor and Engineer worked together for the first time on Sept. 10, 2006 on a yard job assignment.

Prior to the incident, they had worked in various locations throughout the East St. Louis Gateway Yard, moving locomotives to appointed locations. All work had been performed without incident. Late into their shift, they were instructed to assemble a 3-locomotive consist from the roundhouse tracks for outbound Train Symbol MASNL10. Once the locomotives were assembled on Roundhouse Track "B," they were lined up from west to east with Locomotive No. UP 9456

[1] "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

in the lead, followed by Locomotive No. UP 9413 and then Locomotive No. UP 9379. As the Engineer inspected Locomotive No. UP 9456, she observed that it was not lead-qualified, as it had no working radio or head-end monitor. She then conducted a job briefing with the Conductor to discuss putting Locomotive No. UP 9379 in the lead of the consist once they had left the roundhouse so there would be a lead-qualified locomotive on the head end for the outbound train. The plan was to pull the Yard Job YAS271 locomotive consist onto the "B" Way Track, set Locomotive No. UP 9379 over to the "D" Yard Lead, and then put Locomotives Nos. UP 9456 and UP 9413 back onto the Roundhouse Lead. Once that move was completed, the Engineer would then walk over and get on Locomotive No. UP 9379 on the "D" Yard Lead and move it over to the Roundhouse Lead, making it the lead locomotive of the consist.

The Engineer then conducted another briefing, this time with the Yard Master, using the radio to advise him of the move they needed to make. According to the Engineer, the Conductor was present when this radio conversation took place and seemed to understand the plan, and had no questions. As they began to depart the Roundhouse B Track, the Engineer observed the Conductor pull the pin on the wrong locomotive. She then left the locomotive cab and went down on the ground to conduct another job briefing with the Conductor regarding their planned move. Once again, the Conductor indicated his understanding, and the Engineer returned to the locomotive cab. No other job briefings were conducted prior to the incident.

The crew members began their movement off the Roundhouse Lead, moving westbound, with the Engineer operating from lead Locomotive No. UP 9456 with the short end forward. Once the locomotive consist was out on the "B" Way Track, the Conductor lined the Roundhouse Lead Switch and gave both a hand signal and radio instructions for the Engineer to move the locomotive consist eastward onto the "D" Yard Lead. Once the consist was on the "D" Yard Lead, the Conductor stopped the movement with a hand signal and cut Locomotive No. UP 9379 away from the consist, leaving it on the "D" Yard Lead. The Engineer then used her hand-held radio to instruct the Conductor to put a hand brake on the locomotive they were leaving. He acknowledged her communication, applied the hand brake, then used a hand signal, instructing her to move westbound, which she did. The Conductor, using both a hand signal and his hand-held radio, stopped the movement west of the Roundhouse Lead Switch and lined it for movement onto the Roundhouse Lead. Then, using both a hand signal and his hand-held radio, he instructed the Engineer to move eastbound onto the lead. The Engineer began the eastbound movement, but the Conductor stopped her, using a hand signal, when he realized that Locomotive No. UP 9379 would not clear the movement of the two remaining locomotives onto the Roundhouse Lead. The Conductor then gave a hand signal to the Engineer, instructing her to move westbound. He stopped her with another hand signal when the locomotives were west of the Roundhouse Lead Switch. He lined the switch and then, using both a hand signal and his hand-held radio, he signaled the Engineer to bring the locomotive consist back eastbound onto the "D" Yard Lead. He coupled the locomotives back into Locomotive No. UP 9379 and shoved it eastward. He stopped the movement using a hand signal, and once again, cut away from Locomotive No. UP 9379 and, using both a hand signal and his hand-held radio, instructed the Engineer to proceed west. Again, using both a hand signal and his hand-held radio, he stopped the movement west of the Roundhouse Lead Switch and lined the switch for movement onto the Roundhouse Lead.

The area where this move was being made consisted of two sets of parallel railroad tracks extending east and west, with the general office building on the north side of the tracks and the roundhouse facility on the south side of the tracks. The north track is referred to as the “A” Way Track. The south track is referred to as the “B” Way Track up to the Roundhouse Lead Switch located in front of the general office building. This switch, when lined in the normal position, leads to the “D” Yard Lead and when lined in reverse, extends southward to the Roundhouse Lead. Roundhouse Tracks “A” and “B” are located on the sound end of the lead giving access to and from the roundhouse. The area where the incident occurred is very well-lighted, and the tracks are basically flat and level with no appreciable grade. There is an overhead walkway bridge located just east of the Roundhouse Lead Switch, which extends over the “A” Way Track and the “D” Yard Lead Track.

The weather was clear, and the temperature was approximately 73° F.

THE ACCIDENT

At approximately 11:30 p.m., the Conductor boarded Locomotive No. UP 9413 and positioned himself on the locomotive step on the Engineer’s side at the leading end of the shoving move to be made. He then gave the Engineer a hand signal to back eastward onto the Roundhouse Lead Track, which she did. She started moving the locomotive consist eastward, never exceeding 3 mph, onto the Roundhouse Lead. After moving approximately one-half an engine length, she lost sight of the Conductor, at which time she stopped the movement, using the locomotive’s independent brake.

After stopping the movement, the Engineer got off the locomotive consist and walked around it looking for the Conductor. She observed that the leading locomotive of their shoving move on the Roundhouse Lead Track had struck Locomotive No. UP 9379, located on the “D” Yard Lead. When she was unable to locate the Conductor, using her hand-held radio, she requested the Bowl Yard Master to have a Train Master come to her location. The Engineer then walked through the cabs of each of the three locomotives and was unable to locate the Conductor. She got back down on the ground and walked between Locomotive No. UP 9413, which was on the Roundhouse Lead, and Locomotive No. UP 9379, which was adjacent to Locomotive No. UP 9413 on the “D” Yard Lead, and discovered the Conductor lying on the ground between them. Upon discovering him on the ground, she immediately ran into the general office building and notified the Bowl Yard Master that the Conductor was down and that an ambulance and Train Master were needed immediately. After making contact with the Bowl Yard Master, the Engineer returned outside, but was kept away from the area where the Conductor lay by fellow employees who had arrived at the accident site.

Emergency assistance was summoned from via 911, and a Railroad Supervisor and fellow employees quickly arrived on the scene and discovered the Conductor was unconscious. Upon arrival of the ambulance and medical personnel, the Conductor was transported to the Kenneth Hall Regional Hospital in East St. Louis, Illinois, where he was pronounced dead at 12:51 a.m. on Sept. 11, 2006.

POST-ACCIDENT INVESTIGATION

Within hours of the incident, FRA investigators were on-site and took photos of the area and the equipment while it was still in place. In an interview, ALS officials stated that when the Conductor set Locomotive No. UP 9379 on the "D" Yard Lead, he left it foul of the Roundhouse Lead Track. Then, as he controlled the movement of Locomotives Nos. UP 9413 and UP 9456 back onto the Roundhouse Lead, he failed to stop short of the obstruction caused by Locomotive No. UP 9379, allowing Locomotive No. UP 9413 to strike it and crush him between the two locomotives, resulting in him being knocked to the ground. The ALS determined, through the review of a yard camera used by clerks for review of train consists, that once Locomotive No. UP 9379 was shoved east on the "D" Yard Lead and the hand brake was applied, it did not move. The ALS investigators conducted interviews with the Bowl Yard Master after the incident and concluded he had played no part in the incident.

The FRA conducted interviews; reviewed audio, video, and locomotive downloads; participated in a reenactment of the incident; and took measurements. Copies of all railroad accident reports, diagrams, drawings, and police department reports were obtained and reviewed. The testing and training records of both the Conductor and Engineer were reviewed, with no exceptions taken.

An FRA inspection was conducted on all locomotives involved in the incident and no mechanical or safety defects were noted, other than those caused by the incident.

The ALS charged the Locomotive Engineer with failure to comply with the General Code of Operating Rules 5.3.3 and 5.3.6 and Rule 70.3 of the Carrier's Safety Rules. However, a formal investigation, held by the ALS on Sept. 22, 2006, failed to substantiate these charges and no disciplinary action was issued. A copy of the transcript of the investigation was obtained and reviewed.

Personnel from the East St. Louis Police Department responded to investigate the incident. A copy of their report was obtained and reviewed, with no violation of law or ordinance found. The St. Clair County Coroner responded, and a copy of the report was obtained and analyzed during this investigation.

Results of FRA's post-accident toxicological testing of the deceased, the Engineer, and the Bowl Yard Master were reviewed and found to be negative.

Analysis and Conclusions

The video from the clerk's yard camera was reviewed and showed some of the area in which Yard Job YAS271 was working between 11:18 p.m. and 11:32 p.m. on Sept. 10, 2006. The video shows the Conductor giving some hand signals with his lantern. The video also shows what looks like the Conductor applying the hand brake on Locomotive No. UP 9379 after it had been set to the "D" Yard Lead Track. The video verifies that Locomotive No. UP 9379 did not move after it was shoved east on the track for the second time and Yard Job YAS271 cut away from it.

The audio recording of the radio channel for Yard Job YAS271 was reviewed for the time period between 11 and 11:59 p.m., Sept. 10, 2006. During the review of this recording, the Conductor could be heard giving some voice commands to the Engineer via radio. In addition, the recording revealed that at no time during the incident was the emergency broadcast made, as required by Title 49, Code of Federal Regulations (CFR) Section 220.47.

The review and comparison of the audio and video records showed the clock on the video was one minute, 31 seconds faster than the clock on the voice recorder.

A review of the download from the locomotive in use by the Engineer on Yard Job YAS271 on Sept. 10, 2006, showed that movement started back onto the Roundhouse Lead at 11:32:29 p.m. and stopped at 11:33:11 p.m. The total distance of the move was 152 feet, and the maximum speed during the move was 3 mph. The download showed that no brakes were applied until after the move had gone 87 feet at 11:32:51 p.m., and this was the independent brake, which then showed to have been immediately released. The next time the brake showed being applied was at 11:33:05 p.m., at 138 feet. It also showed to have been immediately released. The final brake application showed to have been made at 11:33:08 p.m., at 146 feet. It remained applied until the locomotive came to a stop at 11:33:11 p.m. During the formal investigation held by the ALS on Sept. 22, 2006, the Engineer was questioned about her use of the locomotive brake as she moved onto the Roundhouse Lead. She stated that she had the brake applied throughout the move. When questioned about the Engineer's statement, the Senior Manager of Operating Practices stated that the locomotive she was using had an older style event recorder which would not record the brake application unless at least 15 pounds of air or more were applied, indicating that the Engineer could have had the brakes applied and it would not have been recorded.

A re-enactment of the incident showed that the Conductor would have gone out of the Engineer's sight after having moved approximately 67 feet. At that point, the locomotive the Conductor was riding was 25 feet, 9 inches from the locomotive which was struck.

When the Conductor shoved Locomotive No. UP 9379 onto the "D" Yard Lead Track, he initially failed to leave it clear of the Roundhouse Lead Track. After realizing that it obstructed his movement onto the Roundhouse Lead, the Conductor then had the Engineer move the locomotives back onto the "D" Yard Lead and shove Locomotive No. UP 9379 farther east on the track. However, this second attempt to get the locomotive in the clear also failed. Without realizing that Locomotive UP 9379 would not clear his movement, he boarded the step of Locomotive No. UP 9413 while on the leading end of the shove. In sight of the Engineer, he used a hand signal directing her to begin moving onto the Roundhouse Lead Track. When interviewed, the Engineer was asked if the Conductor had indicated the number of car lengths or distance to go before the move on to the Roundhouse Lead Track began and the reply was that he had not. As he rode the step of Locomotive No. UP 9413, not realizing that Locomotive No. UP 9379 was not in the clear of his track, the Conductor was crushed between the two locomotives.

The Conductor failed to get Locomotive No. UP 9379 clear of the Roundhouse Lead Track, which is required by Rule 81.8.1 of the Carrier's Safety Rules. He also failed to maintain a lookout for close clearance and to stop short of the same locomotive as he moved equipment onto the track, as required by Safety Rule 81.8.2 and the General Code of Operating Rules 6.28. After the use of hand signals was discussed during the job briefing, when the Conductor started using the radio in conjunction with the hand signals, the Engineer should have stopped the work and called for another job briefing to clarify what form of communication was to be used as required by the General Code of Operating Rules 5.3.6. As a result, the use of both hand and radio signals continued right up until just prior to the incident. The job briefing held prior to beginning the switching did discuss the moves to be made; however, when the job changed as a result of Locomotive No. UP 9379 initially being left foul of the Roundhouse Lead, another briefing was not held as required by Safety Rule 70.3. Direct conversation between the Conductor and Engineer could have allowed for a full discussion on the need to get the locomotive clear of the Roundhouse Lead Track. Also, both the Conductor and Engineer, with their experience working in this yard, should have been aware that the move onto the Roundhouse Lead would, at some point, take the Conductor out of the Engineer's sight if he rode it, as he ultimately did. With the Conductor's decision to ride the step of Locomotive No. UP 9413, a job briefing should have been held to discuss the need for radio communication. Had the Conductor been directing the move using his radio and providing the Engineer with car lengths or distance to travel, he would have had to look ahead of the movement and focus on conditions on and around the track directly ahead of him.

When the Locomotive Engineer discovered the Conductor lying on the ground between the two locomotives, both Title 49 CFR Section 220.47 and the General Code of Operating Rules 2.10 required her to initiate an emergency radio transmission preceded by the word "emergency," repeated three times. When interviewed, the Engineer stated that she had a hand-held radio while on the ground looking for the Conductor. However, she stated that she did not use it to summon help, but chose instead to go into the general office building and call the Bowl Yard Master. This failure to comply with the CFR and the Carrier's operating rule may have resulted in a delay in summoning help for the Conductor and in making notification of the incident to officials and others in the area.

APPLICABLE RULES

General Code of Operating Rules

2.10 Emergency Calls

Emergency calls will begin with the words "Emergency, Emergency, Emergency." These calls will be used to cover initial reports of hazardous conditions which could result in death or injury, damage to property or serious disruption of railroad operations such as:

- derailments;
- collisions;
- storms;
- washouts;
- fires;
- track obstructions; or
- emergency brake applications.

In addition, emergency calls must be made for the following:

- over-running limits of authority; or
- over-running stop indications.

Emergency calls must contain as much complete information on the incident as possible. All employees must give absolute priority to an emergency communication. Unless they are answering or aiding the emergency call, employees must not transmit until they are certain no interference will result.

5.3.3 Signal Disappearance

If a person disappears who is giving the signal to back or shove a train, engine, or car, or the light being used disappears, employees must stop the movement, unless the employee on the leading car controls the air brakes.

5.3.6 Radio and Voice Communication

Employees may use radio and other means of voice communication to give information when using hand signals is not practical. Employees must make sure crew members:

- Know which moves will be made by radio communication; and
- Understand that while using the radio, the Engineer will not accept any hand signals, unless they are Stop signals.

Safety Rules:

70.3 Job Briefing

Use the Job Briefing process:

- Before work begins, when all persons, including employees and contractors, are present;
- After work begins, if person(s) arrive who missed the original job briefing; or
- When changes occur to the work plan or conditions change.
  Each work plan must consider hazards, assign specific responsibilities, and explain those assignments.

81.8 Close Clearances

81.8.1 Avoiding Fouling Hazards

Do not leave cars or engines standing where they will foul equipment on adjacent tracks or cause injury to others riding on the side of a car or engine. When machines, tools, material or other equipment may foul adjacent tracks, notify the Yard Master, Train Dispatcher, or Supervisor. They must arrange to restrict movement on the affected track(s) until the work is completed and the fouling hazard is eliminated.

81.8.2 Maintain Lookout

Keep a careful lookout in both directions for trains, engines or cars on adjacent tracks. Look for other close clearances when duties require any part of the body to be extended beyond the side of a moving or standing engine or car.

Title 49 Code of Federal Regulations

§220.47 Emergency radio transmissions:

An initial emergency radio transmission shall be preceded by the word "emergency," repeated three times. An emergency transmission shall have priority over all other transmissions, and the frequency or channel shall be kept clear of non-emergency traffic for the duration of the emergency communication.

SUMMARY FOR FE-16-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Northeast Illinois Regional Commuter Rail Corporation (NIRC)
(Metra, transit agency for NIRC)
Location: Harvey, Illinois
Region: 4

Month: September
Date: Sept. 27, 2006
Time: 9:38 a.m., EST

Data for Fatally Injured Employee(s)

Patrol Officer, Metra Police Department
43 years old
3 years, 7 months of service
Last rules training: N/A
Last safety training: N/A
Last physical: N/A
Last relevant efficiency test: N/A

Data for All Employees (Craft, Positions, Activity)

Craft: Security

Positions:
Fatally Injured Patrol Officer
Police Officer Dispatched to the Scene

Activity

Surveillance of commuter rail station
that had experienced recent criminal activity

EVENT

A Patrol Officer was fatally injured by gunshot wounds while conducting surveillance of a Metra commuter rail station where there had been recent criminal activity.

SUMMARY FOR FE-16-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Patrol Officer received multiple gunshot wounds while conducting surveillance of a commuter rail station.

REPORT:	**FE-16-2006**
RAILROAD:	Northeast Illinois Regional Commuter Rail Corporation (NIRC)
LOCATION:	Harvey, Illinois
DATE & TIME:	Sept. 27, 2006; 9:38 p.m., EST
EVENT[1]:	A Patrol Officer was fatally injured by gunshot wounds while conducting surveillance of a Metra[2] commuter station where there had been recent criminal activity.

EMPLOYEE:	Craft:	Security
	Occupation:	Patrol Officer, Metra Police Department
	Age:	43 years old
	Length of Service:	3 years, 7 months
	Last Rules Training:	N/A
	Last Safety Training:	N/A
	Last Physical:	N/A
	Last Relevant Efficiency Test:	N/A

CIRCUMSTANCES PRIOR TO THE ACCIDENT

A Metra police officer reported for duty at 2 p.m. on Sept. 27, 2006, at Metra's Kensington Yard facility located at l23rd Street in Chicago, Illinois. The officer was assigned to conduct surveillance of the Metra 147th Street Commuter Station located in Harvey, Illinois. This surveillance was being conducted due to recent criminal activity at the station and the surrounding area.

The officer was sitting in a marked police vehicle which was parked on non-railroad property across from the commuter station parking area. The weather was partly cloudy and dry.

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1 "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

2 Metra is the transit agency for NIRC.

THE ACCIDENT

At approximately 9:30 p.m. on Sept. 27, 2006, while sitting in the police vehicle, the officer received multiple gun shot wounds to the back of the head.

POST-ACCIDENT INVESTIGATION

On Sept. 27, 2006, the Harvey Police Department personnel received a phone call notifying them of an incident in an alley near 333 East 147th Place in Harvey. At approximately 9:38 p.m., the Harvey Police Department dispatched an officer to the area. While en route, the reporting officer was advised of a second call. Upon arrival at the scene, the reporting officer observed the Metra Police vehicle parked, facing in a northeasterly direction with the headlights on and the red dome light inside the vehicle activated. When he arrived at the vehicle, the reporting officer noticed a brown substance on the officer's mouth and on the bottom of his uniform shirt and a wound on the back of his head.

The reporting officer notified his superiors of the situation, then notified the Metra Police Department. Medical assistance was requested through the Harvey Police Department dispatcher. On Sept. 27, 2006, at 10:11 p.m., the officer was pronounced dead as a result of multiple gunshot wounds.

SUMMARY FOR FE-18-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Union Pacific Railroad (UP)
Location: Watsonville, California
Region: 7

Month: October
Date: Oct. 13, 2006
Time: 9:17 a.m., PST

Data for Fatally Injured Employee(s)

Brakeman
49 years old
2 years, 8 months of service
Last rules training: Dec. 7, 2005
Last safety training: Aug. 8, 2005
Last physical: Feb. 12, 2004
Last relevant efficiency test: Aug. 4, 2006

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

Train Crew LRQ42-R (Remote Control Operation)
Brakeman
Conductor

Watsonville Yard Office staff

Activity

Switching

EVENT

A Brakeman was fatally injured when struck and run over by rolling rail equipment during a switching operation.

SUMMARY FOR FE-18-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

Investigators concluded that the Brakeman was struck by rolling equipment after he slipped, fell, or stumbled into the path of rolling equipment. As there were no witnesses, the investigators could not say definitely whether the fall occurred because the Brakeman attempted to get on or off the equipment in motion.

PCF No. 2

The event recorder indicated that the Conductor's speed at the time of the incident exceeded 3 mph, the maximum allowed. The RCL locomotive was operated at speeds of nearly 9 mph just prior to the incident. Had the Conductor followed the speed limit, he may have been able to spot the Brakeman and stop in time to avoid the incident.

PCF No. 3

During Federal post-accident toxicological testing, barbiturates (Butalbital) were detected in the blood and urine of the Brakeman at a therapeutic, but nevertheless potentially impairing level. FRA investigation could not determine if the Brakeman had a prescription for the Butalbital or whether he was in compliance with Part 219.103 in using the drug.

REPORT:	**FE-18-2006**
RAILROAD:	Union Pacific Railroad (UP)
LOCATION:	Watsonville, California
DATE & TIME:	Oct. 13, 2006; 9:17 a.m., PST
EVENT[1]:	A Brakeman was fatally injured when struck and run over by rolling rail equipment during a switching operation.

EMPLOYEE:	Craft:	Transportation and Engine
	Occupation:	Brakeman
	Age:	49
	Length of Service:	2 years, 8 months
	Last Rules Training:	Dec. 7, 2005
	Last Safety Training:	Aug. 8, 2005
	Last Physical:	Feb. 12, 2004
	Last Relevant Efficiency Test:	Aug. 4, 2006

CIRCUMSTANCES PRIOR TO THE ACCIDENT

At 6 a.m. on Oct. 13, 2006, two operating crew members, a Conductor and Brakeman, reported for duty at UP's Watsonville Yard in Pajaro, Monterey County, California. The two employees were assigned to operate Train LRQ42-R (Remote Control Operation - RCL) with Locomotive UP 791. The two crew members' duties were to make up the local trains that originated out of the Watsonville Yard. The LRQ42-R was the crew's regular assignment, which normally was worked Monday through Friday, beginning at 5 a.m. Monday and 6 a.m. the rest of the week.

The Watsonville Yard is a typical ladder yard with leads on both ends and nine tracks currently in service. It is located between mileposts 95 and 97.5, on the Coast Subdivision, UP's Roseville Service Unit (RSU). The Coast Subdivision was designated as a north-south route, as stated in the RSU timetable. The track where the incident occurred was tangent, 90-lb. rail, with wood ties and spike fasteners. The grade was relatively flat and level. The track was designated as Federal Railroad Administration (FRA) "EXCEPTED." There used to be 12 tracks in the yard; however, Tracks 03, 09, and 10 had been removed over the years. The rail and ties had been removed and the ground leveled on the three tracks. The space remaining was used for vehicle access for maintenance and equipment crews. The yard had several lights mounted on poles, but

1 "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

this light was not enough to illuminate the entire yard. No remote video cameras were stationed at the Watsonville Yard.

The weather was cloudy and cool; the temperature was approximately 59° F.

The crew's first activity of the day was an FRA random drug test, which was conducted when the crew first reported on duty. Because Amtrak 14 had a critical accident to the north that delayed the arrival of the train bringing their cars, the crew member did not start switching until 8:15 a.m. Following their job briefing, the crew members of the RCL left the yard office, located on the south end of the yard. They went to the north end of the yard, down Track No. 04, to help in the arrival of Train LRQ83, which was carrying the cars necessary for their work. After the southbound train entered Yard Track No. 01, the LRQ42-R crew members lined the switches back and returned via Track No. 04 to the south end to begin making up the local trains. For these moves, the Brakeman was in control of the RCL.

THE ACCIDENT

After returning to the south end on Track No. 04, the Conductor took over control of the RCL. Several moves were made by the LRQ42-R, including placing or kicking cars on several tracks from the south lead. Of approximately 60 cars, several cuts were placed on several tracks, a 21-car cut was set to Track No. 04, and an 18-car cut was set to another track. A lumber car was kicked down the lead and stopped on top of Switch 06. There were 11 other cars that still needed to be switched. At that point, a radio job briefing was held concerning the remaining moves. The crew would pull up to the No. 14 track and spot three cars, then kick the last three onto the No. 4 track, completing the make-up of the Salinas local. That was the last communication between the Conductor and Brakeman. At this point, the Conductor controlled all movements, while the Switchman secured cars switched onto the various tracks.

The moves commenced as briefed with the Conductor standing on the lead on the side of the switches. The last three cars to be kicked onto Track No. 04 were SP 286 128, NOKL 524 015, and FBOX 502 280. The Conductor last saw the Brakeman between Tracks Nos. 02 and 04. Moments later, he saw the Brakeman rolling under the passing cars. The victim's control pack started the tilt warning, although the engine was stopped after the kick had been made.

When the Conductor realized that the incident had occurred, he contacted the Watsonville Yard Office via radio and asked for 911 assistance. Emergency response crews arrived on the site shortly after receiving the 911 call. Upon their arrival, the police and the coroner secured the area. Shortly after their investigation, the body was removed and taken to the Monterey County Coroner's Office in Salinas, California. The victim's control pack was also taken with the body and was held as evidence pending the coroner's release.

POST-ACCIDENT INVESTIGATION

The Conductor was taken to the maintenance-of-way office on the other end of the yard where conference calls and interviews were conducted by officials of UP, FRA, the California Public Utilities Commission (CPUC), and the National Transportation Safety Board (NTSB).

Statements were taken from the Conductor and all other Transportation and Engine employees in the Watsonville Yard office. The Conductor and a local chairman both told interviewers that the deceased Brakeman was known as a careful and safe worker with a good attitude and good work habits.

Site inspections and a re-enactment followed immediately after police and fire officials left with the corpse and released the area. The Conductor's control pack also was tested for tilt and engine response and found to have no defects.

A debrief also was held with representatives of the NTSB, UP, FRA, CPUC, and two labor organizations, the United Transportation Union and the Brotherhood of Locomotive Engineers, during which information was exchanged.

Analysis and Conclusions

The post-accident investigation included a review of the Brakeman's rules training, efficiency training, discipline history, and work history. Rules and procedures governing switching operations at the Watsonville Yard were reviewed, and further interviews were conducted jointly with the NTSB.

A download of the event recorder for the RCL locomotive showed it was operated at speeds between 7 and 9 mph immediately prior to the incident. As the event recorder indicated that the speed at the time of the incident exceeded 3 mph, the maximum allowed, the Conductor was required to attend one week of general operating rules training before returning to work.

Following the incident, the three cars last kicked to Tracks Nos. 04, SP 286128, NOKL 524015, and FBOX 502280 were inspected by UP mechanical officials, and no defects were noted that might have contributed to the incident.

An FRA track inspector examined the track at the accident site ("Excepted Track") and found no exceptions.

Based on the records and interviews of UP officers, the matter of crews getting on and off moving equipment had been an issue since the UP developed a rule in 2003 to prohibit it**.** The investigation revealed a culture among trainmen in Watsonville to continue this practice, however. UP records showed observations of crews were made on an average of once a month. Managers said they noted crews getting on and off moving equipment and handled these infractions verbally. Although the problem of getting on and off moving equipment was well known, there was neither evidence UP had mounted an extensive educational program in Watsonville Yard nor that the UP had enforced this rule through discipline. The Brakeman was tested by three UP officers on nine occasions between Feb. 8, 2005 and June 7, 2006 for rules concerning getting off and on equipment. No failures were taken on any of those tests.

During Federal post-accident toxicological testing, barbiturates (Butalbital) were detected in the blood and urine of the Brakeman at a therapeutic, but nevertheless potentially impairing level. FRA investigation could not determine if the Brakeman had a prescription for the Butalbital or whether he was in compliance with Part 219.103 in using the drug.

UP failed to conduct the required timely post-accident toxicological test on the Conductor. Although the incident occurred at 9:17 a.m. on Oct. 13, 2006, UP did not perform the post-accident test until 6:21 p.m. Therefore, a recommendation for civil monetary penalty was forwarded to FRA's Chief Counsel.

Following the investigation, UP issued MTO Circular 15 on Oct. 18, 2006, prohibiting kicking or pinning of cars at Watsonville, Salinas, and South San Francisco. UP also issued UP Coast Subdivision General Order 19 on the same date, raising the 5 mph speed restriction in the Watsonville Yard to 10 mph.

Investigators concluded that the probable cause of the employee's fatality was that the Brakeman slipped, fell, or stumbled into the path of rolling equipment. As there were no witnesses, the investigators could not say definitively whether the fall occurred because the Brakeman attempted to get on or off the equipment in motion.

The cause of death was as a result of traumatic amputation of the upper legs.

APPLICABLE RULES

Manager of Operations, San Jose, California,
Circular No. 2, effective Jan. 3, 2006

"To all concerned: At South San Francisco, San Jose, Watsonville, and Salinas, there will be no kicking on any job for any reason. Pinning off while on the lead is allowed so long as speed does not exceed 3 mph. Violations of this circular will result in discipline."

SUMMARY FOR FE-19-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Union Pacific Railroad (UP)
Location: Cisco, Utah
Region: 7

Month: October
Date: Oct. 26, 2006
Time: 4:20 p.m., MST

Data for Fatally Injured Employee(s)

Spike Puller Operator
46 years old
28 years of service
Last rules training: April 21, 2006
Last safety training: April 21, 2006
Last physical: Jan. 5, 1999

Data for All Employees (Craft, Positions, Activity)

Craft: Maintenance of Way

Positions:

Tie Gang Crew
Spike Puller Operator
Hi-rail Truck Operator
TKO (tie extractor/inserter machine) Operator
Tie Crane Operator
Spike Driver Operator
Employee in Charge

Railroad Dispatcher

Activity

Replacement of cross ties and
tying up equipment

SUMMARY FOR FE-19-06 CONTINUED
SELECTED FACTORS CONTINUED

EVENT

A Spike Puller Operator was fatally injured
when struck by on-truck equipment.

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Spike Puller Operator failed to comply with the railroad's operating rules prohibiting employees from standing on the track in front of an approaching engine, car, or other moving equipment.

PCF No. 2

The Spike Puller Operator failed to advise the Machine Operator behind him before he abruptly stopped his machine and dismounted.

PCF No. 3

The TKO Operator failed to stay at least 300 feet behind other on-track equipment, trains, or engines while traveling, in non-compliance with the railroad's operating rules.

PCF No. 4

The Tie Puller Operator failed to comply with proper railroad procedures for dismounting his machine. He should have dismounted the machine on the field side of the track, away from live traffic; stood beside his machine and directed the next roadway machine operator to a stop; and waited to go between machines until all machines had come to a stop or the Employee in Charge had given permission.

PCF No. 5

The Employee in Charge failed to comply with the railroad's operating rules when he gave an inadequate, initial briefing, and then failed to give another briefing when working conditions changed. His initial briefing did not include safe traveling distances between machines and safe procedures for tying up machines. After the tie gang experienced a problem with the tie crane, the Employee in Charge should have given a second briefing and had the tie gang travel closer together, which may have prevented the collision.

REPORT: **FE-19-2006**

RAILROAD: Union Pacific Railroad (UP)

LOCATION: Cisco, Utah

DATE & TIME: Oct. 26, 2006; 4:20 p.m., MST

EVENT[1]: A Spike Puller Operator was fatally injured when struck by on-track equipment.

EMPLOYEE:

Craft:	Maintenance of Way
Occupation:	Spike Puller Operator
Age:	46
Length of Service:	28 years
Last Rules Training:	April 21, 2006
Last Safety Training:	April 21, 2006
Last Physical:	Jan. 5, 1999

CIRCUMSTANCES PRIOR TO THE ACCIDENT

At 6 a.m., MST, on Oct. 26, 2006, a 6-employee system tie gang crew reported for work at the Green River, Utah Depot (milepost 555.0). The gang members drove their personal vehicles to Thomson, Utah (milepost 528.0) where the tie equipment was stored. The on-track equipment consisted of a hi-rail truck, a spike puller, a TKO (tie extractor/inserter machine), a tie crane, and a spike driver. After receiving a job briefing, which included instructions to wear personal protective equipment, and clearance to occupy the main line, the tie gang proceeded to the work site. The gang was assigned to replace 55 cross ties east of Thompson, Utah, at milepost 523.0. After replacing the cross ties, the tie gang was to travel east on the main line to Cisco, Utah at mile post 504.0 and to tie up (store) the equipment for the following week's work. The weather was clear and sunny, and the temperature was approximately 52° F.

THE ACCIDENT

After leaving the job site at milepost 523.0 at about 3:30 p.m., the tie gang had a problem with the tie crane's chain drive at about milepost 520.0. The Maintenance Machine Operators

1 "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

decided to attach the tie crane to the TKO (tie remover) machine and pull it to Cisco, Utah. Traveling east, the Hi-rail Truck Operator was first to leave, followed by the Spike Puller Operator, the TKO Operator pulling the tie crane, and the Spike Driver Operator. The Hi-rail Truck Operator remained on the track and went ahead to Cisco approximately four miles ahead of the rest of the equipment. The spike puller was ahead of the TKO tie crane by about 3,000 feet, and the spike driver was about 300 feet behind the TKO and crane. Although there is no mechanical device on the machines to accurately determine speed, the TKO Operator estimated he was traveling at 20 mph.

After traversing a left-hand curve and descending a one percent grade, the TKO Operator saw the spike puller about 3,000 feet ahead of his machine, and assumed that the spike puller was still moving east. At about that same time, and for an unknown reason, the Operator of the spike puller machine stopped, dismounted his machine, and moved to a position where he fouled the track. UP officials speculated he might have stopped to put his jacket on, as his safety vest and a work glove were found underneath his body.

The TKO Operator did not notice the tie puller machine was stopped until he was about 150 feet from the spike puller. He applied his brakes and collided with the spike puller machine. The machines traveled an additional 81.3 feet before coming to a complete stop. Due to the impact of the machines, the Spike Puller Machine Operator was apparently thrown onto the rails and run over by his own machine. The speed at impact is unknown. The accident occurred at milepost 508.0, and the time was about 4:20 p.m., MST.

There were two railroad radios with the tie gang, one on the tie crane and the other in the hi-rail truck. After the collision, the Tie Crane Operator radioed for help. His first call was to the Hi-rail Truck Operator and his second was to the Railroad Dispatcher. Emergency personnel from Moab, Utah were dispatched and responded. A medical helicopter was also dispatched to the accident site, but was released after emergency medical personnel on-site pronounced the Machine Operator dead. The deceased was transported to Moab, Utah by Grand County emergency personnel and then transported to the Medical Examiner's office in Salt Lake City, Utah, where an autopsy was performed.

Mechanical inspections of the involved TKO and spike puller machines revealed no defective conditions that caused or contributed to the accident. Post-accident statements of the Maintenance Machine Supervisor indicated that after testing the spike puller, no problems were found with it to indicate why the Operator had stopped his machine. The mechanical inspection of the TKO machine revealed no defects with the braking or others systems that would have contributed to the accident. FRA inspections of the on-track maintenance machines also revealed no conditions that caused or contributed to the accident. Law enforcement investigators ruled the fatality as an accident.

Conclusion and Analysis

During the safety briefing, the tie gang members were instructed to wear their personal protective equipment while operating their machines. The deceased employee was trained and qualified by the railroad to perform the duties of a Maintenance Machine Operator and was qualified in the operations of moving maintenance machines from one location to another and qualified in the railroad's Roadway Protection Rules. The decedent's attention was inexplicably diverted from what he had been trained to do when he stopped his machine on the main track and stood inside the foul position of the equipment without alerting the Machine Operator who was moving behind him.

The TKO Operator's attention was also diverted from his assigned role of safely moving on-track, maintenance machines from one location to another. The TKO Operator was inattentive and did not keep a lookout for other men and equipment in his direction of travel until the last seconds before his machine collided with the rear end of the spike puller.

Contributing to this accident was the lack of an additional safety briefing, especially when the tie gang experienced a problem with the tie crane. The tie gang could have remained closer together in the event there were additional problems with the machines.

Post-accident toxicology tests performed on the tie gang employees were negative. Tie gang on-track maintenance machines included:

1. A hi-rail truck (which supported the tie gang);

2. A spike puller; SPD 9715 (Narco Super Claw); Serial Number #459; Weight 6,300 lbs.; Year Built 1991; ($1000 damage estimated.);

3. A TKO tie extractor/inserter machine; Serial Number TKO-703; Weight 23,500 lbs.; Year Built 1986; ($1000 damage estimated.);

4. A tie crane; THC-9612 (Jackson 950M); Serial Number 9614; Weight 16,700 lbs.; Year Built 1996; and

5. A Spike Driver; SDAG 5265 (Narco); Serial Number 1076; Weight 21,500 lbs.; Year Built 1995.

APPLICABLE RULES

Union Pacific Railroad
Operating On-Track Equipment Rules Detail
Oct. 30, 2006

1.1.2: Alert and Attentive

Employees must be careful to prevent injuring themselves or others. They must be alert and attentive when performing their duties and plan their work to avoid injury.

1.1.4: Alert to Train Movement

Employees must expect the movement of trains, engines, cars, or other movable equipment at any time, on any track, and in either direction.

Employees must not stand on the track in front of an approaching engine, car, or other moving equipment.

42.2: Maximum Speeds

The maximum track speed for roadway machines and work equipment is 30 mph.

42.2.2: Other Speed Requirements

Track cars and machines must be operated at a speed that will allow the Operator to stop in half the distance the track is seen to be clear.

When approaching workmen or others on or near the track, reduce speed and, if necessary, stop. Operators of on-track equipment (track cars, roadway machines, work equipment, and hi-rails) must ascertain that no employees are fouling the track at a certified control point or interlocking.

136.3.1: Job Briefing for Roadway Work Groups

The employee in charge must conduct a job briefing that includes all information related to on-track safety, such as tracks that may be fouled, safe working/traveling distance between machines, or changes in working conditions or procedures.

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SUMMARY FOR FE-22-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Union Pacific Railroad (UP)
Location: Carson, California
Region: 7

Month: December
Date: Dec. 4, 2006
Time: 9:40 a.m., PST

Data for Fatally Injured Employee(s)

Brakeman
35 years old
8 years, 11 months of service
Last rules training: Oct. 14, 2005
Last safety training: Nov. 2, 2006
Last physical: Nov. 10, 2005
Last relevant efficiency test: Oct. 7, 2006

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

Train LOI-16R-04 (Remote Control Operation)
Brakeman
Conductor

Yard Master
Tractor-trailer Driver

Activity

Switching

EVENT

A Brakeman was fatally injured during a collision with a delivery truck at a highway-rail grade crossing, during a switching operation.

SUMMARY FOR FE-22-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Conductor failed to comply with the railroad's operating rules requiring rail movements, in Southern Pacific territory track, to stop where a STOP sign is located next to a highway-rail grade crossing.

PCF No. 2

The Conductor collided with a truck at a highway-rail grade crossing, pinning the Brakeman between the truck and the rail car.

PCF. No. 3

The Wilmington Avenue crossing had a high volume of truck traffic exiting the freeway en route to the port facility and nearby industrial buildings, increasing the likelihood of a highway-rail collision.

PCF No. 4

The close proximity of the STOP sign to the grade crossing left little margin for error. The California Public Utilities Commission has been exploring this issue to determine what measures should be taken.

PCF No. 5

The two communication losses between the Brakeman and Conductor within 1,200 feet of track indicated to investigators a problem with the employees' attention and situational awareness.

REPORT:	**FE-22-2006**	
RAILROAD:	Union Pacific Railroad (UP)	
LOCATION:	Carson, California	
DATE & TIME:	Dec. 4, 2006, 9:40 a.m., PST	
EVENT[1]:	A Brakeman was fatally injured during a collision with a delivery truck at a highway-rail grade crossing, during a switching operation.	
EMPLOYEE:	Craft:	Transportation and Engine
	Occupation:	Brakeman
	Age:	35
	Length of Service:	8 years, 11 months
	Last Rules Training:	Oct. 14, 2005
	Last Safety Training:	Nov. 2, 2006
	Last Physical:	Nov. 10, 2005
	Last Relevant Efficiency Test:	Oct. 7, 2006

CIRCUMSTANCES PRIOR TO THE ACCIDENT

At 6:30 am., PST, on Dec. 4, 2006, two operating crew members, a Conductor and Brakeman, reported for duty at UP's Delores Yard in Carson, California, Los Angeles County. They were assigned to operate Train LOI-16R-04 in Remote Control Operation (RCO) with locomotives UP 639 and UPY 660. Their duties were to switch or separate cars needed for industries located on the Carson Industrial Lead (also known as 7400 zone) from yard tracks located in Delores Yard. Upon completion, the crew was to transport loads to the Carson Industrial Lead where loaded cars were to be placed at industries and empty cars, if any, were to be removed from the industries. LOI-l6R-04 was the crew members' regular assignment, which they normally worked Monday through Sunday, beginning at 6:30 a.m. daily. The Conductor had just recently bid the job in but had worked it on past occasions. The Brakeman had been on the assignment since March 2006. The Conductor had been off for 36 hours and the Brakeman for 84 hours prior to Dec. 4, 2006.

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1 "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

Delores Yard is a typical switching yard with leads located at both ends. Other than transfer jobs, the majority of the switching assignments at Delores Yard are RCO assignments. Carson Industrial Lead is an industrial lead containing approximately 16 industries, as well as an additional lead and storage tracks. The lead is approximately one mile in length and crosses three public crossings from its origin at Delores Yard (Track No. 850) until it dead ends at Bonito Street. It is located in the Alameda Corridor Subdivision, Los Angeles Service Unit.

Proceeding in a railroad eastward direction toward Wilmington Avenue, the site of the accident, the track is a slight right-hand curve, relatively flat and level. The track is designated as an industrial lead, and Other Than Main Track rules apply to the lead. No remote control video cameras are located on the Carson Industrial Lead.

Wilmington Avenue is a paved, 2-lane road, approximately 41 feet wide, that crosses one FRA excepted track at a 90-degree angle. Highway vehicles travel in a north/south direction. The maximum authorized speed for train movement is 10 mph. For each direction of vehicular traffic, the warning system consists of two standard 5-inch masts. One mast is near the edge of the roadway, and the other is in the center island. Attached to each mast near the edge of the roadway are a cross buck, a 12-inch flashing light unit, and an audible warning bell. Attached to each island mast is a cross buck and a 12-inch flashing light unit. A direct current island track circuit provides train detection. A simultaneous preemption circuit is provided for the vehicular traffic.

The crew members' first activity of the day was to retrieve their power from Track No. 906 and perform switching operations to retrieve 16 cars from Tracks Nos. 910, 911, and 912. When they finished putting their train together and coupling the air brake hoses, the Conductor performed a yard transfer air brake test. After performing the air brake test and conducting a job briefing, the Conductor shoved the 16 cars from Track No. 850 to Track No. 855 where the crew set out 10 of the 16 cars on the Lead and Storage Track No. 855. The Conductor then pulled the remaining six cars out onto Track No. 853 and ran around the cars, leaving the Brakeman at the railroad east end of the cars, in position to take the shove after he completed the runaround movement. The Conductor was in control of the RCO movements, and his transmitter controlled all movements until completion of the runaround movement.

The weather was clear and cool, and the temperature was approximately 56° F.

THE ACCIDENT

The Conductor stated during an interview that after completion of the runaround movement, he coupled the air into the remaining six cars and pitched control of the RCO to the Brakeman. He said he was unsure if another air brake test was performed on the cars at that time. The Conductor went aboard UP unit UPY66O in anticipation of moving the remaining six rail cars to the industries for placement on their unloading tracks. Shortly after beginning movement in an eastward direction, train movement came to a stop, and the Brakeman called the Conductor and requested that he reset his remote control transmitter due to a communication loss. The Conductor did so and after a short period of time, movement commenced in an eastward direction again. Shortly after movement commenced, a second communication loss occurred, causing the movement to come to a stop. The Conductor stated that after resetting the remote control equipment a second time, they commenced movement toward the industries and approximately six to eight cars later came to a stop**.**

The Brakeman's remote control transmitter began broadcasting a tilt/man down message at this time. The Conductor stated he tried three times to contact the Trainman via radio, and he did not answer. Fearing problems, the Conductor came off the locomotive and ran to the crossing where he found the Brakeman pinned between the lead car TGCX 1454 and a delivery truck that had been struck on the passenger's side. After being struck, the truck was shoved approximately 25 feet, causing the rear of the truck to spin in toward the rail car and pin the employee between the rail car and the truck. The Conductor contacted the Yard Master at Delores Yard who then contacted emergency response personnel.

The employee was removed from the scene with no vital signs and transported to Long Beach Memorial Hospital. The employee was revived at the hospital and placed on life support equipment. On Dec. 10, 2006 at 12:00 p.m., the employee's family made the decision to remove him from life support equipment, and he subsequently passed away. The time of death as noted on the certificate of death is 1:40 p.m. on Dec. 10, 2006.

POST-ACCIDENT INVESTIGATION

When the Conductor realized that the Brakeman was injured, he contacted the Delores General Yard Master by cell phone, and the Yard Master contacted the Emergency responders. Emergency response crews arrived on the scene shortly after the 911 call. Upon arrival of the Los Angeles County Sheriff's Department, the streets were closed off to vehicular traffic, and the injured employee was removed from between the truck and the rail car. The employee was then transported to Long Beach Memorial Hospital where he was placed on life support.

The Conductor was kept at the site until the injured Brakeman was removed and was briefly questioned by railroad officials. He left the scene prior to the arrival of FRA and California Public Utility Commission (CPUC) investigators.

FRA and CPUC inspectors arrived on the scene approximately 1.5 hours after the accident and began the investigation shortly after the injured employee was removed.

Post-accident investigation was conducted by FRA; CPUC; UP's signal, operating, and claims departments; and the Los Angeles Sheriff's Department.

The initial investigation of the accident scene and downloads of the locomotive's event recorder revealed that the Brakeman, who was riding the point and in control of the shoving move, had not stopped at a STOP sign located 40 feet prior to the Wilmington Avenue grade crossing. The rail cars had likely entered the grade crossing without activating the warning lights and struck the truck that was occupying the grade crossing. A re-enactment of the incident was performed approximately three hours after the incident. The re-enactment and a review of the downloaded recorder data tended to reinforce the initial conclusion that the operator had passed a STOP sign without stopping and struck the truck on the crossing.

Prior to reopening the crossing to vehicular traffic, tests were conducted by the UP signal department to ascertain if the crossing equipment had functioned as designed. The initial tests and those conducted during the subsequent re-enactment revealed that the equipment had functioned as intended.

UP requested that the remote control equipment manufacturer, Cattron-Theimeg, review the download obtained from the RCL event recorder. Cattron-Theimeg's review concluded that the RCL equipment on the UPY 660 had functioned properly.

The deceased employee had not performed service for 3.5 days prior to the incident. The Conductor had not performed service for 1.5 days prior to the incident.

Post-accident toxicological fatality tests were not administered to either the Conductor or the then-injured Brakeman either immediately following the accident or following the Brakeman's death. The reason cited was that the Brakeman died six days after sustaining his injuries.

Analysis And Conclusions

Cattron Remote Control Transmitters (RCTs) have two separate air brake controls to correspond with locomotive air brake systems. The first system by which a Remote Control Operator (RCO) can stop a movement is by placing the speed selector lever to the stop position. This action causes a full independent brake application (engine brakes only) to occur. In addition, the speed selector has positions from 10 mph down to coast that use independent braking to achieve the speed selected. In the case of the coast position, speed would be allowed to build up to 10 mph and then would be maintained at that speed. Various levels of independent brake applications may also be made by using a lever called the independent brake override selector. This lever, found on the opposite side of the RCT, will apply minimum, medium, or full independent brake to the engines only. The last position found on this lever is the emergency brake position. Normally used only in an emergency, this position exhausts all air from the braking system that extends from the engine through all attached cars. Using current remote technology, this position allows for the fastest stopping possible. A second system for stopping or slowing is use of a toggle switch on top of the RCT which allows the operator to make different automatic brake applications for the engine and attached freight cars.

The RCT allows the operator to use the speed selector toggle switch on the right side of the RCT to slow or stop the train using engine brakes only, or the independent brake override toggle switch on the left side of the RCT to actuate an emergency brake pipe application. The operator can employ both of these toggle switches while riding the side of a car and still maintain 3-point contact with the car. The 3-point contact is defined as one hand and two feet being in contact with equipment.

Results of the event recorder for the remote control locomotive show that it operated for one minute and five seconds at speeds between 10 and 0 mph prior to coming to a complete stop upon impact. It indicates that just prior to the collision, the RCT was in the coast position and went directly to the STOP position. The RCT stayed in the STOP position with independent engine brakes fully applied for an additional six seconds. During this time, speed was reduced from 10 mph to 7.9 mph. At this point, the operator (Brakeman) placed the RCT in an emergency application position. The operator would have been approximately at the STOP sign when he placed the train into emergency. The event recorder tape does not indicate that a stop was made at the STOP sign. The train moved for an additional nine seconds until it came to a complete stop with rail cars occupying the grade crossing, following the collision with the delivery truck. A physical inspection of the accident scene verified that the distance between 223rd Street and Wilmington Avenue was 970 feet. Moving at 10 mph for 65 seconds would generate movement of approximately 953 feet. At 10 mph, that would equal 14.66 feet per second x 65 seconds. This shows the physical distance and the time elapsed were reasonably close. However, the event recorder does indicate that the engine moved 22, 900 feet from start to stop. This is an indication that the footage counter on the event recorder was not reliably accurate, but this disparity had no effect on and did not contribute to the accident.

The post-accident investigation included a review of the rules training, efficiency training, and discipline and work history of the Brakeman. It also included a review of previous accidents at Wilmington Avenue. The decedent was trained and certified as a remote control operator with his last qualification ride being performed on Sept. 24, 2006. He had been tested a total of 39 times in the previous 365 days with a pass rate of 39 for 100 percent. His most recent STOP test had occurred on Oct. 7, 2006 with no exception noted. His fellow worker and the local chairman noted that he was a safe and conscientious worker.

The crossing at Wilmington Avenue is a busy grade crossing with a high volume of truck traffic exiting the 405 Freeway to transit to the port facility and nearby industrial buildings. FRA obtained UP reports (FRA Forms 6180.57 and 6180.97) of another accident at this crossing that had occurred on July 6, 2006 and, coincidentally, involved the decedent and another crew member. UP described the incident, as follows:

> The LOI16R-06 crew shoved five cars back from International Paper and stopped at Wilmington Avenue at the stop board. The crew then proceeded upon the traffic clearing eastbound when the tractor-trailer rig fouled the track and the Driver accelerated, but was struck.
>
> In this accident, the Driver of the tractor-trailer sustained minor injuries and was at fault. There was no allegation of wrongdoing on the decedent's part.

The close proximity of the STOP sign to the grade crossing leaves little margin for error. The two communication losses between the Operator and the locomotive within 1,200 feet of track suggests a problem with the employees' attention and situational awareness. CPUC is looking into possible changes to increase the safety for both vehicular and train traffic at the crossing.

The probable cause of the fatality is that the Brakeman stayed on rail equipment that entered a grade crossing without stopping and struck the delivery truck which pinned him between the truck and the rail car.

APPLICABLE RULES

ITEM 23. ROADWAY SIGNS, as shown in the UPRR SYSTEM SPECIAL INSTRUCTIONS, effective Sunday, June 18, 2006, shows a diagram of a STOP sign similar to the STOP sign posted 40 feet prior to entering the highway-rail grade crossing at Wilmington Avenue.

The General Code of Operating Rules, Section 6.32.2, as shown in the UPRR SYSTEM SPECIAL INSTRUCTIONS, effective Sunday, June 18, 2006, states, in part: "On prior SP (Southern Pacific) territory track where a STOP sign is located next to a grade crossing, movement must stop at the STOP sign. Movement may proceed only after automatic crossing warning devices have been operating long enough to provide warning, and crossing gates, if the crossing is so equipped, are fully lowered. If automatic crossing warning devices fail to operate, movement may enter the crossing only after a crew member is on the ground at the crossing to warn highway traffic."

SUMMARY FOR FE-24-06
SELECTED POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: CSX Transportation Incorporated (CSX)
Location: Selkirk, New York
Region: 1

Month: December
Date: Dec. 18, 2006
Time: 11:57 p.m., EST

Data for Fatally Injured Employee(s)

Car Inspector
53 years old
13 years of service
Last rules training: Jan. 14, 2006
Last safety training: Jan. 14, 2006
Last physical: Aug. 14, 2005

Data for All Employees (Craft, Positions, Activity)

Craft: Maintenance of Equipment

Positions:

Car Inspector
Two additional Car Department employees
Yard Master

CSX Train No. Q164-18
Conductor
Locomotive Engineer

Activity

En route in all terrain vehicle (ATV) to work site
to perform a train inspection.

EVENT

A Car Inspector was fatally injured during a collision between a locomotive and the ATV he was driving at a highway-rail grade crossing.

SUMMARY FOR FE-24-06 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Car Inspector, driving an ATV, collided with a locomotive at a highway-rail grade crossing.

PCF No. 2

The Car Inspector failed to stop at the STOP sign posted immediately before the private industrial crossing, which was equipped with STOP signs only.

PCF No. 3

As the incident occurred at night, the Car Inspector may not have noticed the STOP sign due to poor visibility.

REPORT: **FE-24-2006**

RAILROAD: CSX Transportation, Incorporated (CSX)

LOCATION: Selkirk, New York

DATE & TIME: Dec. 18, 2006; 11:57 p.m., EST

EVENT[1]: A Car Inspector was fatally injured during a collision between a locomotive and the all terrain vehicle (ATV) he was driving at a highway-rail grade crossing.

EMPLOYEE:

Craft:	Maintenance of Equipment
Occupation:	Car Inspector
Age:	53 Years
Length of Service:	13 years
Last Rules Training:	Jan. 14, 2006
Last Safety Training:	Jan. 14, 2006
Last Physical:	Aug. 14, 2005

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The Car Inspector reported for his first tour of duty after returning from four days of vacation at 3 p.m. on Dec. 18, 2006. Upon reporting for duty, he received a start-of-shift safety meeting and job briefing. Among the topics discussed was the fatal accident that had occurred only five days earlier in Syracuse, New York, involving a Car Department employee who was struck at a rail crossing in CSX's Dewitt rail facility on Dec. 14, 2006.

Before the completion of his first shift, the Car Department employee was called to fill a vacancy on the next shift, to begin at 11 p.m. Upon reporting for his second shift, the Car Inspector received another start-of-shift safety meeting and job briefing, which also included a discussion of the same fatal accident in Dewitt the week before.

At 11:35 p.m., the Car Inspector was assigned to inspect CSX Train No. Q436-19 on Yard Track No. 13. An ATV would be used as transportation to carry out this assignment. On his way to the west end of Yard Track No. 13 to join two other Car Department employees

[1] "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

who had preceded him in order to place a blue flag on the track, he stopped first at the car shop to get gas for the ATV.

After fueling up, the Car Inspector departed the car shop and continued on toward Yard Track No. 13. He proceeded through a tunnel immediately to the east of the hump tower, and made a right hand turn onto the service road immediately behind the tower, following it in a westbound direction.

In the mean time, CSX Train No. Q164-18 had been released to the department and was approaching the Inbound Lead Crossing on the service road immediately behind the hump tower. The crew of CSX Train No. Q164-18 consisted of a Conductor and a Locomotive Engineer. Both had reported for duty at 10:30 p.m. after a statutory period of rest. At 11:40 p.m., they boarded their train and, after checking the required paperwork, they informed the Yard Master at 11:45 p.m. that they were ready to proceed. They were instructed to stand by, pending the completion of an inspection of their train by the Car Department. At 11:55 p.m., the crew members were informed that the Car Department had completed its inspection, and they were released to depart.

The sky was overcast, and the temperature was 38° F, with an average wind speed of 8.2 mph from the west, providing a wind chill factor of 32° F.

THE ACCIDENT

At approximately 11:57 p.m., as the Q164-18 approached the Inbound Lead Crossing, the Car Inspector was following close behind a hotel shuttle van as it passed immediately in front of the approaching Q164-18. He then drove his ATV directly into the path of the on-coming eastbound CSX freight train at a highway-rail grade crossing located within CSX's yard facility at Selkirk, New York, where he was struck and fatally injured. It does not appear that the Car Inspector made any attempt to stop at the STOP sign posted immediately before the crossing.

The employee had been operating an ATV in the performance of his assigned duties and responsibilities. The freight train, CSX Q164-18, had just begun to pull, leaving the yard to begin an assigned trip from Selkirk, New York, to South Kearney, New Jersey, when the Car Inspector drove the ATV into its path. The Car Inspector did not have sufficient time to clear the crossing, and was struck by the train. Train speed, as recorded on the lead locomotive's (CSX 612) event recorder, was 8 mph.

The ATV was completely demolished, but the lead locomotive sustained no damage, and no rail equipment was derailed. Neither train crew member sustained injuries.

The highway-rail grade crossing is located on a paved service road immediately behind the hump tower in the Selkirk Yard, and is referred to as the Inbound Lead Crossing. It is a private industrial crossing, and is equipped with STOP signs only. It is not assigned a DOT number and is not listed in the National Inventory of highway-rail grade crossings.

POST-ACCIDENT INVESTIGATION

FRA's Region I Deputy Administrator, Grade Crossing Safety Program Manager, Motive Power and Equipment Safety Inspector, and one Hazardous Materials Safety Inspector responded to the accident scene in the Selkirk rail facility, Selkirk, New York, after 2 a.m. on the morning of Dec. 19, 2006.

During the investigation, the following materials and information were obtained:

- Accounts from interviews of the crew and eye witnesses;
- Event recorder data;
- Employee histories of the fatally injured Car Inspector, Locomotive Engineer, and Conductor;
- Copies of the carrier's accident and personal injury reports;
- A copy of the police report from the Bethlehem, New York Police Department; and
- Copies of information relative to the carrier's ATVs, including training and operational policies. The carrier had implemented an action plan to address highway-rail grade crossing safety issues for employees working within its rail facilities. The action plan included an intensive safety awareness campaign.

Analysis and Conclusions

Although it appeared that highway user inattention was the probable cause in this case, the accident remained under investigation at the time of this report, and any final determination would depend upon a more thorough review of the facts and circumstances.

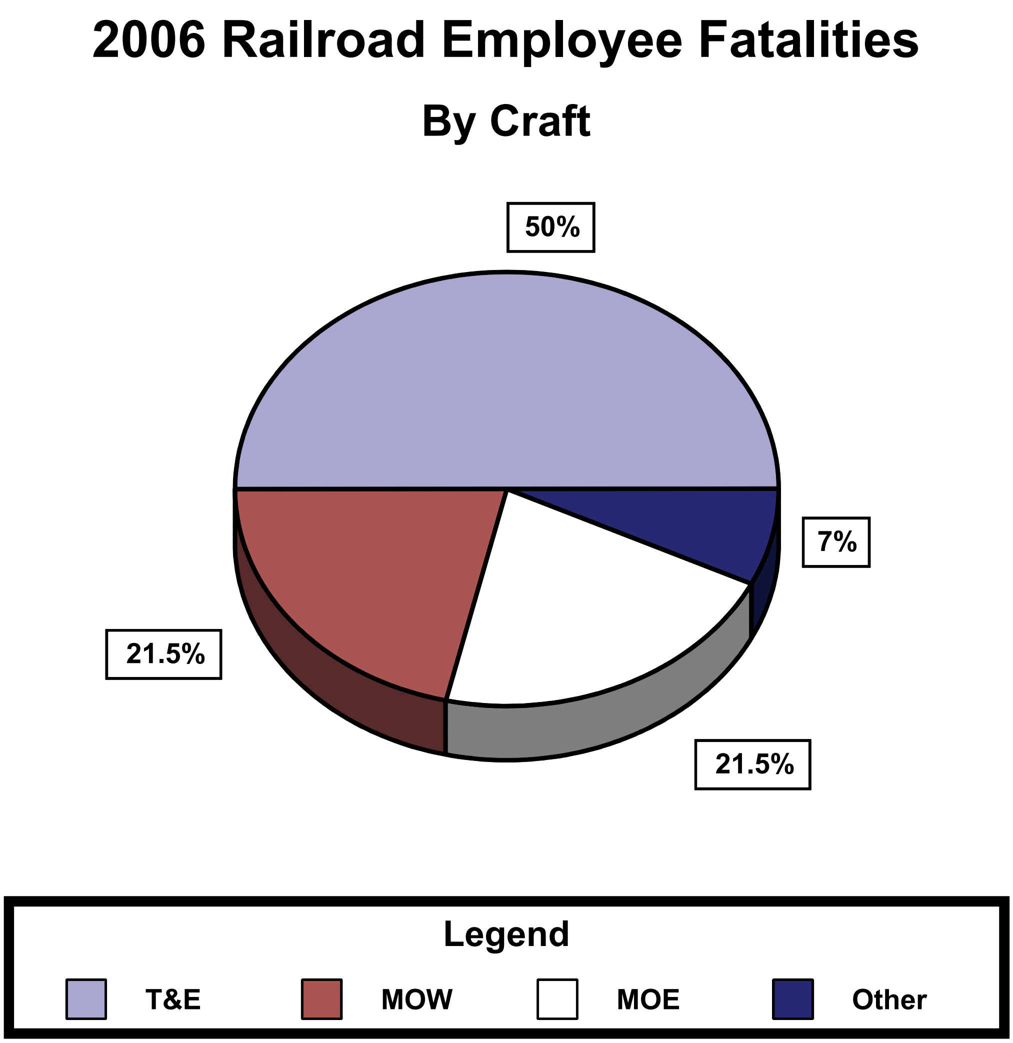
APPLICABLE RULES

No Federal regulations or railroad operating rules appear to have been violated.

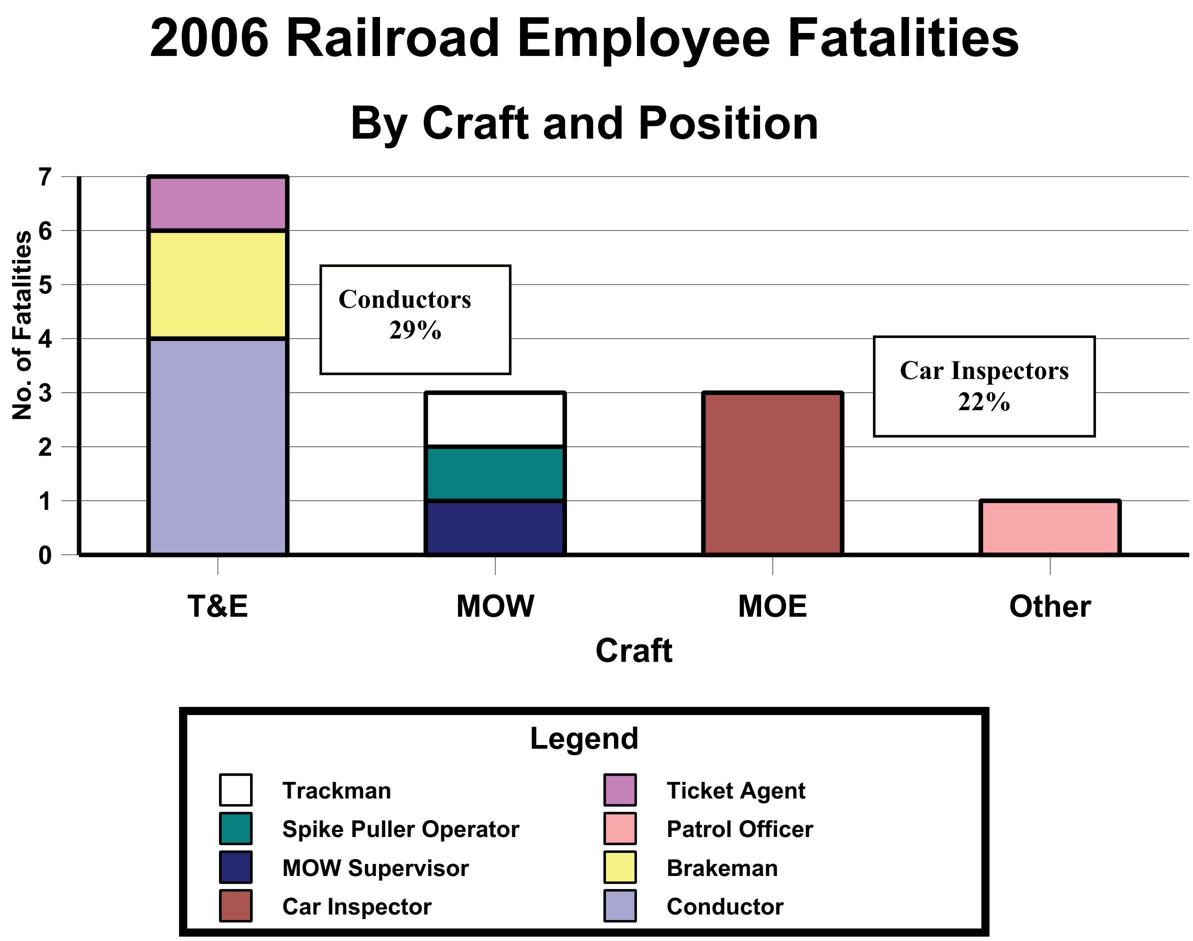
APPENDICES A THROUGH I

(BAR AND PIE CHARTS)

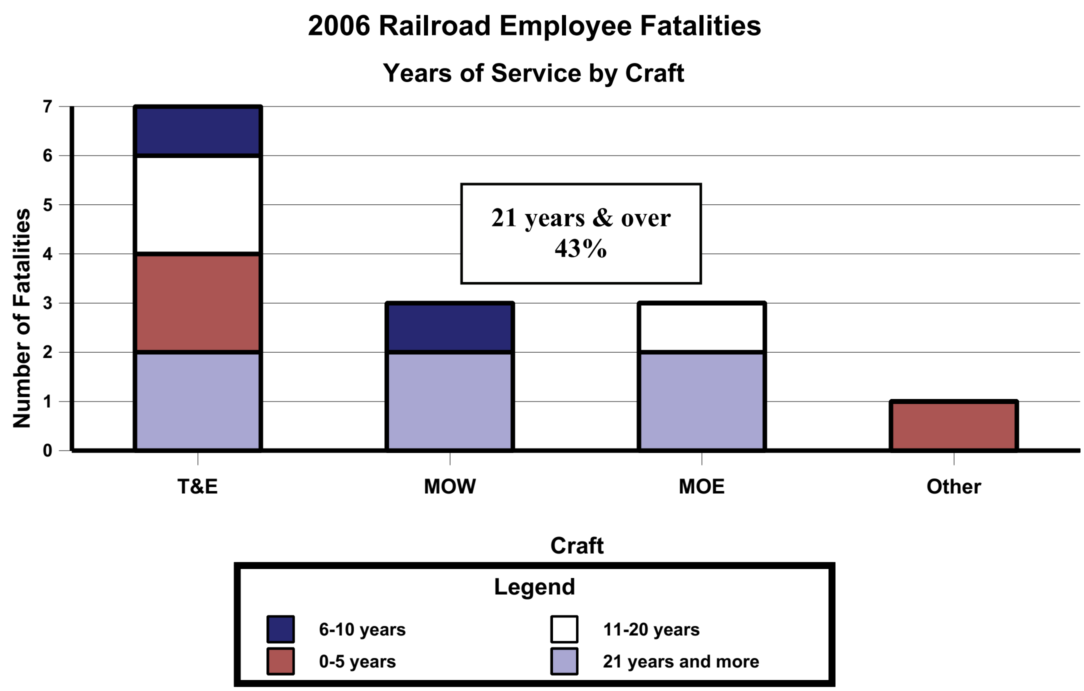
APPENDIX A

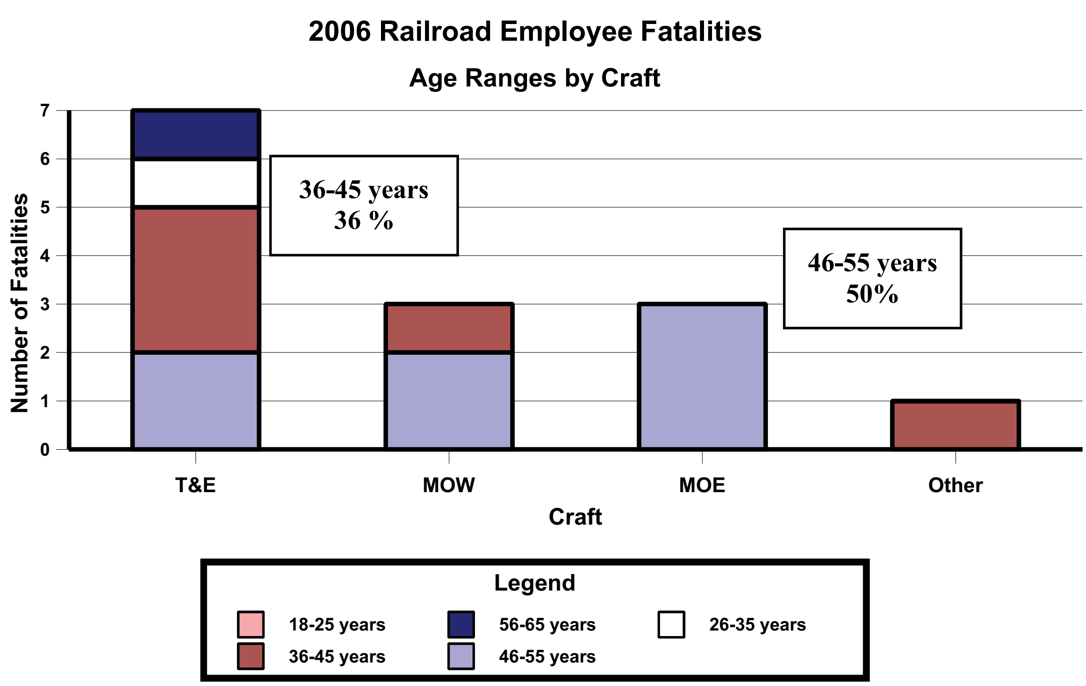

2006 Railroad Employee Fatalities
By Craft
50%
7%
21.5%
21.5%
Legend
T&E
MOW
MOE
Other

APPENDIX B


2006 Railroad Employee Fatalities
By Craft and Position
No. of Fatalities
0
1
2
3
4
5
6
7
Conductors
29%
Car Inspectors
22%
T&E
MOW
MOE
Other
Craft
Legend
Trackman
Spike Puller Operator
MOW Supervisor
Car Inspector
Ticket Agent
Patrol Officer
Brakeman
Conductor

APPENDIX C

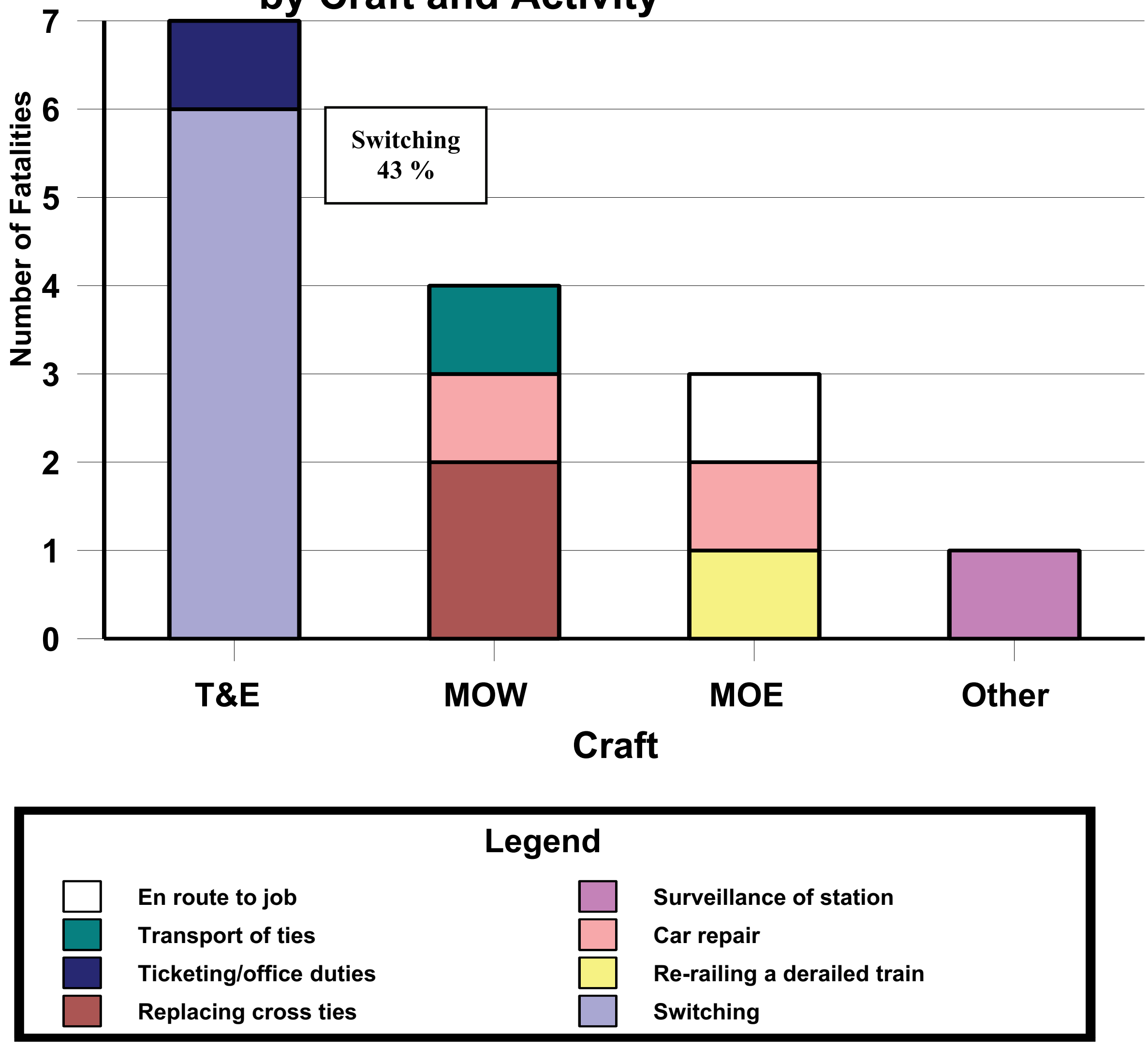

2006 Railroad Employee Fatalities
Years of Service by Craft
Number of Fatalities
0
1
2
3
4
5
6
7
21 years & over
43%
T&E
MOW
MOE
Other
Craft
Legend
6-10 years
11-20 years
0-5 years
21 years and more


2006 Railroad Employee Fatalities
Age Ranges by Craft
Number of Fatalities
0
1
2
3
4
5
6
7
36-45 years
36 %
46-55 years
50%
T&E
MOW
MOE
Other
Craft
Legend
18-25 years
56-65 years
26-35 years
36-45 years
46-55 years

APPENDIX D

2006 Railroad Employee Fatalities

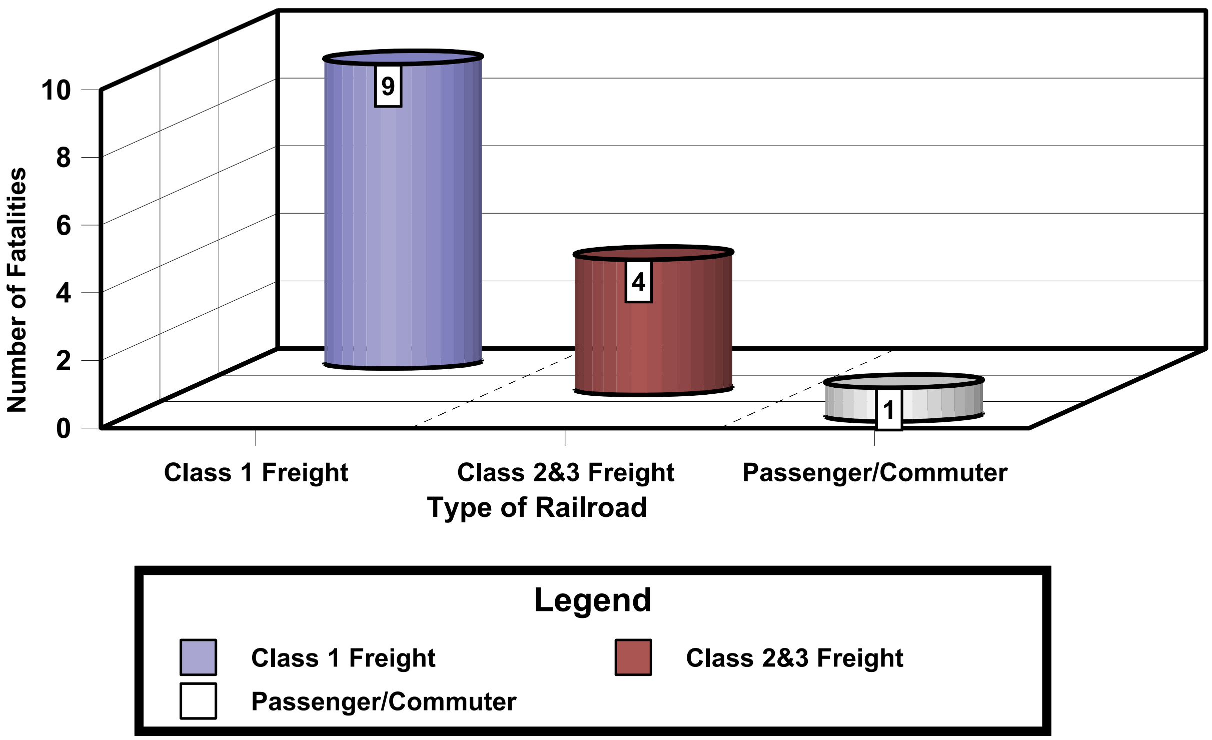
by Craft and Activity



APPENDIX E

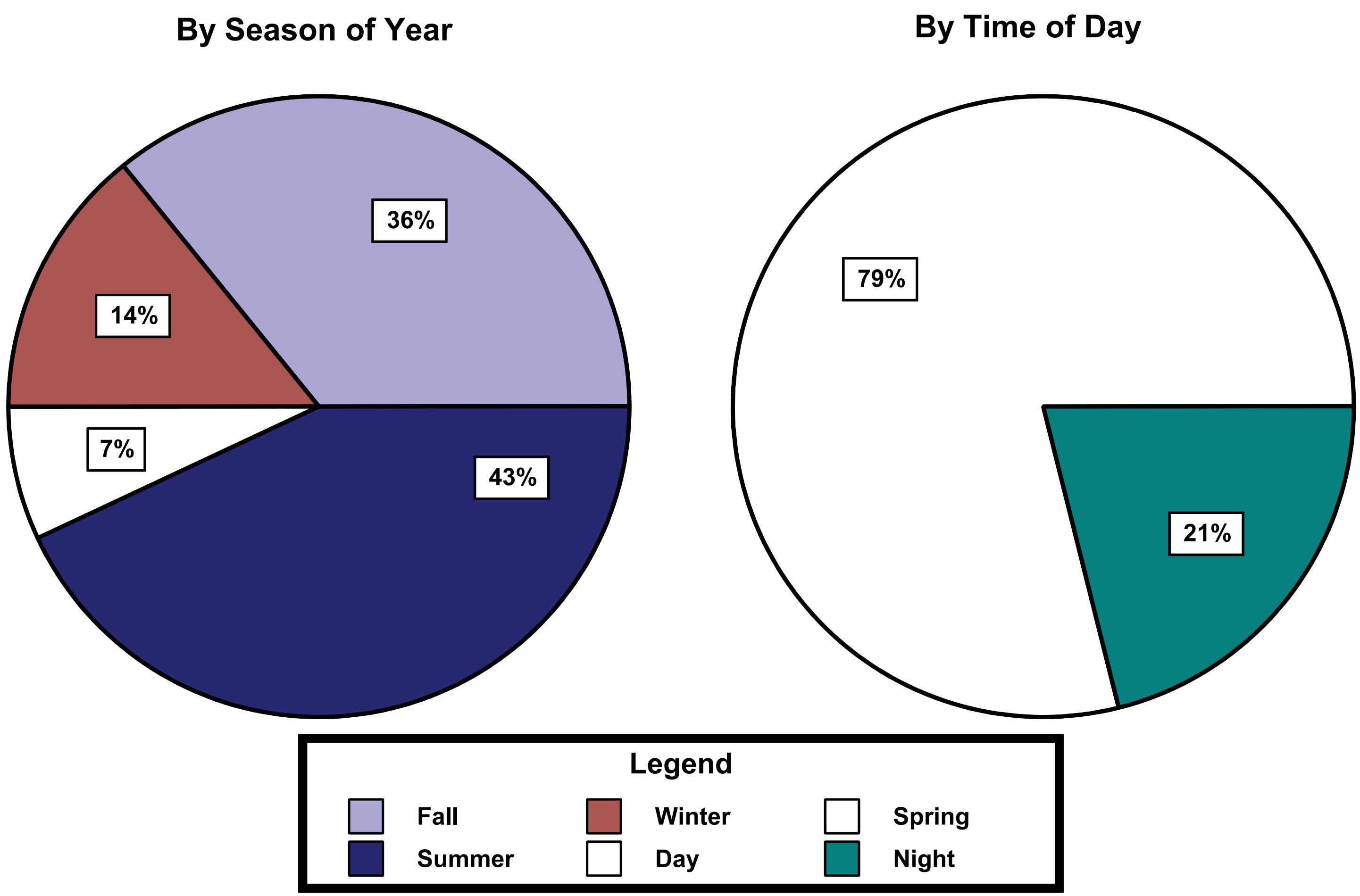
2006 Railroad Employee Fatalities

By Type of Railroad



APPENDIX F

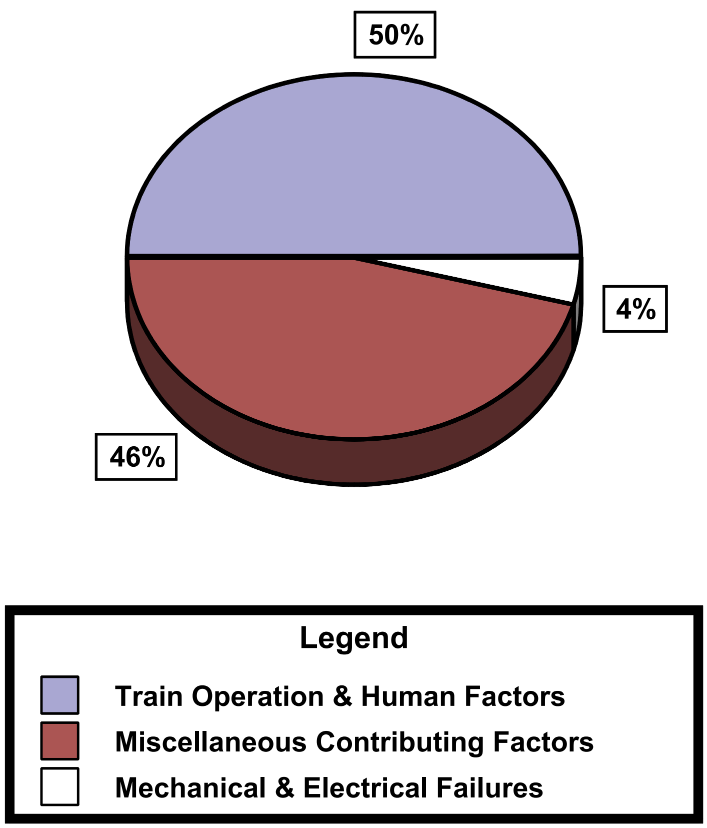
2006 Railroad Employee Fatalities



APPENDIX G

2006 Railroad Employee Fatalities

Major Possible Contributing Factor Categories



APPENDIX H

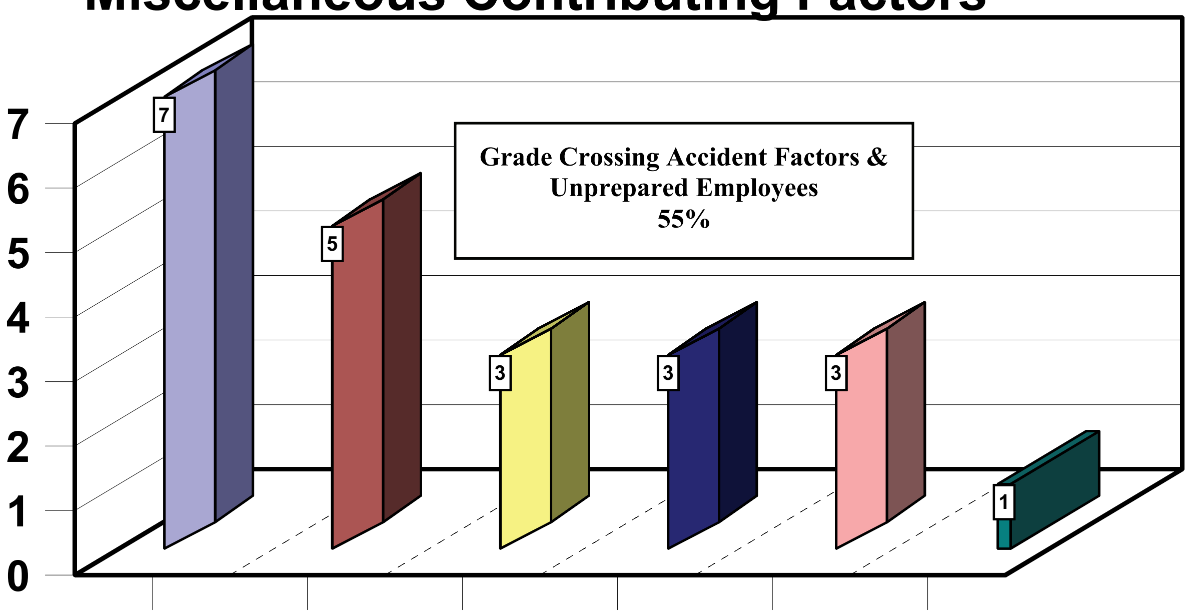
2006 Railroad Employee Fatalities

Train Operation & Human Factors Involved

APPENDIX I

2006 Railroad Employee Fatalities

Miscellaneous Contributing Factors



Legend

- Grade Crossing Accident Factors
- Unprepared Employees
- Highway Accident Factors
- Systemic Problems
- Environmental Conditions
- Homocide