U.S. Department of Transportation
Federal Railroad Administration

2003 RAILROAD EMPLOYEE FATALITIES:

CASE STUDIES AND ANALYSIS

Office of Safety
Washington, DC 20590

March 2006

Memorandum

U.S. Department
of Transportation

Federal Railroad Administration

Date: March 31, 2006

Subject: **2003 Railroad Employee Fatalities: Case Studies and Analysis**

From: Jo Strang,
Associate Administrator for Safety

To: Distribution

On behalf of the Office of Safety, I am pleased to distribute this report**,** entitled "2003 Railroad Employee Fatalities: Case Studies and Analysis." Designed to promote and enhance awareness of many unsafe behaviors and conditions that typically contribute to railroad employee fatalities, this report 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 2003's 16 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 *individual* fatality, particularly the possible contributing factors (PCFs);
- *Overall* findings for the 2003 fatalities which identify *who* the majority 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 which illustrate the above findings.

OVERVIEW OF 2003 RAILROAD EMPLOYEE FATALITIES

EXECUTIVE SUMMARY

This document, entitled "2003 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 2003's 16 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 individual 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 "Crane manuals, which were available to the crew, lacked instructions on the proper removal of the crane's counter weight."

  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 2003 fatalities (see Pages 2-7)*** which identify ***who*** the ***majority*** 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.

COMPLEXITY OF FATALITIES

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 2003, approximately 56 percent of all fatalities had three or more PCFs. Fatalities ranged in complexity from only one PCF to five PCFs.***

As an example, Report FE-34-03 describes a complex fatal incident in which a Bridge and Building Mechanic, acting as Watchman/Lookout for the rest of the Maintenance of Way gang, was fatally injured when struck by an on-coming freight train. The incident involved the following five PCFs:

- At the time of the incident, the Bridge and Building Mechanic was distracted from his role as Watchman/Lookout because he was performing other duties (operating a snow blower to remove snow from pedestrian walkways), in non-compliance with Federal regulations and railroad safety rules concerning roadway worker protection;

- The Foreman also acted in non-compliance with the above Federal regulations and railroad safety rules when he instructed the fatally injured employee to perform other duties in addition to his role as Watchman/Lookout;

- The investigation revealed that Massachusetts Bay Commuter Railroad (MBAX) gangs routinely used train approach warning to provide on-track safety due to an historic reluctance of CSX, Incorporated (CSX) to issue MBAX work gangs foul time, a much safer method;

- Although the CSX crew reported that the train's headlight was on at the time of the accident, the remaining MBAX crew reported that it was not. Investigators could not establish who was correct. However, the near blizzard conditions limited visibility for all concerned, despite overhead illumination at the station; and

- According to statements provided by the CSX Dispatcher and train crew, they were not aware that an MBAX snow removal gang was working at the Wellesley Farms passenger station. Since all rail traffic over this section of the railroad (CSX freight, Amtrak passenger, and Massachusetts Bay Transit Authority commuter trains) operated under a contract agreement with MBAX, there should have been communication between MBAX and the CSX Dispatcher, especially considering the inclement weather conditions.

FINDINGS

WHO were most of the fatally injured employees?

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

  In 2003, Transportation and Engine (T&E) employees represented approximately 69 percent of railroad employee fatalities and Maintenance of Way (MOW) employees approximately 31 percent. In 2003, no fatalities occurred to Maintenance of Equipment and Signal and Train Control employees.

(See Appendix A, 3-D pie chart entitled "2003 Railroad Employee Fatalities By Craft.")

- ***Position: Conductors***

  In 2003, approximately 38 percent of all fatally injured employees were Conductors. Switchmen and Brakemen, who ranked second, comprised approximately 13 percent each of all fatally injured employees. Other fatally injured employees included a Carpenter, Electrician, Bridge Mechanic, Track Foreman, Bridge and Building Mechanic, and Yard Foreman.

  (See Appendix B, stacked bar chart entitled "2003 Railroad Employee Fatalities by Craft and Position.")

- ***Experience: Split between five or fewer years and 21-35 years***

  Most fatally injured employees in 2003 had either worked five or fewer years or were very experienced with 21-35 years, each group representing approximately 38 percent each of all fatally injured employees.

  (See Appendix C, stacked bar chart entitled "2003 Railroad Employee Fatalities: Years of Service by Craft.")

- ***Age Range: 36-45 years***

  In 2003, approximately 31 percent of all fatally injured employees were concentrated in the 36-45 year range, with employees in the 26-35 year range a close second at 25 percent. Approximately 75 percent of all fatally injured employees were at least 36 years old.

  (See Appendix C, cluster bar chart entitled "2003 Railroad Employee Fatalities: Age Ranges by Craft.")

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

- ***Activity: Switching***

  In 2003, approximately 63 percent of fatally injured employees were involved in switching (including two who were switching with remote control locomotives), and approximately 19 percent were fatally injured while maintaining track. Other activities in which employees were fatally injured in 2003 included preparing a crane for shipment, clearing snow from a pedestrian walkway, and operating a train to its destination.

(See Appendix D, stacked bar chart entitled "2003 Railroad Employee Fatalities by Craft and Activity.")

WHERE did most of the railroad employee fatalities occur?

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

  In 2003, 75 percent of all railroad employee fatalities occurred on Class I freight railroads, 12.5 percent on Class II and III railroads, and another 12.5 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 "2003 Railroad Employee Fatalities by Type of Railroad.")

WHEN did most of the fatalities occur?

- ***Season: Fall***

  In 2003, 37.5 percent of all fatalities occurred in the fall, 25 percent in the winter, and 18.75 percent each in the spring and summer.

  (See Appendix F, pie chart entitled "2003 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 through sunset, and "night" as immediately after sunset until sunrise. In 2003, approximately 63 percent of the fatalities occurred during the day and approximately 37 percent during the night.

  (See Appendix F, pie chart entitled "2003 Railroad Employee Fatalities by Time of Day.")

WHY did most of the fatalities occur?

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

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

- ***Most PCFs: Miscellaneous Contributing Factors***[1]

  - In 2003, approximately 52 percent of all PCFs to the 16 fatalities were Miscellaneous Contributing Factors, followed by approximately 41 percent which were Train Operation and Human Factors[2].

  - In 2003, the remaining approximately 7 percent of all PCFs were Mechanical and Electrical Failures. Specifically, they included a coupler mismatch (high/low), other coupler and draft system defects, and a defective switch machine.

(See Appendix G, 3-D pie chart entitled "2003 Railroad Employee Fatalities: Major Possible Contributing Factor Categories.")

Break-down of Train Operation & Human Factors

- ***Of all the Train Operation & Human Factors in 2003, two sub-categories predominated: Human Factors, Track at approximately 61 percent and Switching Rules at approximately 17 percent.***

  Human Factors, Track included fouling track or positioning oneself in front of or between rail equipment; failure to obtain foul time in the proper manner; unsafe dismantling of a crane's counter weight and boom; improper use of fall protection equipment; and non-compliance with On-Track Safety and Roadway Worker Protection regulations.

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1 **During 2003, Miscellaneous Contributing Factors included environmental conditions; unusual operational situations; inadequate preparation of employees; inadequate coordination and/or communication between affected parties; systemic problems, such as inadequate efficiency testing in particular areas; highway collisions; and inexperience.**

2 **During 2003, Train Operation and Human Factors included improper use of brakes; improper radio communication; non-compliance with general switching rules; errors in train handling; improperly lined switches; and human factors/track, such as fouling the track, failure to obtain foul time, or improper use of fall protection equipment.**

General Switching Rules violations included failure to couple and inadequate safety precautions for riding a cut of cars (i.e. footing and hand hold not secure).

(See Appendix H, cluster bar chart entitled "2003 Railroad Employee Fatalities: Train Operation & Human Factors Involved.")

Break-down of Miscellaneous Contributing Factors

- ***Two sub-categories predominated: Environmental Conditions and Inadequate Coordination at approximately 26 percent each, together over half of all Miscellaneous Contributing Factors.***

  Environmental Conditions included poor visibility because of inadequate artificial light at night, heavy snow, or visual obstructions such as track curvature, buildings, stationary equipment, and train headlights. Other Environmental Conditions included moving equipment not heard by employees because of competing noise, and snow or ice on the track.

  Inadequate Coordination included lack of communication among employees, lack of cooperation among employees, inadequate coordination between affected railroads, and supervisory problems (i.e. an employee failed to comply with his supervisor's instructions, and a supervisor gave unsafe instructions).

- ***Ranking second, Unprepared Employees represented approximately 18 percent of all Miscellaneous Contributing Factors.***

  Inadequate preparation of employees included inadequate briefings; no or inadequate training provided; or no or inadequate instructional materials (e.g. manuals, manufacturer's operational instructions, technical bulletins, etc.) provided.

- ***Systemic Problems ranked third at approximately 13 percent of all Miscellaneous Contributing Factors.***

  System Problems included inadequate efficiency testing in particular areas, inadequate management oversight of specific types of operations (e.g. switching with remote control locomotives); and a railroad's propensity for using a less safe method (train approach warning rather than the foul time method).

- ***The remaining sub-categories, Unusual Operational Situations, Inexperience, and Highway Collisions comprised approximately 9 percent and approximately 4 percent each, respectively. Unusual Operational Situations included application of the emergency brake to avoid an accident, and improperly de-boarding moving equipment.***

(See Appendix I, 3-D angled bar chart entitled "2003 Railroad Employee Fatalities: Miscellaneous Contributing Factors.")

INDIVIDUAL SUMMARIES AND REPORTS

(FE-01-03 THROUGH FE-35-03)

SUMMARY FOR FE-01-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: CSX Transportation, Incorporated
Location: Waycross, Georgia
Region: 3

Month: January
Date: Jan. 14, 2003
Time: 12 p.m., EST

Data for Fatally Injured Employee(s)

Bridge Mechanic
46 years old
27 years of service
Last rules training: Oct. 9, 2002
Last safety training: Jan. 13, 2002
Last physical: June 3, 2000

Data for All Employees (Craft, Positions, Activity)

Craft: Maintenance of Way

Positions:

MOW crew
Fatally injured Bridge Mechanic
Two additional Bridge Mechanics
Two Crane Operators

Crane Operator from Florence (Trainer)

Activity:

Preparing an American Crane for shipment.

EVENT

During the MOW crew's attempt to dismantle the crane's rear counter weight and boom, the counter weight fell, crushing the right index and ring finger of the Bridge Mechanic who had placed his hand on the crane deck to regain his balance. The Bridge Mechanic received surgery, but died as he was taken from the operating room to recovery.

SUMMARY FOR FE-01-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The MOW crew failed to use proper procedures for the safe dismantling of the crane's rear counter weight and boom.

PCF No. 2

Crane manuals, which were available to the crew, lacked instructions on the proper removal of the crane's counter weight.

PCF. No. 3

The crew received inadequate training in the maintenance and safe operation of the crane, which was brought to the Waycross yard from Florence, South Carolina, about a month prior to the fatal incident, for use in replacing retarders at Waycross yard.

REPORT: **FE 01-2003**

RAILROAD: CSX Transportation, Incorporated (CSX)

LOCATION: Waycross, Georgia

DATE & TIME: Jan. 14, 2003, 12 p.m., EST

EVENT[1]: During the work crew's attempt to dismantle the crane's rear counter weight and boom, the counter weight fell, crushing the right index and ring finger of the Bridge Mechanic, who died following surgery, the following day.

EMPLOYEE:

Craft:	Maintenance of Way (MOW)
Activity:	Preparing an American Crane for shipment
Occupation:	Bridge Mechanic
Age:	46
Length of Service:	27 years
Last Rules Training:	Oct. 9, 2002
Last Safety Training:	Jan. 13, 2002
Last Physical:	June 3, 2000

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On the morning of Jan. 14, 2003, three Bridge Mechanics and two Crane Operators went on duty at 7 a.m. at Rice Yard in Waycross, Georgia. The Crane Operators received their job briefing at the Road Master's office and the Bridge Mechanics received their job briefing at the job site. The five employees were assigned to prepare an American Crane for shipment. The crane was located on the Hays Track (AO 1) located near Tower A, near the west end of the yard. This was a stub end track, with no other tracks located within 100 feet.

One of the Crane Operators showed up about 8 a.m. and conducted another job briefing on how to dismantle the rear counter weight and boom. They began work on the boom, then proceeded to the rear of the crane to lower the counter weight.

The weather was clear, and the temperature was 60° F.

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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.

THE ACCIDENT

The three Bridge Mechanics and a Crane Operator started to remove the top pins from the hydraulic rams attached to the top of the counter weight. The Crane Operator began operating two small levers at the rear of the crane to move the hydraulic cylinders up and down. After the top pins were removed, they began removing the lower pins on the right side, facing the rear of the crane. The second Crane Operator showed up at this time.

The second Crane Operator said he would have to remove his bucket before he could use the crane to help. While taking off the bucket, he found a leak in one of the fittings. He told the others he would need to find the mechanic to get a part, then left.

The first Crane Operator and the Bridge Mechanics continued to work on the lower right pin. The pin came out part of the way, then got in a bind. The Bridge Mechanics moved around to the left side of the crane and removed the lower pin with few problems. They returned to the right side of the crane and made another attempt to remove the right pin. It still would not come out. The second Crane Operator returned about this time and said he had to replace the fitting on his crane before he could help.

The Bridge Mechanics and the first Crane Operator backed a truck up to the counter weight to provide a platform from which to work. Two of the Bridge Mechanics placed a hydraulic track jack between the pin and the counter weight in an attempt to pry it out. One Bridge Mechanic held the jack while the other operated it. The pin came out, but when it did, the jack fell, causing one of the Bridge Mechanics to lose his balance and place his hand on the deck of the crane. The counter weight fell with the removal of the pin and crushed the right index and ring finger of the Bridge Mechanic who had placed his hand on the crane deck.

The two Crane Operators transported the injured Bridge Mechanic to the local hospital in Waycross. They arrived at the hospital at about 12:15 p.m. The Bridge Mechanic received medical attention, but it was determined he needed surgery, and the hospital was not equipped to handle the type of procedure he needed.

The Bridge Mechanic was transported by Emergency Medical Services to Memorial Hospital in Savannah, Georgia, where medical personnel told him they could surgically save his fingers. The operation would be a routine 2-hour surgery scheduled for 5:30 p.m. the following day, January 15.

The surgery proceeded without incident on January 15, but as the Bridge Mechanic was being taken from the operating room to recovery, he passed away.

POST-ACCIDENT INVESTIGATION

Inspection of the crane by representatives of the Federal Railroad Administration and railroad personnel disclosed no equipment defects. All crane manuals were in place, but there were no instructions in the manuals for the proper removal of the crane counter weight.

Interviews with the two Crane Operators and the two Bridge Mechanics revealed that the employees could not remember the proper procedure to remove the crane's counter weight. The crane was brought to Waycross from Florence, South Carolina, around November 2002, for use in replacing retarders at Waycross yard. Because the Crane Operator in Waycross was not familiar with this type of crane, an Operator from Florence came down for about three weeks to train him and the Bridge Mechanics. The day the attaching of the counter weight and removal for travel were discussed, the Waycross Operator was not present, just the Bridge Mechanics. In the interviews, all Bridge Mechanics said they were not sure about the proper way to dismantle the counter weight.

APPLICABLE RULES

The FRA's investigation disclosed no violation of CSX rules. There are no Federal regulations applicable to the removal of a crane counter weight.

In an attempt to avert a similar occurrence in the future, CSX issued instructions and conducted training on the proper procedures for dismantling a crane counter weight.

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

SELECTED FACTORS

Railroad: Illinois Central Railroad (subsidiary of Canadian National Railroad)
Location: Flat Rock, Michigan
Region: 4

Month: February
Date: Feb. 11, 2003
Time: 5 p.m., EST

Data for Fatally Injured Employee(s)

Brakeman
57 years old
31 years of service
Last rules training: Sept. 26, 2002
Last safety training: Dec. 20, 2002
Last physical: Sept. 4, 2001

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

216 YFRS35 Crew
Fatally injured Brakeman
Locomotive Engineer
Conductor

Extra Yard YFXS31 Crew
Locomotive Engineer
Brakeman
Conductor

Yard Master

Activity: Switching

EVENT

A Brakeman was fatally injured when struck by rail cars during a shoving movement.

SUMMARY FOR FE-03-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The 216 Crew Brakeman failed to stand clear of the track when moving equipment was approaching.

PCF No. 2

The ground along the rails was snow-covered, and the ground between the running rails was slippery. The 216 Crew Brakeman compounded this safety hazard by failing to wear anti-slip covers, such as rubber overshoes or boots.

PCF No. 3

After lining the switch, the 216 Brakeman left the vicinity of his switch without advising his own crew members or acknowledging the extra crew members when walking in front of their van to get coffee. This lack of communication prevented the 216 Engineer from spotting the Brakeman until he had been struck during a switching movement and was found lying under a tank car.

REPORT: **FE-03-2003**

RAILROAD: Illinois Central Railroad (IC), a subsidiary of Canadian National Railroad

LOCATION: Flat Rock, Michigan

DATE & TIME: Feb. 11, 2003, 5 p.m., EST

EVENT[1]: A Brakeman was fatally injured when struck by rail cars during a shoving movement.

EMPLOYEE:

Craft:	Transportation and Engine (T&E)
Activity:	Switching
Occupation:	Brakeman
Age:	57 years
Length of Service:	31 years
Last Rules Training:	Sept. 26, 2002
Last Safety Training:	Dec. 20, 2002
Last Physical:	Sept. 4, 2001

CIRCUMSTANCES PRIOR TO THE ACCIDENT

At 3:30 p.m. on Feb. 11, 2003, a regular yard crew reported for duty for Assignment 216 YFRS35 at the Trim Shanty at IC's Flat Rock Yard, in Woodhaven, Michigan. The crew comprised an Engineer, Conductor, and Brakeman. The crew's assignment was to switch the shop tracks. A short safety briefing was held before commencing work.

At 3:39 p.m., on Feb. 11, 2003, an extra yard crew reported for duty for Assignment YFXS31 at the Trim Shanty. This crew also comprised an Engineer, Conductor, and Brakeman. The crew's initial assignment was to pull 21 cars from the North Receiving Track to the Northbound Departure Yard.

The weather was partly cloudy and cold; the temperature was 21° F with a wind chill of 10° F, and winds gusting up to 10 mph. The ground along the rails and between the running rails was snow-covered. The distance from the Trim Shanty to the accident site, which was flat with no major obstructions, was approximately 75 feet.

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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.

THE ACCIDENT

The 216 Crew began the process of switching the shop tracks at the conclusion of the safety briefing. The Conductor was located on the north side of the shop track switch, having lined the switch in order to pull the cars out of that track. He also lined the switch on the northbound trim track. The Brakeman lined the North Loop Pocket switch for his crew to go onto the No. 4 Shop Track. Sometime after he lined the switch, he told his Engineer via radio to come back eight to nine car lengths. From the tower, the Yard Master observed the Brakeman lining the switch. However, the Yard Master did not see the Brakeman leave the vicinity of this switch. Without telling anyone, the Brakeman then walked across the lead to the shanty with a coffee cup in hand to get more coffee.

The Extra Crew came to the 5-shop track switch and stopped, waiting for the 216 yard assignment to clear before shoving into the Northbound Departure Yard. The Conductor of the 216 Crew indicated that he had talked with the Extra Crew's Conductor via radio, advising him to stop clear of the lead because his crew was switching the shop track and had the lead fouled. He told the Extra Crew's Conductor that when he cleared the lead, the Extra Crew could go to the departure yard.

The Extra Crew's Conductor and Brakeman were riding in a van to protect their shove movement. After the crew of the 216 yard assignment had cleared the lead and the switch was lined for movement, the Conductor of the Extra Crew told his Engineer to start shoving ahead. The Extra Crew's Conductor and Brakeman then got out of the van to line the switches on the yard lead track. They didn't observe the rear car of the movement all the time and didn't see the accident happen.

The Van Driver said he saw the Brakeman from the 216 Crew walk in front of his vehicle with a coffee cup in his hand, as the Driver was transporting the Extra Crew's Conductor and Brakeman around to the lead. He indicated the Brakeman wasn't wearing a hood or ear muffs, but had a red cap on his head and was walking in a hurry. He said the Brakeman didn't acknowledge him or the crew in the van.

The Engineer of the 216 Crew indicated that he was located on the east side of his locomotive in the Engineer's seat, approximately 50 feet west of the lead, when he noticed the Brakeman's red cap on the ground outside of the running rail. He looked further ahead and saw the Brakeman on the track under the tank car. The Engineer called on the radio for all movements to stop, announced the Brakeman had been struck, and requested assistance. He said the movement had stopped by that time. The Yard Master called 911 to report the accident.

The Flat Rock Police Department received the call at 4:59 p.m. The police department and Flat Rock Fire Department emergency response personnel arrived on the scene at 5:05 p.m. The Brakeman, who had suffered massive injuries to his head and body, was pronounced dead at the scene by the Wayne County Medical Examiner.

At the time of the accident, the Conductor and Brakeman of the Extra Crew were in a van protecting the shove and didn't observe the Brakeman from the 216 Crew trying to cross in front of their movement. The view they had from their position on the lead was unobstructed. However, the Extra Crew's Engineer could not see the rear of his 21-car shoving movement. Before the movement was stopped, 14 cars had passed over the body of the Brakeman.

POST-ACCIDENT INVESTIGATION

The Federal Railroad Administration (FRA) investigators conducted a mechanical inspection of the radio which was used on the locomotive of the extra yard job and the regular assigned job. They found no defects and concluded that both radios had functioned as intended. The railroad's radio technicians conducted an inspection of the radios used by both train crews; they were found to be in good working order. The investigation further revealed that the deceased employee had not experienced any sleep deprivation.

A site analysis by FRA revealed that the track where the accident had occurred had patches of snow, but was not excessively slippery except between the running rails. The Brakeman was properly attired for safety, but his footwear comprised conventional leather soles without anti-slip covers, such as rubber overshoes or boots. The railroad did not require anti-slip covers, but most employees used them when available. In all other respects, the Brakeman was properly attired. No physical evidence of tripping was found at the site. Immediately near the accident site, a large, plastic coffee mug was found. The snap-on cover of the mug was found adjacent to it. Interviews with his co-workers revealed that the Brakeman was a coffee drinker and could always be found with his cup nearby. He had been observed by supervisors carrying his coffee mug while on the leads during switching operations. The Van Driver stated that he had observed the Brakeman walking with the coffee mug in his hand just before the accident. However, no other employees observed this behavior on the day of the accident. It could not be determined if the act of carrying the coffee mug had affected the employee's method of walking or had contributed to his inattentiveness.

Crew members indicated that they had observed no unusual behavior from the Brakeman, who had appeared jovial in exchanges with his co-workers prior to the accident.

The final report of the Coroner's Office regarding the autopsy of the Brakeman revealed no medical conditions that could have accounted for the death of the employee. The Medical Examiner's report also stated, incorrectly, that the employee fell from the top of the train and was run over and killed.

Federal post-accident, toxicological tests of the deceased were negative.

The railroad began a "Take Five for Safety" campaign immediately after the accident. It comprised discussing the accident with employees and requiring them to answer five questions related to SOFA[2] activities.

APPLICABLE RULES

IC operating rules require employees to take measures to prevent injury to themselves or others. They must be alert and attentive when performing their duties. Employees must expect the movement of trains, engines, cars, or other movable equipment at any time, on any track, and in either direction. Also, the rules require that employees must stand clear of the track when an engine, car, or other moving equipment is approaching. Within the yard, all movements must be made at a speed which is specified in the timetable special instructions. In Flat Rock Yard, this speed is 10 mph.

The following rule books were sources of this information:

Illinois Central Railroad
U. S. Operating Rules
Second Edition
Effective: 1200 Hours, Sunday, June 2, 2002
Rule C&F

Illinois Central Railroad
U.S. Safety Rule Book - Transportation
Effective: July 15, 2002
Rule 8, 9
T-11, Rule 2.

[2] SOFA is an acronym for Switching Operations Fatality Analysis, promoted by the industry, FRA, and labor unions, that emphasizes safe procedures in yard operations.

SUMMARY FOR FE-04-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: CSX Transportation, Incorporated
Location: East Syracuse, New York
Region: 1

Month: February
Date: Feb. 16, 2003
Time: 12:24 a.m., EST

Data for Fatally Injured Employee(s)

Switchman (Secondary Remote Control Operator)
36 years old
2 ½ years of service
Last rules training: April 20, 2002
Last safety training: April 6, 2002
Last physical: N/A

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

Yard Assignment Y-390-15
Fatally injured Switchman (Secondary Remote Control Operator)
Foreman (Primary Remote Control Operator)

Yard Master

Activity: Switching

EVENT

A Switchman was fatally injured when he slipped or fell in front of an approaching freight car which ran over him.

SUMMARY FOR FE-04-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

For reasons unknown, the fatally injured Switchman fell across the south rail of the north drill track as the kicked car approached, running over him.

PCF No. 2

The Switchman may have slipped on the layer of snow and ice on the ground from a previous snow fall.

REPORT: **FE-04-2003**

RAILROAD: CSX Transportation, Incorporated (CSX)

LOCATION: East Syracuse, New York

DATE & TIME: Feb. 16, 2003; 12:24 a.m., EST

EVENT[1]: A Switchman was fatally injured when he slipped or fell in front of an approaching freight car which ran over him.

EMPLOYEE:

Craft:	Transportation and Engine (T&E)
Activity:	Switching
Occupation:	Switchman (Secondary Remote Control Operator)
Age:	36 years
Length of Service :	2½ years
Last Rules Training:	April 20, 2002
Last Safety Training:	April 6, 2002
Last Physical:	N/A

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Feb. 16, 2003 at 12:24 a.m., a CSX employee was fatally injured while performing remote control locomotive switching operations at the railroad's Dewitt Yard in East Syracuse, New York. Dewitt Yard is a major freight car classification yard located on the railroad's east/west (timetable direction) Chicago Main Line between M.P. 283.8 and M.P. 286.0 on CSX's Albany Service Lane. Yard movements within Dewitt Yard are made at "restricted speed," not exceeding 10 mph.

On Feb. 15, 2003, the employee was assigned to the railroad's "extra list". Following the statutory time-off period, he was called to work as the Secondary Remote Control Operator for Yard Assignment Y-390-15**,** which also comprised a Primary Remote Control Operator (Foreman). Each crew member was equipped with an operator control unit to operate the assigned remote controlled locomotives. The two men reported for duty at the rail yard's east end crew room prior to their 11 p.m. on-duty time. After a brief conversation, the Foreman

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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.

walked to the east end tower to receive a job briefing and a switch list from the Yard Master. While the Foreman was at the tower, the Switchman inspected and set up their assigned locomotives (CSX 2543 and CSX 2766) for remote control operation.

The two men met back at the crew room where the Foreman conducted a job briefing. They discussed the weather conditions and the need to take frequent breaks during the shift because of the cold temperatures.

At approximately 11:25 p.m., the crew members tested their remote control equipment in accordance with CSX company rules**.** They performed a "vigilance test," a "standing brake test," and a "running brake test." At 11:42 p.m., they performed a "tilt feature" test which was acknowledged by the Yard Master via 2-way radio. No exceptions to the equipment were noted by either crew member.

The crew members began performing their routine switching activities at the east end of the classification yard at approximately 11:45 p.m. The Foreman operated the remote control locomotives from his operator control unit while the Switchman aligned switches to direct cars onto various tracks. They were working approximately 500 feet apart and communicated via 2-way radios. The Foreman first coupled the locomotives to the east end of nine cars on Track No. 18 and switched them to Track No. 20 where they were coupled to 16 additional cars. The 25 cars were then pulled out onto the north drill lead (a.k.a. "ladder track") to be switched to various tracks according to the switch list. While the Foreman completed moves onto Track No. 15 and Track No. 16, he instructed the Switchman to align switches for Track No. 6 and Track No. 2. After they left one car (SM 3131) on Track No. 15 and four cars (WC 24098, WC 28162, WC 28043 and KCS 752789) on Track No. 16, the next car on the switch list (CSX 138276) was destined for Track No. 6. The crew used a common railroad switching practice known as "kicking" to switch the cars to various tracks. "Kicking" refers to the practice of shoving and releasing cars, allowing them to roll free (coast) onto the designated track. Once the car had cleared the switch onto Track No. 6, the Switchman was to re-align the switches for a single car destined for Track No. 2.

At 12:13 a.m., the Switchman radioed the Foreman and asked whether he had any aspirin in his locker. The Foreman responded, "...do you need it now?" The Switchman then replied, "No, I can wait." At 12:20 a.m., the Switchman told the Foreman via radio, "After this car goes to six, ... I'm gonna walk up...I gotta get some water out of the penalty box there." The "penalty box" is a small "shanty" used by crew members to get out of the weather. The Foreman acknowledged by saying, "Yeah, okay." As the Foreman was pulling the cut of cars out of Track No. 16 onto the north drill lead, he observed the Switchman standing in the clear of the north drill lead, in the walkway between the switch for Tracks Nos. 6 and 7. At 12:22 a.m., the Foreman radioed the Switchman, "Coming back for 6." The Switchman acknowledged, "Roger." The Foreman attempted to "kick" the car (CSX 138276) toward Track No. 6. He pulled the uncoupling lever on the car, but the knuckle pin dropped and the car failed to uncouple. He stopped the movement, uncoupled the car and closed the two knuckles between the cars. He then shoved against the car and sent it down the ladder track toward the Switchman's position at the Track No. 6 switch.

At the time of the accident, the sky was clear, and the temperature was -15° F. There was a layer of snow and ice on the ground from a previous snow fall.

THE ACCIDENT

At 12:24 a.m., the Foreman's operating control unit indicated a "no poll" failure and had lost continuity with the remote control unit installed on the locomotive. Because of this loss of continuity, the remote control locomotive (CSX 2543) went into a penalty brake application, a power knockdown occurred, and the throttle went to idle.

The Foreman radioed the Switchman asking, "Did you turn off the box by accident?" There was no response from the Switchman. The Foreman tried unsuccessfully several more times to contact the Switchman as he walked toward the Switchman's last known location. The Foreman was approximately 300 feet east of the Track No. 6 switch when he observed the Switchman lying across the south rail of the north drill track. The Foreman radioed the Yard Master to call "911." Local ambulance and emergency medical responders arrived at approximately 12:35 a.m., followed by police and fire departments.

POST-ACCIDENT INVESTIGATION

Officials of the Federal Railroad Administration (FRA), New York State Department of Transportation, Town of Manlius, New York Police Department, Onondaga County Medical Examiner's Office, and CSX conducted investigations of the employee fatality. There were no eye-witnesses to the accident. Police investigators concluded the fatally was accidental.

FRA investigators concluded that for reason(s) unknown, the employee fell across the south rail of the north drill track, as the kicked car approached. The employee was unable to recover before being run over by the moving freight car. The employee was found face up with his upper torso inside the gauge of the track and his lower torso and legs outside the gauge.

Post-accident inspection of the involved on-track equipment revealed no defective condition(s) that caused or contributed to the accident. Data from the event recorder installed on locomotive CSX 2766 (Quantum-SN 94060005) was downloaded by CSX personnel and the relevant data reviewed. Data indicated the maximum recorded speed of the locomotive, prior to releasing car CSX 138276, was 10 mph.

The area where the accident occurred was well lighted, with illumination provided by flood lights installed on several poles in the immediate area.

Federal post-accident toxicological tests of the deceased were negative.

A forensic autopsy conducted by the Onondaga County Medical Examiner's Office, dated Feb. 17, 2003, indicated the manner of death as "accident," and the cause of death as "blunt force injuries of the trunk due to: train versus pedestrian accident." Comments indicated: "No other significant injuries are present, and no significant natural disease is evident."

APPLICABLE RULES

CSX Safety Rule 2051: Working On or About Tracks

When working on or about tracks:

- Be alert for and keep clear of the movement of cars, locomotives, or equipment at any time, in either direction, on any track;
- Stand at least 30 feet from a switch or derail associated with the route of a passing train, and 10 feet, when practical, from a switch or derail being traversed by engines or cars during switching operations; and
- Look in both directions before making any of the following movements:
  - Fouling or crossing a track;
  - Moving from under or between equipment;
  - Getting on or off equipment; or
  - Operating a switch.

SUMMARY FOR FE-05-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: CSX Transportation, Incorporated
Location: Cheektowaga, New York
Region: 1

Month: February
Date: Feb. 18, 2003
Time: 12:53 p.m., EST

Data for Fatally Injured Employee(s)

Conductor
51 years old
29 years of service
Last rules training: March 7, 2002
Last Safety training: Jan. 1, 2003
Last physical: Not required by CSX

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

Switching Crew Y102-18
Locomotive Engineer
Fatally injured Conductor
Brakeman

Yard Master

Car Department Employees

Activity: Car Department employees performed an outbound equipment inspection and transfer train air brake test of the 20-car consist to which Crew Y102-18 then performed switching movements.

EVENT

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

SUMMARY FOR FE-05-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

While riding the end ladder during a shoving move, the Conductor was crushed between the boxcar he was riding and the boxcar of an opposing, free-rolling, 5-car consist.

PCF No. 2

Inspection of the five cars that had rolled free revealed that there was no air present in the brake system. The Brakeman verified that no hand brakes had been applied. The Conductor had instructed the Brakeman to check for hand brakes prior to the accident.

PCF No. 3

During a previous switching move, the crew had failed to successfully couple the 5-car cut to a standing 4-car cut because the couplers on the relevant cars had by-passed. No member of the crew was aware of the problem until the collision had occurred.

REPORT: **FE-05-2003**

RAILROAD: CSX Transportation, Incorporated (CSX)

LOCATION: Cheektowaga, New York

DATE: Feb. 18, 2003

TIME: 12:53 p.m., EST

EVENT[1]: A Conductor was fatally injured when crushed between two box cars during a switching operation.

EMPLOYEE:

Craft:	Transportation and Engine (T&E)
Activity:	Switching
Occupation:	Conductor
Age:	51 years
Length of Service:	29 years
Last Rules Training:	March 7, 2002
Last Safety Training:	Jan. 1, 2003
Last Physical:	Not Required by CSX

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Feb. 18, 2003, following a statutory off-duty period, a 3-member train crew, comprising a Locomotive Engineer, Conductor and Brakeman, reported for duty at 6:59 a.m., EST, at CSX's Frontier Yard in Buffalo, New York. The crew was assigned local switcher Y102-18. Frontier Yard is located on CSX's Chicago Main Line in the railroad's Albany District. Rail movements made within Frontier Yard are conducted at "restricted speed" with a maximum authorized speed of 10 mph. The method of operation on the Chicago Main Line is governed by Railroad Operating Rule 261, and traffic over this portion of the railroad is controlled by Automatic Block System (ABS).

Prior to picking up their locomotives, the Y102-18 crew members attended a routine daily safety briefing during which they were instructed on the safety rule of the day by the on-duty Yard

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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.

Master. Their first assignment was to assemble a train consisting of 20 cars for delivery to various local industries. They switched the 20 cars and placed them on the west end of the "North Six" Track where car department employees performed an outbound equipment inspection and a transfer train air brake test. The Locomotive Engineer was located in the cab of the controlling locomotive (CSX 2793), which was coupled to the west end of the train while the Conductor and Brakeman were positioned in the locomotive cab of CSX 1192, which was on the east end of the train. The car department released the train at approximately 11:15 a.m., and the crew received permission to depart eastward via the "Eastbound Running Track" toward CP 433 located at the east end of Frontier Yard. At CP 433, they stopped and waited for a signal indication to enter the main line. At approximately 12:30 p.m., the crew received a signal indication and operated eastward on the main line's Track No. 4 toward its first pick up and delivery at the Bestway Foods plant, located at milepost 432.9 in Cheektowaga, New York.

The Chicago Main Line at this location (MP 432.9) comprised four east/west (timetable direction) tracks, identified from north to south as: Track No. 4, No. 3, No.1 and No. 2, respectively. The walking surface on the south side of Track No. 4 was level with unobstructed visibility for approximately one mile in both directions. The entrance to the Bestway Foods plant was via a manually operated switch located to the north of Track No. 4. Facing east, the track into the Bestway Food plant curved left and descended slightly into the plant.

At the time of the accident, the sky was overcast with light snow flurries. The temperature was 18° F, with light winds.

THE ACCIDENT

When the east end of the train arrived at the Bestway Food's switch, the Conductor instructed the Engineer to stop. The Conductor and Brakeman got off the locomotive at the switch. The Conductor instructed the Engineer to shove the train east, over the switch, to make room for about six cars they were to pick up at the plant. The Conductor uncoupled between the fourth and fifth car of the train and told the Engineer to pull the four cars (from west to east, designated as MP 267835, MP 268204, NYC 221568, and NYC 221532) westward past the switch. The Brakeman aligned the switch toward the plant while the Conductor walked to open the gate. The Brakeman instructed the Engineer to shove the four cars into the plant, where the Conductor coupled onto a 5-car pick-up (from west to east, designated as UP 563222, UP 563100, GTW 384546, GTW 384039, and NYC 221417). The Conductor connected the air hoses between the cars, but did not put air into the train line. He then instructed the Engineer to pull the nine cars back toward the main line. When the last car cleared the switch, the Brakeman aligned the switch back to the main line and instructed the Engineer to shove eastward toward the 16 cars they had left standing on the main line. The Conductor took control of the move and instructed the Engineer to stop as the cars made contact. The Conductor was positioned approximately 1 ½ car lengths from the coupling and apparently was unaware that the couplers on the two cars had by-passed and that the coupling was unsuccessful.

After the train was "stretched," the Conductor walked west and uncoupled between the 5-car pick-up and the four cars to be delivered to the plant. After uncoupling the cars, the Conductor instructed the Engineer to pull west over the switch, and the Brakeman aligned the switch to Bestway Food. The Conductor asked the Brakeman to couple the air hoses on the cars left standing on the main line and to check for hand brakes. The Brakeman crossed over to the south side of Track No. 4 and began walking east, between Tracks No. 4 and No. 3, toward the standing cars. The Conductor was last observed boarding the side ladder on the north side of the leading end of NYC 221532. He instructed the Engineer to shove eastward into the plant. During the shoving move, the Conductor evidently crossed over (via the end platform) to the south side of the car and was riding the end ladder as the east end of the car passed the switch. At about this time, the Brakeman observed the five cars (which had failed to successfully couple) rolling west toward the switch. He radioed the Locomotive Engineer to stop. The Engineer was unable to react before the corners of the two box cars (NYC 221532 and UP 563222) had collided. The Brakeman was not in a position to see the cars come together, but he heard the impact. He walked back (west) toward the switch, where he discovered the Conductor lying on the ground. He had been crushed between the corners of the two cars. Realizing his co-worker was seriously injured, the Brakeman radioed for emergency responders. The Conductor was pronounced dead at the scene.

POST-ACCIDENT INVESTIGATION

Representatives of the Federal Railroad Administration and CSX conducted inspections of the involved equipment, focusing on the safety appliances and brake equipment. The inspection disclosed no defective conditions present on the involved equipment that had caused or contributed to the cause of the accident. The track structure, switches, and walking surfaces also were inspected, with no conditions noted that caused or contributed to the cause of the accident.

Inspection of the couplers at the east end of NYC 221417 and at the west end of AOK 110176 revealed that the unsuccessful coupling was caused by two couplers "by-passing" one another. The coupler at the east end of car NYC 221417 was against the north coupler stop, and the coupler at the west end of car AOK 110176 was against the south coupler stop. Inspection of the five cars that rolled free (from west to east: UP 563222, UP 563100, GTW 384546, GTW 384039, and NYC 221417) revealed there was no air present in the brake system. Statements were obtained from the Locomotive Engineer and the Brakeman. The Brakeman reported to investigators that no hand brakes had been applied to the five cars by the Conductor prior to the accident.

The fatally injured employee's right-hand glove was found attached to the top rung of the B/L end ladder of car NYC 221532, indicating the employee's position on the car at the time of impact.

The Cheektowaga Police Department conducted a separate investigation and determined that the employee fatality was accidental.

Federally mandated post-accident toxicological test results, conducted on the Locomotive Engineer and the Brakeman, were negative.

The "Certificate of Death" issued by the New York State Department of Health, indicated the immediate cause of death as: "Multiple Crush Injuries."

APPLICABLE RULES

CSX Operating Rule (NORAC) 109. Hand Brakes

a. Cars or Drafts of Cars Left Standing

A sufficient number of hand brakes must be applied on cars to make them secure when left standing on any track. If necessary, car wheels must be blocked.

CSX Safety Rules for Transportation Department (Oct. 1, 2001)

2200 - Coupling Equipment

Before attempting to couple equipment, make certain that the couplers are in line with each other and at least one of the knuckles is open.

2201 - Making a Safety Stop

Stop the equipment at least 50 feet, but not more than 250 feet before coupling to equipment. Make certain that:

1. Any employee riding the equipment is not seated in the locomotive dismounts until the coupling is made;
2. Couplers are aligned; and
3. At least one of the knuckles is open.

SUMMARY FOR FE-11-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Union Pacific Railroad Company
Location: Pocatello, Idaho
Region: Region 8

Month: April
Date: April 11, 2003
Time: 10:43 p.m., MST

Data for Fatally Injured Employee(s)

Conductor
55 years old
24 years of service
Last rules training: March 19, 2002
Last safety training: Jan. 13, 2003
Last physical: Jan. 18, 2000

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

Train MGRHK-11
Engineer
Conductor

Yard Master
Crew Van Driver
Utility Clerk
Manager of Yard Operations

Activity: Switching

EVENT

During a switching operation, the car the Conductor was riding derailed and flipped on its side, causing the Conductor to receive a fatal head injury.

SUMMARY FOR FE-11-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

During a switching move, the Engineer was forced to make an emergency air brake application, which caused the train to uncouple, allowing 71 cars to roll east, and resulted in the derailment of the car the Conductor was riding and next two adjoining cars, during which the Conductor's car flipped over onto its side.

PCF No. 2

The Conductor did not give the Engineer adequate warning to enable him to safely stop the train short of the red flag. (The crew members had been given instructions, via a track bulletin, that a red flag and derail were in place at milepost 214.25, and they were to stay clear of the portion of track between milepost 214.25 and 214.50 where work was being done. In addition, the Yard Master had informed the Conductor via radio about the red flag.)

PCF No. 3

The lighting in the vicinity of the accident site, originally designed to light the depot for passenger train boarding and de-boarding, did not illuminate any of the yard tracks. Following the accident investigation, the railroad planned to install more lighting in the Pocatello Yard.

REPORT: **FE-11-03**

RAILROAD: Union Pacific Railroad Company (UP)

LOCATION: Pocatello, Idaho

DATE & TIME: April 11, 2003; 10:43 P.M., MST

EVENT[1]: During a switching operation, the car the Conductor was riding derailed and flipped on its side, causing the Conductor to receive a fatal head injury.

EMPLOYEE:	Craft:	Transportation and Engine (T&E)
	Activity:	Switching
	Occupation:	Conductor
	Age:	55 years
	Length of Service:	24 years
	Last Rules Training:	March 19, 2002
	Last Safety Training:	Jan. 13, 2003
	Last Physical:	Jan. 18, 2000

CIRCUMSTANCES PRIOR TO THE ACCIDENT

Following the completion of a statutory, off-duty period, the Conductor went on duty at 12:05 p.m., MST, on April 11, 2003, at UP's Yard Office, in Pocatello, Idaho. He and an Engineer were assigned to operate Train MGRHK-11 from Pixley, Wyoming, 136 miles east of Pocatello, to Pocatello. The train's final destination was Hinkle, Oregon. Prior to beginning his tour of duty, the Conductor was observed by the Engineer to be fit for duty.

The crew was transported by crew van to Pixley's siding, milepost 78.2, on UP's Portland Division, Pocatello Subdivision. The crew members boarded the train and prepared it for departure. After reviewing their train orders and track warrants, they had a job briefing and departed Pixley. The trip from Pixley to Pocatello was uneventful.

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Upon reaching Pocatello Yard, the crew members contacted the Yard Master via radio. The Yard Master instructed them to perform switching operations in preparation for the train to continue westward. The crew operated their train onto Receiving Track No. 12 and stopped. With the help of a crew van and Driver to transport the Conductor through the yard, the crew members uncoupled and pulled the first 16 cars from the train onto Track No. 11. They then traveled over to the Heines spur track, added Locomotive No. UP5855 to their locomotive consist, and traveled back to Track No. 12. They coupled up to the remaining cars in their train and pulled out of Track No. 12, backed onto Receiving Track No. 2, and coupled up to 66 cars located on that track.

The last switch move the crew was instructed to perform was to pull the now 122-car train west out of Receiving Track No. 2, onto Main Track No. 3, at CP 215, then travel back eastward on Main Track No. 3, to a point clear of the Union Pacific Fruit Express (UPFE) grade crossing. The crew members had been instructed to clear the crossing to allow access to local mechanical personnel to both sides of their train. They were further instructed by the Yard Master to not connect the air lines on the 66 cars to which they had just coupled until they were in the clear on Main Track No. 3. The Yard Master informed the Conductor via radio about a red flag on Main Track No. 3, relating to work being done on a portion of the track.

The Engineer was located on the leading locomotive, UP 5869, at the control stand on the right side of the cab. The train pulled out of Receiving Track No. 2, onto Main Track No. 3, at CP 215, and stopped. The Conductor lined the switch for the main track and boarded the east end, north side, of the rear car, FLIX 3738, and instructed the Engineer via radio to proceed east 50 cars lengths. The Conductor then informed the Engineer that they would need to stop their train short of a red flag, located on Main Track No. 3. The Engineer was operating the train via directions (car counts) from the Conductor who was riding the leading car of the shoving movement. As the Engineer operated the train eastward at approximately 8 mph, he heard the Conductor say 30 cars. When the locomotives cleared the UPFE grade crossing, the Engineer heard the Conductor say 20 cars. Then the Engineer heard in quick succession, "Red flag . . . plug it."

At the time of the accident, it was dark and clear. The temperature was 55° F.

THE ACCIDENT

The Engineer placed the train into an emergency air brake application, bringing it to a stop. The train uncoupled between the 51st and 52nd head cars, allowing the rear 71 cars to roll east. The car the Conductor was riding and the next two adjoining cars went past the red flag and over the derail located at milepost 214.25. The car the Conductor was on derailed, flipped southward onto its side, and slid for approximately two car lengths before coming to rest perpendicular to the main track. The second car derailed and remained upright. The east set of wheels of the third car derailed; however, the car remained upright. The flipping of the first derailed car caused the Conductor to strike his head on the inside well of the car body where the air brake reservoir was located.

The Utility Clerk driving the crew van witnessed the derailment and radioed the Yard Master, who called 911 and contacted the Manager of Yard Operations to investigate.

The Pocatello Police Department was first on the scene, followed by the Pocatello Fire Department, and an ambulance. Emergency response personnel found the Conductor laying partially inside the car well on the B-end of the car he had been riding. The Bannock County Deputy Coroner then arrived on the scene and pronounced the employee dead at the scene, a result of "Massive Head Trauma," inflicted by a blow to the head.

POST-ACCIDENT INVESTIGATION

The railroad reported estimated damages of $39,542 ($15,942 to equipment and $23,600 to the track structure).

This accident met the criteria for classification as a major train accident because damage to rail equipment exceeded the current threshold at the time and one fatality resulted. Following a major train accident, 49 CFR, Part 219, Subpart C, requires that all train crew members involved in the event receive post-accident toxicological testing. The deceased was tested, with negative results. However, the Engineer was not tested, in non-compliance with the regulation, and a recommendation for civil penalty was forwarded to the Federal Railroad Administration's (FRA) Office of Chief Counsel in Washington, D.C.

Furthermore, FRA's post-accident investigation revealed that UP personnel had failed to use the proper fatality testing box on the deceased Conductor. Instead, they used the collection kit designed for live individuals, which makes harvesting and shipment/classification of the required specimen problematic, and a defect was noted for the non-compliance.

A printout of the locomotive event recorder revealed that the speed of the train at the time of derailment was 8 mph.

Track Bulletin Form "C" No. 06089, issued to the crew, stated "To UP5869 West at Pixley, Main Track 3 Pocatello Out Of Service, between milepost 214.25 to milepost 213.50." A red flag and derail were in place at milepost 214.25.

The portion of track on Main Track No. 3 between milepost 214.25 and milepost 214.50 had been out of service since April 1, 2003.

The Conductor had just completed a week of vacation and this was his first tour of duty since returning from vacation. He was using a lantern and proper personal protection gear at the time of the accident.

The Engineer had 29 hours and 15 minutes off duty prior to reporting for duty.

The 7,954-foot train leaving Receiving Track No. 2 comprised 122 cars and three locomotives. While shoving east on Main Track 3, the train had 56 cars with operative train line air brakes and 66 cars without. When the Engineer placed the train into an emergency brake application, the

train uncoupled between TTPX 805048 (the 51st car from the head end) and LW 74539 (the 52nd car from the head end). The rear 71 cars that broke away contained the 66 cars without train line air brakes and five cars with train line air brakes. An inspection by UP mechanical personnel revealed that the coupler knuckle on the east end of car TTPX 805048 was broken into separate pieces, and that the fracture was a fresh break.

The distance between the two sets of cars after they stopped was approximately 21 feet. The crew had been instructed to shove to the clear so Carmen would have access to both sides of the train. The UPFE grade crossing was the first crossing to allow Carmen access to both sides. The UPFE crossing was 8,602 feet west from the point of derailment. The train stopped approximately 837 feet east of the crossing.

The lighting in the vicinity of the accident site, which was originally designed to light the depot for passenger train boarding and de-boarding, illuminated a roadway and a walkway; however, it did not illuminate any of the yard tracks. The lighting for the depot began with a light on the telephone pole, marking milepost 214.25. After this accident, illumination of yard tracks was addressed in a Safety & Health Education of Operating Practices (SHEOP) meeting. As a result, UP has committed to install more lighting in the Pocatello Yard.

The Bannock County Coroner's office did not perform an autopsy.

The Death Certificate lists the cause of death as "Massive Head Trauma."

SUMMARY FOR FE-12-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: CSX Transportation, Incorporated
Location: Kingsport, Tennessee
Region: 3

Month: June
Date: June 6, 2003
Time: 8:25 a.m., EST

Data for Fatally Injured Employee(s)

Brakeman
35 years old
3 years of service
Last rules training: Feb. 28, 2002
Last safety training: Feb. 28, 2002
Last physical: March 27, 2000

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

Train No. Y422-06
Brakeman
Conductor
Engineer

Tractor-Trailer Operator

Activity: Switching

EVENT

During a backing maneuver to dock his trailer, a Tractor-Trailer Operator's vehicle jack-knifed into the side of a railroad switching movement, striking, pinning, and fatally injuring the Brakeman, who was riding the northeast corner side ladder of the lead rail car.

SUMMARY FOR FE-12-03 CONTINUED
SELECTED AND POSSIBLE CONTRIBUTING FACTORS CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

A Tractor-Trailer Operator's vehicle collided with a railroad switching movement because the Operator violated several local laws and ordinances. He was charged with improper backing, failure to yield the right-of-way, and driving left of center.

REPORT: **FE 12-2003**

RAILROAD: CSX Transportation, Incorporated (CSX)

LOCATION: Kingsport, Tennessee

DATE & TIME: June 6, 2003; 8:25 a.m., CST

EVENT[1]: During a backing maneuver to dock his trailer, a Tractor-Trailer Operator's vehicle jack-knifed into the side of a railroad switching movement, striking, pinning, and fatally injuring the Brakeman, who was riding the northeast corner side ladder of the lead rail car.

EMPLOYEE:

Craft:	Transportation and Engine (T&E)
Activity:	Switching
Occupation:	Brakeman
Age:	35
Length of Service:	3 years
Last Rules Training:	Feb. 28, 2002
Last Safety Training:	Feb. 28, 2002
Last Physical:	March 27, 2000

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The fatally injured employee reported for duty at 5 a.m. on June 6, 2003, at the CSX yard office in Kingsport, Tennessee. He had been called to perform duties as a Brakeman on Train No. Y422-06 with a crew that also included a Conductor and Engineer. The crew performs switching in and around Kingsport Yard and various industries in the vicinity.

The area at the site of the accident was an asphalt-paved municipal street called Clinchfield Street. Railroad tracks ran parallel with the direction of vehicular traffic. The double yellow dividing line between the eastbound and westbound lanes ran down the center of the gage of the rail; there were two lanes of traffic in both directions. However, when railroad equipment occupied the track in the center of the street, the two center lanes were restricted for movement of vehicular traffic. The street was bordered by a walkway on both sides, with the south side of the street serving as access and egress to a number of parking lots and businesses, while the north side beyond the walkway was blocked by the brick wall of the Quebecor Printing, Inc. building.

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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.

At the time of the accident, the weather was dry and sunny, and the temperature was 65° F.

THE ACCIDENT

The crew members proceeded to Quebecor Printing and pulled two loaded rail cars from spots nos. 1 and 4. The crew wanted to make this the first move because the level of street traffic was lowest at this time. Then the crew switched two empty rail cars out of yard inventory to spot at Quebecor Printing. The crew then proceeded to Quebecor, which was within the yard limits and only two city blocks from the yard office. The main track in this area was oriented in a north-south direction; therefore, when the crew proceeded toward Quebecor Printing, they were considered to be proceeding in a northbound timetable direction. However, the lead proceeded toward Quebecor at a 90-degree, right hand curve and then in a geographically eastbound direction. The police report also referred to the street direction at the location of the accident as being oriented in a north-south direction. All references to direction in this report will refer to geographic directions. This will mean that Clinchfield Street is geographically oriented on an east-west direction and Center Street is oriented on a north-south direction. The crew was operating the rail cars without air brakes connected, controlling the movement with locomotive brakes. One of the rail cars was to be spotted at Quebecor Printing Spot No. 1, and the other was to be spotted at Spot No. 4, approximately 100 yards beyond the first spot on a short spur track from the switching lead into the building.

The crew had arrived at the first Quebecor switch, just west of the intersection of Clinchfield and Center Streets. The Brakeman had aligned the switch and remained at the switch while the Conductor continued to control the movement of the equipment through the intersection and into the Quebecor building to spot the rail car. The Conductor spotted and secured the rail car, separated the spotted rail car from the rest of the equipment, and instructed the Engineer to return to the switching lead under the direction of the Brakeman. The Brakeman protected the lead end of the equipment returning to the switching lead and stopped the movement when the equipment cleared the switch accessing the No. 1 Quebecor spur track. The Brakeman aligned the switch for movement on the switching lead, then waited for the traffic control signals protecting the intersection of Clinchfield and Center Streets to stop the traffic on Center Street. He then instructed the Engineer to shove eastbound through the intersection. The Conductor had completed his duties connected with the rail car just spotted and was waiting east of the intersection. Since the Brakeman was occupying the lead end north side ladder of the movement, the Conductor mounted the lead end south side ladder. The objective of having two personnel protecting the lead end of the movement was to protect the movement and the vehicular traffic as the rail movement proceeded down the center of the street. Each individual was responsible for protecting his side of the movement from vehicular movement on the street. After the Conductor mounted the equipment, the crew continued its movement eastbound toward the next rail car spot at No. 4 Quebecor.

After the Conductor had mounted the equipment, the movement proceeded a short distance of 30 to 40 feet when the Brakeman initiated a radio transmission instructing the Engineer to stop the movement. The Brakeman yelled “Woe, Woe!” This was followed by the sound of grinding metal over the radio.

Between the time that the rail crew moved the loaded rail cars from the industry track and returned with the empties for delivery, a Tractor-Trailer Operator had arrived with a delivery. He had parked

his vehicle on the north side of Clinchfield Street, occupying a position partially blocking the northernmost westbound lane and the sidewalk adjacent to the Quebecor building. The Tractor-Trailer Operator then entered the building and inquired about the spotting of his delivery; he was informed that he could spot his delivery at the truck dock as soon an the railroad crew had completed its delivery. The truck dock was immediately west of the rail car spot inside the building, and the railroad tracks would have to be clear of train traffic before the trailer could be docked. The Tractor-Trailer Operator returned to his vehicle to wait for the railroad crew to clear the tracks.

During the time that the train crew was engaged in moving through the intersection after delivering the empty rail car and the Conductor was mounting the south side of the lead rail car, the Tractor-Trailer Operator began the backing maneuver to dock his trailer. As the backing maneuver progressed, the vehicle jack-knifed into the traffic lanes and into the side of the railroad movement, striking the Brakeman riding the northeast corner side ladder.

The Brakeman was pinned between the rail car and the right front corner of the trailer body. The massive blunt force trauma resulting from this collision resulted in fatal injuries to the Brakeman. The Holston Valley Emergency Medical Service responded to the scene, as did the Sullivan County Coroner. The coroner pronounced the Brakeman dead at the scene, of massive blunt force trauma.

POST-ACCIDENT INVESTIGATION

The Federal Railroad Administration's (FRA) investigation revealed that the railroad employees were performing their duties in accordance with outstanding rules and local practices. There were no operational failures evident on the part of crew members which caused or contributed to the severity of this accident. The Kingsport Police Department also investigated the accident and found that the train crew did not operate in violation of any laws or ordinances. However, the Tractor-Trailer Operator was found to be in violation of a number of state and local vehicle safety laws. The railroad performed safety inspections of the equipment during the course of their investigation and found no defects.

FRA's post-accident toxicology tests were administered to the deceased employee. Results were negative for both drugs and alcohol. The Kingsport Police Department administered an evidential blood test for alcohol and drug use on the Tractor-Trailer Operator. The Kingsport Police Department's policy prohibited the release of drug and alcohol test results because their investigation still was in progress at the time of this report.

APPLICABLE RULES

FRA's investigation of the accident did not reveal any violations of Federal regulations or railroad operating or safety rules by railroad personnel which caused or contributed to the severity of this accident. However, the Kingsport Police Department found that the Tractor-Trailer Operator had violated a number of laws and ordinances. He was charged with "Improper Backing, Failure to Yield Right-of-Way, and Driving Left of Center." The local authorities also indicated evidence would be presented to support "Reckless Endangerment" and possibly "Negligent Homicide." These charges would be pursued only on the recommendation of the district attorney and a positive finding of a grand jury.

SUMMARY FOR FE-13-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Burlington Northern Santa Fe Corporation
Location: Buena Park, California
Region: 7

Month: June
Date: June 8, 2003
Time: 1:40 a.m., PST

Data for Fatally Injured Employee(s)

Conductor
34 years old
6 years of service
Last rules training: July 7, 2002
Last safety training: March 31, 1999
Last physical: March 29, 1996

Data for All Employees (Craft, Position, Activity)

Craft: Transportation and Engine

Positions:

Train Z-KCKLACI-05 (BNSF 5351 West)
Conductor
Engineer

Train M-BARPICI-07 ("M" Train)
Crew members (not specified)

Train Dispatcher

Activity: Operating train from Barstow, California, to Los Angeles, California

EVENT

A Conductor sustained fatal injuries after jumping from the leading locomotive of his train while traveling at 39 miles per hour.

SUMMARY FOR FE-13-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

Visual obstructions at nighttime created confusion and panic.

(Explanation: After passing the green signal at Basta, which authorized the train to proceed, the crew members of BNSF 5351 West noted that the next signal at Buena Park was obstructed by track curvature and a building next to the right of way. Compounding the confusion, the crew members saw an illuminated light, which at first they thought might be on the building, but then decided was a locomotive's headlight on dim. Because of their line of sight, the light appeared to the crew members to be the headlight of an oncoming train, but it was unclear whether the train was on their track or the adjacent main track.)

PCF No. 2

The Engineer and Conductor could not agree on what action to take, and did not work together effectively to respond to the perceived emergency.

PCF No. 3

As the train slowed down to 39 mph, the Conductor ran past the Engineer, opened the rear door behind the Engineer, ran out onto the exterior walkway to the end of the locomotive, and jumped, despite admonitions from the Engineer not to do so, and also in non-compliance with the railroad's operating rules regarding de-boarding moving equipment.

Additional Information

The light that the crew of BNSF 5351 West had observed was the dim headlight on a helper locomotive located on the rear of the "M" train, which was standing on the adjacent track. The BNSF 5351 West stopped on Main Track One, about 300 feet from the helper locomotive.

REPORT: **FE-13-2003**

RAILROAD: Burlington Northern Santa Fe Corporation (BNSF)

LOCATION: Buena Park, California

DATE & TIME: June 8, 2003; 1:40 a.m., PST

EVENT[1]: The Conductor sustained fatal injuries after jumping from the leading locomotive of his train while traveling at 39 miles per hour.

EMPLOYEE:

Craft:	Transportation and Engine (T&E)
Activity:	Operating train from Barstow, California to Los Angeles, California
Occupation:	Conductor
Age:	34 Years
Length of Service:	6 Years
Last Rules Training:	July 7, 2002
Last Safety Training:	March 31, 1999
Last Physical Exam:	March 29, 1996

CIRCUMSTANCES PRIOR TO THE ACCIDENT

A Los Angeles-based train crew comprising a Conductor and an Engineer reported for duty on June 7, 2003, at 7 p.m., PST at Barstow Yard, Barstow, California, after receiving their statutory off-duty rest period. The crew was called to operate Train Z-KCKLAC1-05 (BNSF 5351 West) from Barstow, California to Los Angeles, California. The train crew, after receiving the initial Track Warrant and Track Bulletin at Barstow Yard, operated from Barstow to Los Angeles over two subdivisions, the Cajon Subdivision, between Barstow and San Bernardino, and the San Bernardino Subdivision, from San Bernardino to Los Angeles.

The BNSF 5351 West was an intermodal train with three locomotives, 65 loads, and no empties. It weighed 4,500 tons and was 6,013 feet long. The train originated at the BNSF terminal in Kansas City, Kansas. The initial terminal air brake test was performed at the BNSF Yard in Kansas City prior to the train departing, and the required 1,000-mile air brake inspection was performed at Belen, New Mexico.

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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.

The BNSF 5351 West departed Barstow Yard at 12:35 a.m., on June 8, 2003, en route to Los Angeles, California. At the time of the incident, the train was being operated westbound on the Southern California Division, San Bernardino Subdivision of the BNSF. The method of operation was Centralized Traffic Control or CTC.

The maximum authorized speed on this subdivision was 50 mph for freight trains and 79 mph for passenger trains.

On June 8, 2003, the BNSF 5351 West had followed a westbound manifest Train M-BARPIC1-07 ("M" train) from San Bernardino, on the San Bernardino Subdivision, to Fullerton Junction, on Main Track Two for a distance of 45.5 miles. At about 1:30 a.m., the Train Dispatcher lined the crossover switches at Fullerton Junction from Main Track Two to Main Track One to allow BNSF 5351 West to pass the M train. The signal at Fullerton Junction displayed a red over green aspect. This authorized the train to operate through the crossover switches and onto Main Track One, then continue at the maximum authorized speed. The next signal they passed was at Basta, which displayed a green aspect, authorizing the train to proceed. The next signal at Buena Park was obstructed by track curvature and a building next to the right of way.

The terrain in this area was a descending grade of 0.23 percent with some sweeping curves between Fullerton Junction and Buena Park. West of Basta, the track curved to the right, beginning with a 1 degree and 27 minute curve and continuing with a 1 degree and 13 minute curve to the right, proceeding westward to just east of Buena Park.

The Engineer was seated at the locomotive controls, and the Conductor was seated on the opposite side of the control compartment of the leading locomotive. After passing Basta, they began to discuss whether a building ahead of them had an illuminated light, or if they were looking at a locomotive with the head light on dim. They decided it was not a light on the building. The Engineer started the conversation with the Conductor by asking the location of the M train. The Conductor replied that he thought that there was an opposing train operating on their track (Track One). Because of their line of sight, the light appeared to the crew of BNSF 5351 West to be the headlight of an oncoming train. As the crew members talked, the Conductor became more convinced that they were going to be involved in a head-on collision. Because they could not determine what track the train ahead was on, the Conductor wanted to stop the train. The Engineer said that they had just passed a control signal displaying a green aspect for Main Track One, and the green signal aspect would indicate that the headlight was not on the same track as they were.

As the Conductor became more concerned, the Engineer made a full service application of the train's air brake system. The Engineer reduced the throttle to idle and placed the locomotive controls in the dynamic brake position. The Engineer told the Conductor that he could stop the train before they reached the other locomotive. The Engineer advanced the dynamic brake selector to throttle eight (full dynamic brakes). The Conductor shouted, "This is not good enough; This is not good enough! We are going to have a head-on collision with the oncoming train!" The Engineer told the Conductor again, "I can stop our train before we reach the other train, if the other train is on Main Track One. The other train must be stopped because the head light is on dim."

The train had slowed down from 50 mph to about 49 mph when the Conductor pulled his emergency brake handle located on the Conductor's side of the locomotive cab, which initiated an emergency application of the train's air brake system.

THE ACCIDENT

As the train was slowing down to about 39 miles per hour, the Conductor ran past the Engineer, opened the rear door behind the Engineer, ran out onto the exterior walkway, and continued down the walkway to the end of the locomotive. The Engineer called to the Conductor, "Don't jump; we are going to stop." The Conductor, believing that a head-on collision was imminent, jumped from the locomotive and sustained fatal injuries.

After the BNSF 5351 West stopped, the Engineer contacted the Train Dispatcher and informed him that the Conductor had jumped from the train. He advised the Train Dispatcher of their location and asked that emergency personnel be directed to their location.

Emergency response personnel arrived, and the Conductor was pronounced dead at the scene.

POST-ACCIDENT INVESTIGATION

The light that the crew of the BNSF 5351 West had observed was the dim headlight on a helper locomotive located on the rear of the "M" train which was standing on Main Track Two. The BNSF 5351 West stopped on Main Track One, approximately 300 feet from the helper locomotive on the rear of the "M" train standing on Main Track Two.

The Conductor was taken to the Orange County Morgue, in Santa Ana, California, where a Federal post-accident toxicological test was performed by the Coroner on duty. The Engineer received a Federal Post-Accident Toxicological Test at the Los Angeles Medical Clinic. All test results were negative.

The Buena Park Police Department, Buena Park Emergency Response Team, and Orange County Coroner responded to the scene.

APPLICABLE RULES

Burlington Northern Santa Fe Railroad

Burlington Northern Santa Fe Railroad Employee Safety Rules, Effective January 31, 1999, (including revisions up to Tuesday, June 25, 2001)

S-1.4.5 On or Off Moving Equipment
Do not get on or off moving equipment, except in an emergency to avoid injury.

S-13.5.2 Getting off Equipment

B. Moving Equipment

- Face the direction the equipment is moving.
- Get off with the trailing foot first to direct you away from the equipment.
- When getting off a caboose, walk down the steps, turn at the bottom step and face the car, then get off.
- Avoid jumping to the ground from a rail car or an engine ladder, step platform or deck.

General Code of Operating Rules, Fourth Edition, Effective April 2, 2000.

1.1.1 Maintaining a Safe Course
In case of doubt or uncertainty, take the safe course.

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.

SUMMARY FOR FE-20-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Lancaster and Chester Railway Company
Location: Chester, South Carolina
Region: Region 3

Month: August
Date: Aug. 26, 2003
Time: 12:30 p.m., EST

Data for Fatally Injured Employee(s)

Conductor
29 years old
2 years of service
Last rules training: Dec. 18, 2002
Last safety training: Aug. 26, 2003
Last physical: None (not required by FRA regulation)

Data for All Employees (Craft, Position, Activity)

Craft: Transportation and Engine

Positions:

Switching Job L&C-16/17
Engineer
Conductor
Brakeman Trainee

Car Inspector
Train Dispatcher

Activity: Switching

EVENT

A Conductor was fatally injured when crushed between two rail cars during a switching movement.

SUMMARY FOR FE-20-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

Investigators concluded it was likely that the Conductor became pinned between the train's rear car and a covered hopper car because he was attempting to adjust the couplers, which had failed to couple.

PCF No. 2

The couplers in question were misaligned about seven inches (coupler mismatch, high/low). (During a post-accident re-enactment, investigators found that the two freight cars would not couple when an attempt was made.)

PCF No. 3

Investigators concluded that the Conductor had failed to use proper radio communication, and that the Engineer had erred by acting on the improper instruction.

PCF No. 4

Investigators concluded that the Conductor had failed to protect himself properly before going between the rail cars, in non-compliance with railroad operating rules, which prohibited employees from stepping between standing cars or engines without first arranging for members of their crew to protect against coupling to or moving the equipment.

PCF No. 5

Investigators determined that the railroad's efficiency testing program was inadequate in the areas of proper radio procedures and employees working around and between equipment.

REPORT: **FE-20-2003**

RAILROAD: Lancaster and Chester Railway Company (L&C)

LOCATION: Chester, South Carolina

DATE& TIME: Aug. 26, 2003; 12:30 p.m., EST

EVENT[1]: A Conductor was fatally injured when crushed between two rail cars during a switching movement.

EMPLOYEE:

Craft:	Transportation and Engine (T&E)
Activity:	Switching
Occupation:	Conductor
Age:	29 years
Length of Service:	2 years
Last Rules Training:	Dec. 18, 2002
Last Safety Training:	Aug. 26, 2003
Last Physical:	None (Not required by FRA Regulation)

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Aug. 26, 2003, the crew of Switching Job L&C-16/17 went on duty at 7:30 a.m. at the L&C headquarters in Lancaster, South Carolina. The crew comprised an Engineer, Conductor, and Brakeman Trainee. All crew members received a statutory off-duty period of more than 12 hours at their home terminal prior to reporting for duty. The crew members discussed the safety rule of the day, received work instructions, and then drove a company vehicle to their train located on the rock track, milepost 0.0, in Chester, South Carolina. They arrived at their train about 9:30 a.m.

L&C 16/17 departed Chester and proceeded east to the Cortex Company at milepost 5.0, with two locomotives and 14 cars. From Cortex, the L&C 16/17 crew continued east with four cars to the east leg of the Wye track, milepost 5.5, where it reversed movement and shoved north onto the CSX Transportation, Incorporated (CSX) lead track to the GAF track (formerly used to service GAF Industries, no longer in existence). L&C 16/17 pulled eight CSX and three Norfolk Southern Railroad (NS) cars from the GAF track, then continued shoving north to the PPG Industries (PPG) switch. The Engineer was seated on the right side of the lead locomotive, HLCX 3821, with the short hood

[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.

forward, the Brakeman was located on the left side, and the Conductor was on the ground controlling the train movement.

The Conductor instructed the Engineer to shove the NS cars clear of the PPG switch, then pull ahead to clear the PPG switch. He lined the switch for the PPG spur track and unlocked the steel gate which blocked the track. This was the last time the Conductor was seen by the Engineer and Brakeman prior to the accident.

At the time of the accident, the sky was sunny, and the temperature was 89° F.

THE ACCIDENT

With the Conductor controlling the shoving movement via radio, he instructed L&C-16/17 to back up to the first coupling. The Conductor said the coupling did not make and told the Engineer "to get off it", (i.e., pull the train forward) then "bump it up" (i.e., back the train up a short distance). The Conductor then said, "The coupling had made" and the Engineer could hear the air flowing from the locomotive into the cars. L&C16/17 had coupled onto two empty covered hopper cars. The Engineer said he had waited 30 to 40 seconds before the Conductor said, "Come to me three feet" (i.e. back the train up three feet). As the train began to move, the Engineer and Brakeman heard the Conductor shout, "Hold it, stop, stop, hold it!" The last thing the Engineer or Brakeman heard the Conductor say was "I need help!"

The Brakeman left the locomotive and hurried to the rear of the train. He found the Conductor lying face up across both rails between the train's rear car, CSXT 242234, and a covered hopper, CSXT 242111. The Conductor's feet were over the west rail and his upper torso and head were over the east rail. The Brakeman said the coupling did not make, and there were about two feet between the last car of the train and the covered hopper car. Both coupler pins were in the up position. The Brakeman radioed the Engineer to call 911.

An L&C Car Inspector, who was just departing the CSX interchange tracks and returning to Lancaster, overheard the Conductor's call for help. He radioed the Engineer and Brakeman that he already had called 911 on his cell phone and that he was on his way to the accident scene.

The Engineer radioed the L&C Dispatcher reporting the accident and contacted via radio a CSX train crew working near the PPG track. He then proceeded to the rear of the train to see if he could provide assistance. He observed the Conductor "gasping for air" and noticed that a partially open angle cock on the last car of the train was blowing air on the Conductor. He closed the angle cock, and then knelt by the Conductor to check his pulse.

The Chester County Emergency Medical Services responded and arrived at the accident scene at 12:41 p.m. The Chester County Sheriff's office was called at 12:34 p.m. by the 911 Dispatcher. The Sheriff arrived at 12:41 p.m. The train was moved ahead about six feet so the emergency technicians could treat the Conductor at the scene. He was then transported to the Chester County Hospital Emergency Room where he was pronounced dead at 1:16 p.m.

An autopsy was performed on Aug. 27, 2003 at Newberry Pathology Associates in Newberry, South Carolina. Newberry Pathology attributed the probable cause of death to bleeding and shock from blunt force trauma to the pelvis due to being hit by a train. The anatomic diagnosis was fatal blunt

force trauma to the upper aspect of lower extremities, pelvis and lower torso with resultant fracture of the pelvis, laceration of pelvic organs, and internal bleeding.

POST-ACCIDENT INVESTIGATION

Federal Railroad Administration (FRA) investigators arrived at 2:30 p.m. on the day of the accident. The investigation began with interviews of the L&C Car Inspector and company officials. FRA inspected the two covered hopper cars involved in the accident and was informed that the train had been moved to provide access for emergency personnel, but had been returned to the original accident position prior to FRA's arrival.

At the time of the accident, the Conductor was positioned between the "B" end of CSXT 242111 and the "B" end of CSXT 242234. The Brakeman said there were no signs of blood and that the Conductor did not appear to have any serious injuries. He further stated that the Conductor was breathing abnormally with short sporadic breaths. He told the Conductor to keep breathing, that help was on the way. The Brakeman and Car Inspector stated they saw rust marks on the Conductor's shirt, in the abdominal area. They lifted the Conductor's shirt and could see severe bruising on the left side of his abdomen, but were unsure how severe his injuries were.

Inspection of covered hoppers CSXT 242111 and CSXT 242234 disclosed no apparent defects that either caused or contributed to the accident. It was observed that the couplers involved were mis-aligned about seven inches. The two freight cars would not couple when an attempt was made. L&C employees interviewed stated that this switching move was a daily occurrence; they did not remember any previous problems with misaligned couplers at this location. Investigators concluded that it was likely the Conductor became pinned between the cars because he was attempting to adjust the mis-aligned couplers.

Train L&C 16/17 was a regular job assignment for the L&C Railroad. The crews' regular work hours were Monday through Friday, from 7:30 a.m to 3:30 p.m. The Engineer had been working this job since July 2002, and his certification was current. The Conductor had been working this assignment since July 18, 2003. The Brakeman had only worked this assignment one day prior to the accident. An inspection of the L&C Hours of Service Records indicated the Engineer and Conductor were off duty 16 hours prior to the day of the accident. The Brakeman was off duty for 84 hours.

There were no witnesses to the accident, nor were there any surveillance cameras to monitor the activities at this location. The locomotives were not equipped with event recorders and the carrier's radio was not recorded, not uncommon for yard operations.

FRA's post-accident toxicology tests were negative for drugs and alcohol.

Description of Accident Area

The L&C Main Track between Lancaster and Chester ran geographically east and west with PPG Industries located about one half mile north of the main track at milepost 5. The CSX lead track came

off the Wye and extended south to north, intersecting with State Highway 9. The CSX lead track connected to the L&C main track just north of PPG Industries, which connected to the CSX main track. Two auxiliary tracks, one east of the main track, the other west of it, paralleled the main track and were used for storing CSX interchange cars.

To the west of the CSX lead track and north of State Highway 9 was the PPG Spur Track, used to place covered hoppers cars for unloading by PPG Industries. The PPG Spur Track extended northward to the PPG unloading track where it dead-ended north of the plant.

The operating speed where the accident occurred was 10 mph. Trains operated under authority of the Lancaster & Chester Timetable No. 83, dated Sept. 23, 2003, and NS Operating Rule 105.

Analysis and Conclusions

FRA's investigation revealed that neither the L&C Conductor nor Engineer had complied with the railroad's safety rules, operating rules, or Federal radio communication regulations. The Conductor failed to use proper radio communication, and the Engineer acted on his improper instruction. The Conductor failed to properly protect himself before going between the cars when he coupled the air hoses. The Engineer failed to advise the Conductor that he had not protected himself prior to going between the cars. The Conductor also failed to remain clear of the approaching equipment (stepping between the moving cars) on the last coupling.

FRA's investigation determined that L&C's efficiency testing program concerning proper radio procedure and employees working around and between equipment was inadequate. An inspection of the Lancaster and Chester records from Jan. 1 through Aug. 25, 2003, indicated that L&C managers had conducted only three radio efficiency tests on the Engineer and Conductor. No efficiency tests were made on them concerning working around or between equipment. The total number of efficiency tests for all L&C operating employees during this time frame was 46, eight for radio procedures and three for working around or between equipment. No tests were conducted on the Brakeman since his employment began in July 2003.

L&C had not adopted FRA's Switching Operations Fatality Analysis (SOFA) recommendations. The L&C efficiency testing program mirrored tests recommended by SOFA, but the railroad's program did not emphasize the life critical rules identified by SOFA. FRA's investigator suggested that life critical rules be incorporated in future efficiency testing, to include safety procedures prior to going between rail equipment with locomotives attached.

Since this accident, L&C has increased efficiency testing efforts with emphasis placed on the life critical rules and radio procedures. From Aug. 27 through Dec. 1, 2003, L&C conducted 18 efficiency tests relative to radio rules and 15 efficiency tests concerning employees working around or between equipment. On December 25, L&C also hired a consultant agency to structure its operating rules and efficiency testing programs.

FRA will continue to monitor the L&C for safety rules, operating rules, and efficiency testing compliance.

APPLICABLE RULES

L&C used Norfolk Southern Railroad's operating rules, and its own safety and general conduct rules.

Lancaster & Chester Railway Company Safety and General Conduct Rules

GR-14 Employees must not stand on the track in front of closely approaching equipment, or step between coupled moving cars or engines, for any reason. They must not step between standing cars or engines until they have arranged for members of their crew to protect against coupling to or moving the equipment.

Employees must neither walk around the end of a standing car, nor adjust a draw-bar or knuckle, without a half car length of open space, and they must expect sudden spring action from cushion underframe draft gear. To adjust a coupler or knuckle, an employee must stand to the side with feet clear of a falling knuckle.

GR-14 was last discussed with all crews at the morning safety briefing held on June 27, 2003.

49 Code of Federal Regulations, Part 220

49 CFR Part 220.43 Radio communications consistent with Federal regulations and railroad operating rules. Radio communications shall not be used in connection with a railroad operation in a manner which conflicts with the requirements of this part, Federal Communication Commission regulations, or the railroad's operating rules.

Norfolk Southern Railway Company Operating Rules

(504.3) Identify each mobile station by (a) the name or initial letters of the railroad, (b) the train name or number, if one has been assigned, or (c) other appropriate unit designation.

(505.1) Employees will promptly acknowledge the receipt of a radio call, identifying the receiving station according to **(504.2)** and **(504.3).**

(508.) Shoving, Backing, or Pushing Movements.

SUMMARY FOR FE-22-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Georgia Central Railway Company
Location: Dublin, Georgia
Region: 3

Month: September
Date: Sept. 12, 2003
Time: 11:45 a.m., EST

Data for Fatally Injured Employee(s)

Conductor
45 years old
2 months of service
Last rules training: Aug. 15, 2003
Last efficiency test: Aug. 25, 2003
Last physical: July 3, 2003

Data for All Employees (Craft, Position, Activity)

Craft: Transportation and Engine

Positions:

Georgia Central Industry Switcher, Y103
Engineer
Conductor

Foreman
Train Dispatcher

Activity: Switching

EVENT

A Conductor was fatally injured when crushed between two rail cars during a switching movement.

SUMMARY FOR FE-22-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Conductor failed to remain clear of moving equipment, in non-compliance with the railroad's operating rules.

PCF No. 2

The Conductor had completed an operating rules exam a month before the incident, had participated in eight safety meetings since his employment two months prior to the incident, and had performed well during efficiency tests. However, with only two months employment, the Conductor was very inexperienced.

REPORT: **FE-22-2003**

RAILROAD: Georgia Central Railway Company (GC)

LOCATION: Dublin, Georgia

DATE & TIME: Sept. 12, 2003; 11:45 a.m., EST

EVENT[1]: The Conductor was fatally injured when crushed between two rail cars during a switching movement.

EMPLOYEE:

Craft:	Transportation and Engine (T&E)
Activity:	Switching
Occupation:	Conductor
Age:	45 years
Length of Service:	2 Months
Last Rules Training:	Aug. 15, 2003
Last Efficiency Test:	Aug. 25, 2003
Last Physical:	July 3, 2003

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Sept. 12, 2003, a 2-person crew (Conductor and Engineer) was called to operate Georgia Central (GC) Industry Switcher, Y103. The crew reported for duty at 7 a.m., EST, at the Southeast Paper Mill (SEP) in Dublin, Georgia. Both crew members received a statutory off-duty period of more than 12 hours at their home terminal prior to reporting for duty.
After reporting for duty, the crew inspected the locomotive, called the various SEP docks to confirm their work orders, and conducted a job briefing. Y103's first move was to shove eight outbound loads to the main track located 3/4 of a mile west of SEP. The crew switched the Mohawk and Clay docks, then called the Foreman on the No. 2 dock, and pulled five loads from the dock. Y103 departed SEP with 17 cars, coupled to the eight cars they left on the main track, and pulled west to Dublin Yard.

The weather was clear, and the temperature was 78° F.

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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.

THE ACCIDENT

Y103 pulled to the main track switch at the west end of Dublin yard with 25 cars. The Engineer was operating lead locomotive GC 3968 from the south side, short hood forward. The Conductor dismounted the lead locomotive from the north side at the main track switch. After stopping Y103 clear of the main track switch, the Conductor removed the west derails on the No. 1 and No. 2 storage tracks. The Conductor lined the storage track switch for the No. 2 storage track, then lined the main track switch for movement toward the storage tracks.

After lining the switches, the Conductor instructed Y103 to pull ahead a couple of car lengths. The Engineer began to pull ahead in a westward direction when the Conductor said, "Hold up, what are you doing?" The Engineer responded, "You told me to pull ahead." The Conductor then stated, "No, I meant shove back about four or five car lengths." The Engineer acknowledged the instruction and began shoving back in an eastward direction. The move was to couple to freight cars standing on the No. 2 storage track.

After shoving back in an eastward direction for about 1 ½ car lengths, the Engineer called the Conductor on the radio and received no response. The Engineer called again and when there was still no response, he brought the train to a stop. When he called again and received no response, he dismounted the locomotive and walked back to see what was wrong. When he got to the rear of the train, the Engineer found the Conductor's body cut in half, lying on the north side of the main track. The accident occurred about 11:45 a.m.

The Engineer ran back to the locomotive and radioed the GC Dispatcher in Vidalia, Georgia. He advised the Train Dispatcher of the accident and said emergency response personnel were needed at Dublin Yard. The Laurens County Sheriff's Department and the Laurens Emergency Medical Service arrived at the accident site about 12:24 p.m. The body was taken to the Fairview Park Hospital Morgue, where a screening of the body was conducted by the Laurens County Deputy Coroner. The body was later transported to the Georgia Bureau of Investigation's State Laboratory in Atlanta, Georgia, where an autopsy was performed.

POST-ACCIDENT INVESTIGATION

The Conductor started working for GC in July 2003, as a Conductor Trainee. His on-the-job training was with the train crew of Y103. GC qualified him as a Conductor in August and assigned him to Y103 as the Conductor.

The primary duties of Train Y103 were to service SEP and build an east and west bound pickup at Dublin Yard. This was a 7-day per week assignment from 7 a.m. to 3 p.m.

Dublin Yard was located on the GC Macon Subdivision, at milepost 57. The accident occurred at milepost 56.9. The yard was in a remote wooded area and comprised two storage tracks located on the north side of the main track. Both storage tracks had the capacity to hold

approximately 27 cars. The method of operation was Yard Limits with an operating speed of 10 mph.

The investigation revealed the Conductor was struck by the brake end (B-end) of the lead car, CSXT 150181. Blood stains were found on the right number one and number two wheels. The Engineer brought the train to a stop approximately three and a half car lengths east of the accident site. The body was located at about 11 feet, 5 inches west of the main track switch. Both halves of the body were found on the north side of the rail. The Conductor's hat was found between the rails near the body. There were no tape recordings of radio transmissions, and the locomotive was not equipped with an event recorder. The Engineer estimated the shoving speed at the time of the accident to be approximately 3 mph. The GC track and mechanical departments found no defects on the car involved in the accident or the track in the accident area.

The Conductor completed his operating rules exam on August 15, and had participated in eight safety meetings since his employment. GC personnel records revealed that the carrier had conducted efficiency tests of the Conductor's performance on August 25. The tests covered several categories including switching, switches, and working around moving equipment. There were no deficiencies recorded.

Post-accident toxicology tests were negative for drugs and alcohol on both crew members.

APPLICABLE RULES

The Conductor was in violation of Georgia Central operating rule 70.32.4: Sufficient Distance. This rule states the following:

> Employees must maintain a safe distance from equipment and not:
>
> 1. Cross or step foul of tracks closely in front of or behind moving equipment;
> 2. Go between equipment if the opening is less than one car length; or
> 3. Cross tracks in front of or behind standing equipment unless there is at least 20 feet between the employee and the equipment.

SUMMARY FOR FE-23-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Union Pacific Railroad Company
Location: Ogden, Utah
Region: 7

Month: September
Date: Sept. 14, 2003
Time: 1:15 p.m., MST

Data for Fatally Injured Employee(s)

Conductor
53 years old
26 years of service
Last rules training: May 24, 2001
Last safety training: Sept. 14, 2003
Last physical: June 26, 2003

Data for All Employees (Craft, Position, Activity)

Craft: Transportation and Engine

Positions:

Yard Switch Job, YOG17
Engineer
Conductor
Two Switchmen

Activity: Switching

EVENT

A Conductor was riding the end of a free-rolling, 2-car cut, whose speed he was controlling with a handbrake, when he fell, and the cars ran over him, amputating his legs. Still alive at the scene, the Conductor was airlifted to the hospital, where he was pronounced dead.

SUMMARY FOR FE-23-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

Investigators concluded that the Conductor either stepped on the uncoupling lever and/or bracket (which was defective with poor weld penetration and a missing support brace) or fell on them just before falling from the car.

PCF No. 2

The Conductor did not place himself in a safe position to ride the cut of cars (including firm footing and hand hold to prevent slipping, falling, or injuries), in non-compliance with the railroad's operating rules.

REPORT: **FE-23-2003**

RAILROAD: Union Pacific Railroad Company (UP)

LOCATION: Ogden, Utah

DATE & TIME: Sept. 14, 2003, 1:15 p.m., MST

EVENT[1]: The Conductor was riding the end of a free-rolling, 2-car cut, whose speed he was controlling with a handbrake, when he fell, and the cars ran over him, amputating his legs. Still alive at the scene, the Conductor was airlifted to the hospital, where he was pronounced dead.

EMPLOYEE:

Craft:	Transportation and Engine (T&E)
Activity:	Switching
Occupation:	Conductor
Age:	53 Years
Length of Service:	26 Years
Last Rules Training:	May 24, 2001
Last Safety Training:	Sept. 14, 2003
Last Physical:	June 26, 2003

CIRCUMSTANCES PRIOR TO THE ACCIDENT

After receiving their statutory off-duty period, a local yard switch crew comprising a Conductor, two Switchmen, and an Engineer reported for duty at 7 a.m., MST, on Sept. 14, 2003, at Riverdale Yard in Ogden, Utah. The crew was called to work Yard Switch Job, YOG17, performing switching service at the south end of the Riverdale Yard.

The crew's assignment was to place cars on various yard tracks that branched off of the south lead track. First, the crew members proceeded northward on the south lead and decided to place two cars onto Track No. 21. They stopped near the Track No. 15 switch to uncouple the two cars and allow them to roll freely onto Track No. 21. One Switchman subsequently uncoupled the cars, and the Conductor boarded the northeast corner of Freight Car CNW 137337 to control the speed of the cars by operating the hand brake. The loaded cars began rolling slowly down the south lead track toward Track No. 21, which has a descending grade of 0.41 percent.

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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.

At the time of the accident, the Engineer was seated at the locomotive's controls and one Switchman was on the ground at the southwest corner of the second car, uncoupling the cars. The Conductor was at the northeast corner of Freight Car CNW 137337, which was being switched onto Track No. 21.

Another Switchman working on this assignment had just ridden some cars onto another track to set the hand brakes. He was walking back up the lead from Track No. 15 and saw the Conductor riding on one of the cars headed for Track No. 21. He crossed over to the west side of the rail behind the cars and did not see the Conductor set the hand brake or fall.

THE ACCIDENT

As the two cars moved slowly over the lead track at about 3 mph, in the vicinity of the Track No. 18 switch, the Conductor, who was riding on Freight Car CNW 137337, fell and landed on the east rail. The cars rolled over and amputated both of his legs, then continued the movement and coupled to the cars on Track No. 21. After the accident, the injured Conductor was heard yelling by other employees, who rushed to his aid. They contacted emergency response personnel and attempted to stop the bleeding. The injured Conductor was subsequently air lifted to the hospital where he was pronounced dead.

POST-ACCIDENT INVESTIGATION

It is unknown whether the Conductor had stepped on the ladder or the uncoupling lever of Freight Car CNW 137337 to control the movement with the hand brake. It appears he either stepped on the uncoupling lever and/or bracket or fell on them just before falling from the car. The uncoupling lever bracket on the corner of the car was found to be broken at the butt weld where the bracket was attached to the car. The weld had poor penetration and was approximately 90 percent new break. The support brace that should have been underneath the uncoupling lever bracket was missing. The uncoupling lever and bracket fell off of the car and landed on the east rail and wedged against the wheel on the northeast corner of the car.

The hand brake on the lead car was found to be applied.

The uncoupling lever showed signs of falling to the ground approximately nine feet north of the Track No. 19 switch. The first signs of blood were approximately two feet north of the Track No. 19 switch, and the injured Conductor was found approximately 16 feet further south. There were indications of blood on all four wheels of Freight Car CNW 137337, and there was blood on the first wheel of the second car.

An autopsy, performed by the Office of the Medical Examiner for the State of Utah, determined the immediate cause of death was traumatic amputation of the lower extremities.

It was determined from interviews UP conducted with two of the surviving crew members that several job briefings had been held throughout the shift with all of the employees, prior to the accident.

A Federal post-accident toxicological test was performed by Northwest Technology, Inc. All test results were negative.

The Riverdale Police Department and Life Flight Medical Services responded to the accident.

APPLICABLE RULES

Union Pacific Railroad Company Employee Safety Rules, Effective Oct. 25, 1998

81.7.1 Designated riding places
When required to ride on cars, engines, or other equipment:
Ride on designated steps, ladders, or platforms.

81.11 Handbrake
When operating hand brake, inspect for defects. Use good body mechanics. Have firm footing and hand hold to prevent slipping, falling, or injuries (e.g., sprains, strains).

End mounted brake on equipment equipped with a brake step or platform and locomotive hand brake must be applied or released from a position on the equipment. When climbing on equipment, maintain at least a 3-point contact. This consists of both feet and one hand or both hands and one foot touching the equipment. When in position to apply or release an end-mounted brake with a platform, place your left foot on the ladder rung and your right foot on the brake platform. Grasp a ladder rung or the top hand hold with your left hand and operate the brake with your right hand. Do not place both hands on the brake wheel.

General Code of Operating Rules, Fourth Edition, Effective April 2, 2000

1.1.1 Maintaining a Safe Course
In case of doubt or uncertainty, take the safe course.

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.

SUMMARY FOR FE-25-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Burlington Northern Santa Fe Corporation
Location: Fresno, California
Region: 7

Month: September
Date: Sept. 24, 2003
Time: 1:10 a.m., PST

Data for Fatally Injured Employee(s)

Yard Foreman
35 years old
2 years, 3 months of service
Last rules training: June 7, 2003

Data for All Employees (Craft, Position, Activity)

Craft: Transportation and Engine

Positions:

Yard Job YFSR 301 23A (Job 301)
Yard Foreman
Switchman Helper
Engineer

Assistant Trainmaster
Engineer operating another train in the yard

Activity: Switching

EVENT

A Yard Foreman was fatally injured when struck by rail equipment when he fell from a freight car during a switching movement.

SUMMARY FOR FE-25-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

Investigators concluded that poor train handling (throttle and brake actions) by the Engineer may have caused, or contributed to, the Yard Foreman falling off the side of the freight car.

REPORT: **FE-25-2003**

RAILROAD: Burlington Northern Santa Fe Corporation (BNSF)

LOCATION: Fresno, California

DATE &TIME: Sept. 24, 2003; 1:10 a.m., PST

EVENT[1]: The Yard Foreman was fatally injured when struck by rail equipment when he fell from a freight car during a switching move.

EMPLOYEE:

Craft:	Transportation and Engine (T&E)
Activity:	Switching
Occupation:	Yard Foreman
Age:	35 Years
Length of Service:	2 Years, 3 Months
Last Rules Training:	June 7, 2003

CIRCUMSTANCES PRIOR TO THE ACCIDENT

A Burlington Northern Santa Fe Railroad (BNSF) crew of Yard Job YFSR 301 23A (Job 301**)**, comprising a Yard Foreman, Switchman Helper, and an Engineer reported for duty to Calwa Yard in Fresno, California, at 11 p.m. on Sept. 23, 2003, after completing the statutory off duty period. The Engineer held a regular position on the crew. The Yard Foreman was called off the extra board, and the Switchman Helper was taken off his regular assignment to fill a vacancy on the job.

After receiving a job briefing by the Assistant Trainmaster, the Yard Foreman drove the rest of the crew to the Visalia main track via company vehicle. The Engineer boarded the locomotive, and the Switchman Helper stayed on the ground to line back the derail. The Yard Foreman left in the company vehicle to line switches ahead of the train, where the crew was to pull a cut of cars from the Visalia Main to Calwa Yard Track No. 5154. That having been accomplished, and after performing a number of yard switching duties, the crew of Job 301 operated eastward onto Track No. 5156 to pull a cut of cars from that track. As the cars were being pulled westward out of Track No. 5156, the Yard Foreman and Switchman Helper noticed that two of the 38 cars on the list were missing.

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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.

The movement was stopped, and the Yard Foreman rode the leading or easterly car back onto the track to couple into the two missing cars.

THE ACCIDENT

The accident occurred shortly after the Yard Foreman climbed on the north side or "A" end of RBOX 31644, the easterly car, and then told the Engineer via portable radio, "Back up approximately 50 cars." The Switchman Helper of Job 301 corrected him by saying, "You mean forward." Since the locomotive attached to the cars was facing eastward, an eastward movement was forward. Both the Yard Foreman and the Switchman Helper were on the opposite side of the train from the Engineer's position in the locomotive cab. The Switchman Helper remained in the vicinity of the 5156 switch while the shoving move was in progress.

The Engineer initiated the shoving move, using a short period of high throttle use (position 6), which resulted in high traction motor amperage, followed shortly thereafter by throttle modulation between positions two and three. After he had moved approximately 20 car lengths eastward, at a speed of 4 to 6 mph, and had not heard any further instructions, the Engineer called the Yard Foreman and asked, "How are we looking?" At that point, he heard a faint response. An Engineer operating another train in the yard communicated via radio that he heard the Yard Foreman say, "I fell off the car; 301, that'll do." Then, the Engineer and the Switchman Helper heard, "301, that'll do."

The Engineer used the independent brake to bring the train to a stop within 158 feet from the location where he heard the Yard Foreman had fallen off the car. None of the cars had functioning air brakes because the air hoses had not been coupled by the train crew. However, switching without air brakes is a common practice that allows crew members to cut cars, allowing them to travel onto the track desired. Air brakes would cause cars to stop abruptly after being cut from the train.

The Assistant Trainmaster was at the east end of the yard giving a departing train a roll by inspection when he heard the communication over the radio. He immediately went to the accident scene and found the Foreman crushed beneath the L3 wheel of covered hopper car DOWN 21209, six cars behind the easterly car he was last seen riding. The Yard Foreman's switch list and lantern were found together between the rails, 22 feet west of the body. The portable radio used by the Yard Foreman was found near the same location, about three feet outside of the north rail.

After finding his body, the Assistant Trainmaster called 911 and directed the responding Fresno Police Department, Fresno Fire Department, and an American Medical Services ambulance to the scene. The Yard Foreman was declared dead at the scene by the Fresno County coroner at 1:29 a.m., on Sept. 25, 2003.

POST-ACCIDENT INVESTIGATION

When last seen by the Switchman Helper, the Yard Foreman was riding the lead or easterly car, RBOX 31644, as it was shoved eastward onto Track No. 5156. It appeared he either fell from or was dislodged from the lead car at some point and for unknown reasons ended up under the wheels of covered hopper car DOWN 21209. Investigators did not find evidence of blood on any of the wheels of the six cars that were ahead of the car under which the body was found. The Federal Railroad Administration's (FRA) track inspection revealed no defects that may have caused or contributed to the accident.

An Operating Practices Inspector with the California Public Utilities Corporation (CPUC) reviewed the deceased employee's operating rules test records; tests were current. Records also indicated that the employee was qualified as a Switch Foreman. The operational testing records of the deceased employee also were inspected. They revealed he had been subjected to 84 rules observations with three safety rules failures in July 2001, for which he had received verbal warnings. All of the safety rule failures concerned S13.1.3 General Requirements (Crossing tracks greater than 25 feet from standing equipment, and not crossing in front of moving equipment unless safe); S13.1.4 General Requirements (Do not sit or stand on rails or track structure unless duties require, do not stand or sit on top of equipment, do not sit on steps of moving engines or cabooses, do not sit or lie under or lean against standing equipment unless duties require, and do not stand or sit on engine or caboose hand rails); and S21 Personal Protective Equipment. No recent failures on the efficiency tests were found.

A CPUC Mechanical Inspector conducted mechanical inspections, finding no defects that may have caused or contributed to the accident.

FRA's post-accident toxicological testing was conducted on the Engineer and Switchman Helper at an area hospital. The results were found to be negative. The Coroner's office conducted an FRA fatality toxicology test on the deceased. Results of these tests were negative.

The portable radio used by the Yard Foreman and the radio from the locomotive used by Job 301 were inspected by the BNSF Radio shop and were found to be working as intended.

The Road Foreman of Engines indicated that the event recorder download showed that the throttle had been in the run six position when shoving the 36 cars. Then, the throttle dropped to run three, and then idle. It took the locomotive 158 feet to stop. The Road Foreman did not believe that slack action could have knocked the Yard Foreman off of the car. However, FRA's review of the event recorder data revealed a short period of high throttle use (position 6), resulting in high traction motor amperage, followed shortly thereafter by throttle modulation between positions two and three. This evidence led investigators to conclude that train handling may have caused, or contributed to, the employee falling or being dislodged from the side of the freight car at some point during the throttle and brake actions of the locomotive Engineer.

The Forensic Pathologist stated that the immediate cause of death was traumatic severing of the torso at the pelvis and amputation of the right arm.

BNSF operating officers conducted a safety stand down after the accident and held safety meetings for all crews at terminal points to discuss the fatality. Appropriate safety rules were reviewed. Rules classes with an instructor were offered at Richmond, Stockton, Fresno, and Bakersfield, California. The classes were voluntary and were conducted by a Rules Instructor.

APPLICABLE RULES

Burlington Northern Safety Rules

1.1.2 Alert and Attentive

1.20 Alert to Train Movement

2.13 In Place of Hand Signals

5.3.7 Radio Response

6.5 Handling Cars Ahead of Engine

S-1.1 Job Safety Briefing

S13.1.5 Riding In or On Moving Equipment

SUMMARY FOR FE-28-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Long Island Railroad
Location: Copiague, New York
Region: 1

Month: October
Date: Oct. 20, 2003
Time: 10:20 a.m., EST

Data for Fatally Injured Employee(s)

Electrician/Third Railman (acting as Watchman/Lookout)
41 years old
17 years of service
Last rules training: N/A
Last safety training: May 5, 2003
Last physical: July 16, 2003

Data for All Employees (Craft, Position, Activity)

Craft: Maintenance of Way

Positions:

Gang No. 5
Gang Foreman
Electrician/Third Railman acting as Watchman/Lookout
Second Watchman/Lookout
Seven other gang members

Long Island Railroad (LIRR) Passenger Train No. 34
Locomotive Engineer
Off-duty Train Service Employee

Activity: Performing Watchman/Lookout duties while rest of gang performed track maintenance

EVENT

An Electrician/Third Railman, who was acting as Watchman/Lookout for his MOW gang, was fatally injured when struck in the back by an oncoming passenger train.

SUMMARY FOR FE-28-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Electrician/Third Railman acted in non-compliance with the railroad's operating rules by standing on the track of an oncoming train, and by not anticipating equipment to move on any track, in either direction, at any time. His back was to the oncoming train, most likely, because he assumed the eastbound train was on the adjacent track, as a westbound train had passed by on the track where he was standing just 10 minutes before. However, LIRR passenger trains habitually operated over this section of the railroad on both tracks, in either direction; both tracks were equipped with signals for bi-directional traffic.

PCF No. 2.

The Gang Foreman conducted a job briefing only for the five crew members in his truck, not including the second Watchman/Lookout, who was riding in the second truck with two others, and a fourth who was riding his own vehicle. As instructed, the other gang members assembled on the north side of Track No. 1, to allow the two assigned Watchmen/Lookouts to get into position. Up to the time of the accident, the second Watchman/Lookout (who had not been briefed) had not assumed his post. A second Watchman might have alerted the first Watchman to the oncoming train and prevented the fatal incident.

REPORT: **FE-28-2003**

RAILROAD: Long Island Railroad (LIRR)

LOCATION: Copiague, New York

DATE & TIME: Oct. 20, 2003; 10:20 a.m., EST

EVENT[1]: An Electrician/Third Railman, who was acting as Watchman/Lookout for his gang, was fatally injured when struck in the back by an oncoming passenger train.

EMPLOYEE:

Craft:	Maintenance of Way (MOW)
Activity:	Performing Watchman/Lookout Duties while MOW gang did track maintenance
Occupation:	Electrician/Third Railman
Age:	41 years
Length of Service:	17 Years
Last Rules Training:	N/A
Last Safety Training:	May 5, 2003
Last Physical:	July 16, 2003

CIRCUMSTANCES PRIOR TO THE ACCIDENT

Work Crew (Gang No. 5)

On Oct. 20, 2003, at approximately 7:45 a.m., an LIRR Electrician (a.k.a. Third Railman) reported for his normally assigned shift (8 a.m. to 4 p.m.) at the railroad's Electric Traction Department, a maintenance facility in Valley Stream, New York, following a 1-week vacation. He was assigned to a 10-person roadway work group (a.k.a.. Gang No. 5) under the supervision of a Gang Foreman. The assigned duties for the work group that day were shimming and gauge alignment of the third rail, and picking up scrap materials left along the railroad right-of-way between the Lindenhurst and Copiague Passenger Stations. Following routine pre-shift activities and casual conversation with co-workers, the roadway work crew members met with the Foreman to receive their work assignments for the day. According to co-worker statements, the

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Third Railman's demeanor was normal, and he appeared to be in good spirits. At approximately 8:30 a.m., after they loaded tools and equipment onto company trucks, the crew members departed Valley Stream in two trucks en route to the job site. The Foreman rode in the larger truck with five of the crew members while the other three crew members followed in a smaller truck (one employee traveled to the site in his personal vehicle).

En route, the crew stopped at a local coffee shop for approximately 15 minutes before arriving at the job site at approximately 9:45 a.m. The driver parked the truck on a public street under a railroad viaduct near the job site. The second truck had not yet arrived. Before climbing the embankment up to track level, the Gang Foreman conducted a job briefing for the employees in his truck. He assigned the Electrician to be Watchman/Lookout for the crew, providing the train approach warning for eastbound trains. Another employee (riding in the second truck) was to be assigned the duties of Watchman/Lookout, providing the train approach warning for westbound trains. Following the briefing, the men collected their equipment and climbed up the railroad embankment to track level.

The work site was located on LIRR's Montauk Branch, and comprised two main line tracks. The two east/west (timetable direction) tracks were electrified (third rail) and identified as: Track No. 1 to the north, and Track No. 2 to the south. Long Island passenger trains operated over this section of the railroad on both tracks, in either direction. Both tracks were equipped with signals for bi-directional traffic. The maximum authorized timetable speed for passenger trains was 80 mph, and there were no temporary speed restrictions in effect. The distance between the two track centers was approximately 25 feet and the third rail for each track was located between the tracks. Approaching from the west, there was a slight curve to the north. Copiague Passenger Station was located approximately 1,000 feet west of the accident site.

Long Island Passenger Train No. 34

Long Island Passenger Train No. 34 departed New York's Penn Station at 9:31 a.m., en route to Montauk, New York. The train operated eastbound on signal indication, making scheduled passenger station stops at Woodside, Jamaica, and an intended final stop at Babylon. The train passed Copiague Passenger Station, operating on Track No. 1, at 67 mph as it approached the work crew's location at MP 32.6. The Locomotive Engineer was seated in the control cab on the right side of the lead MU 9040. An off-duty, LIRR train service employee was dead-heading on Train No. 34 to Montauk, New York, and was positioned on the left side of the MU car, adjacent to the Engineer.

At the time of the accident, the sky was clear, and the temperature was approximately 48° F. There was also snow on the ground from a previous snowfall.

THE ACCIDENT

After climbing up the embankment to track level, the crew assembled on the north side of Track No. 1, to wait for the arrival of the other crew members and to allow the two assigned Watchmen/Lookouts to get into position. The Gang Foreman instructed the Watchman/Lookout to walk west to be in position when the other Watchman/Lookout arrived. The Electrician crossed over Track No. 1 and walked between Tracks Nos. 1 and 2, approximately 900 feet west. The Foreman told the other crew members to remain in the clear of the tracks until both Watchmen/Lookouts were in position. At about this time, an LIRR passenger train, operating westbound on Track No. 1, approached the area. The Watchman/Lookout alerted the crew by sounding his air horn and holding up his Watchman's disk toward Track No. 1. The Gang Foreman acknowledged the warning by waving. The train passed the worker's location and continued westbound. Approximately 10 to 12 minutes later (10:20 a.m.), an eastbound LIRR passenger train (No. 34) approached the area. According to statements of crew members who witnessed the accident, the Electrician sounded the air horn and pointed toward Track No. 2 with his watchman's disk. The Electrician then stepped from his position between Track No. 1 and Track No. 2, and stood within the gage of Track No. 1 while continuing to indicate with his disk toward Track No. 2. The crew members (still standing in the clear) acknowledged the watchman's warning by waving to him. The witnesses observed the Electrician standing, facing east, with his back toward the approaching train. They first observed the approaching train and realized that it was on Track No. 1 when it was approximately 200 feet from the Watchman/Lookout's position. They heard the train horn sound as it approached the Electrician, but he never turned around.

The Engineer of Train 34 observed the employee on the track ahead, and sounded the locomotive horn. When it became apparent that the employee was not going to move in the clear, he initiated an emergency application of the train's brakes. Train 34 struck the Electrician from behind, fatally injuring him. When the train came to a stop, the Engineer contacted the LIRR Dispatcher to report the accident.

The Gang Foreman immediately ran down the embankment toward the parked truck to summon emergency responders, while other members of the work crew covered the body with their jackets. The employee was pronounced dead at the scene by a local medical official.

POST-ACCIDENT INVESTIGATION

The Metropolitan Transit Authority (MTA) Police Department and LIRR officials investigated events leading up to the employee fatality. FRA's investigation would determine whether a violation of Federal safety regulations or railroad operating rules had caused or contributed to the fatality. Statements were obtained from all involved individuals. Data from the train's event recorder supported statements made by the Engineer and other eye witnesses at the scene.

LIRR training records indicated the employee had received Roadway Worker Protection/On-Track Safety training (RWP/OTS) and was qualified by the railroad to perform the duties of Watchman.

Conclusion and Analysis

Prior to the arrival of Train No. 34, eye witnesses stated they had observed the Watchman/Lookout move from his safe location between the two tracks to Track No. 1. He warned the other crew members of the approaching train by sounding his air horn and pointing his watchman's disk toward Track No. 2. It was evident to them that the Watchman/Lookout assumed that the approaching eastbound train was operating on Track No. 2. Witnesses stated that the employee never turned around to verify which track the approaching train was on prior to being struck. Investigation findings revealed that the employee was qualified and capable of performing the assigned duties of a Watchman/Lookout. For reasons unknown, the employee mistakenly assumed that the approaching eastbound train was operating on Track No. 2, when in fact, it was on Track No. 1.

APPLICABLE RULES

49 CFR Part 214.313

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

b) A roadway worker shall not foul a track except when necessary for the performance of duty.

c) Each roadway worker is responsible to ascertain that on-track safety is being provided before fouling a track.

49 CFR Part 214.315

a) When an employer assigns duties to a roadway worker that call for that employee to foul a track, the employer shall provide the employee with a job briefing that includes information on the means by which on-track safety is to be provided, and instruction on the on-track safety procedures to be followed.

b) A job briefing for on-track safety shall be deemed complete only after the roadway worker has acknowledged understanding of the on-track safety procedures and instructions presented.

c) Every roadway work group whose duties require fouling a track shall have one roadway worker designated by the employer to provide on-track safety for all members of the

group. The designated person shall be qualified under the rules of the railroad that conducts train operations on those tracks to provide the protection necessary for on-track safety of each individual in the group. The responsible person may be designated generally, or specifically for a particular work situation.

49 CFR 214.339

Each railroad shall require that the locomotive whistle be sounded, and the locomotive bell be rung, by trains approaching roadway workers on or about the track. Such audible warning shall not substitute for on-track safety procedures prescribed in this part.

Long Island Railroad Roadway Worker Protection Program, On-Track Safety Manual

A. Job Briefings:

Before beginning work, all roadway workers must participate in a job briefing.

B. Responsibilities of Roadway Workers:

If you are a roadway worker, you have the responsibility to:

1. Comply with the rules and instructions in the Roadway Worker Protection/On-Track Safety Manual, as well as all other applicable instructions, i.e., 49 CFR Part 214, Subpart C, etc.

C. Crossing Tracks:

When you are crossing tracks, expect equipment to move on any track, in either direction, at any time. Follow these precautions when crossing tracks:

1. Look both ways, then take the safest route. If you must cross the track, stop and look both ways before crossing each track.

4. Avoid crossing in front of a moving train or equipment. If you must cross in front of a moving train or equipment, make sure you can reach the opposite side and be in a position of safety at least 15 seconds before the train or equipment arrives and have at least 4 feet of clearance from the field side of the rail.

D. Assigning Watchmen:

Employees in Charge are responsible for a safe operation and must take every reasonable precaution to protect Roadway Workers in their charge. They will assign Watchmen and Advance Watchmen when needed.

1. When a gang fouls a track outside the work limits, assign one or more Watchmen to give warning of approaching trains that will allow them to be in a safe position in the clear at least 15 seconds before the engine(s) or on-track equipment arrives at the location where they are working.

2. Assign only trained and qualified Watchmen who have current RWP/OTS qualifications.

E. Responsibilities of Watchmen:

Where working limits are not established, the Employee-in-Charge assigns Watchmen to watch for approaching trains and to warn Roadway Workers to clear the tracks. If you have been assigned as a Watchman, you must:

1. Give full attention to detecting the approach of trains and warning roadway workers to clear the tracks; and

2. Not perform any other duties, even momentarily.

SUMMARY FOR FE-30-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Illinois Central Railroad
Location: Grenada, Mississippi
Region: 3

Month: October
Date: Oct. 22, 2003
Time: 9:45 a.m., CST

Data for Fatally Injured Employee(s)

Carpenter
39 years old
9 years of service
Last rules training: May 7, 2003
Last safety training: June 30, 2003
Last fall protection training: Dec. 3, 1997
Last physical: Not Required

Data for All Employees (Craft, Position, Activity)

Craft: Maintenance of Way

Positions:

Two Bridge Gangs, ICCX DO1 and CO1
Foreman (Employee in Charge)
Two Assistant Foremen
Pile Driver Engineer
Bridge Welder
Carpenter
Carpenter Helper/Tie Handler Operator

Activity: Renewing bridge ties

EVENT

While assisting other bridge workers in the replacement of old bridge ties, a Carpenter fell from a railroad trestle and drowned.

SUMMARY FOR FE-30-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Carpenter, in non-compliance with Federal bridge worker safety standards, failed to reconnect his personal fall protection equipment to a rail slide before leaving the safe zone.

PCF No. 2

In non-compliance with railroad operating rules, the Carpenter failed to comply with instructions from his supervisor, who was concerned with his safety.

REPORT: **FE-30-2003**

RAILROAD: Illinois Central Railroad (IC)

LOCATION: Grenada, Mississippi

DATE & TIME: Oct. 22, 2003; 9:45 a.m., CST

EVENT[1]: While assisting other bridge workers in the replacement of old bridge ties, a Carpenter fell from a railroad trestle and drowned.

EMPLOYEE:	Craft:	Maintenance of Way (MOW)
	Activity:	Installing Bridge Ties
	Occupation:	Carpenter
	Age:	39 years
	Length of Service:	9 years
	Last Rules Training:	May 7, 2003
	Last Safety Training:	June 30, 2003
	Last Fall Protection Training:	Dec. 3, 1997
	Last Physical:	Not Required

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Oct. 22, 2003, two IC bridge gangs, ICCX DO1 and CO1, reported to the IC train depot in Grenada, Mississippi, at 7 a.m., CST. They held a job briefing and safety meeting at the train depot from 7 a.m. to 7:30 a.m. The job briefing included their on-track authority, general safety rules, and bridge worker safety. For this project, both gangs would be working together renewing bridge ties on Bridge No. 617.3. The combined bridge gangs comprised one Foreman, who was the Employee In Charge (EIC), two Assistant Foremen, one Pile Driver Engineer, one Carpenter Helper/Tie Handler Operator, one Bridge Welder, and one Carpenter. About 7:45 a.m., the bridge crew inspected and put on their personal fall protection equipment. The EIC received a track warrant authority to occupy the main track, MP 617 to MP 618, from 7:30 a.m. until 3:30 p.m.

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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.

Five members of the bridge crew walked north from the depot at MP 617.0 to the bridge and began work. At 8:30 a.m., the hi-rail gang truck was set on the main track at the depot and hi-railed north to the bridge. The on-track Tie Handler moved from a side track, at MP 617.1, onto the main track and followed the hi-rail gang truck to the bridge.

On an 80-foot through-plate section of the bridge, the bridge gangs were removing old bridge ties and replacing them with new ties. The bridge gang removed the spikes that secured the rail to the old timber. Then using track jacks, they raised both rails so the Tie Handler could remove the old ties. Ten consecutive ties were removed, exposing an opening 11 feet in length by 20 feet, 6 inches in width. The Tie Handler was now positioned south of the opening, and the gang truck was positioned 30 feet north of the opening.

The Tie Handler began sliding new ties into place, working north to south. As the Tie Handler was sliding the second tie beneath the rail and over a floor beam, he began having difficulty sliding the tie over the floor beam rivets. The Foreman instructed the Tie Handler to "bump" the tie, in an attempt to force it over the floor beam rivets. The Foreman directed the bridge gang to move to the safe zone behind the gang truck and between the rails. He told the bridge gang members they could disconnect their lanyards from their rail sliders once in the safe zone.

While the Tie Handler "bumped" the tie, the Carpenter took a pry bar and moved to the west stringer in an apparent attempt to help position or hold the tie as it was being installed. Noticing the situation, the Foreman instructed the Carpenter to move away from the area because he had not reconnected his personal fall protection equipment to a rail slide**.** An Assistant Foreman and Welder heard the Foreman tell the Carpenter to get out of the way and come back. Neither man was sure if the Carpenter heard the Foremen's instructions.

The weather was sunny, and the temperature was about 70° F.

THE ACCIDENT

At 9:45 a.m. the Carpenter was standing on a stringer and girder portion of the through-plate bridge. He either slipped or lost his balance while attempting to help the Tie Handler move the tie, which was lodged between the bridge floor beam and the rail. An Assistant Foreman saw the Carpenter fall backward into the Yalobusha River. He removed his fall protection equipment and jumped off the bridge into the water in an attempt to save the Carpenter. The other bridge workers observed the Carpenter resurface once downstream.

The Tie Handler Operator used his mobile telephone to call 911 and request emergency personnel at 9:45 a.m. The Grenada Police Department, Grenada Fire Department, and Grenada Lake Medical Center arrived at the scene about 9:55 a.m. At about 11:00 a.m., the U.S. Army Corps of Engineers shut down the Grenada Lake spillway to lower the water and slow the water's current downstream. At 6:04 p.m., the Carpenter's body was found about 300 feet downstream and wearing his personal fall protection equipment.

The final report of the autopsy stated the cause of death to be fresh water drowning consistent with a fall from a railroad trestle.

POST-ACCIDENT INVESTIGATION

The 958-foot, 2-inch bridge comprised, from the north, a 208-foot ballast deck timber structure, a 30-foot, 7-inch I-beam span, an 80-foot through-plate girder, a 139-foot riveted through-truss span, an 80-foot through-plate girder, a 30-foot, 7-inch I-beam span, and a 390-foot ballast deck timber structure.

The Carpenter fell 23 feet, 10 inches into the Yalobusha River. The river, approximately 360 feet wide and 10 feet deep, had a water speed of two to three feet per second.

It was determined that when the Carpenter fell into the river, he was wearing boots, standard summer type clothing with coveralls, and a body harness with a lanyard. The carrier's fall retrieval plan at the work site comprised a Rollgliss rescue frame system.

The Grenada County Coroner sent the Carpenter's body to the State Medical Examiner in Jackson, Mississippi, for an autopsy and toxicological testing. Body fluids were sent to the State Crime Lab for laboratory testing. Results are not expected for up to two years.

APPLICABLE RULES

Federal Railroad Administration Regulations
Bridge Worker Safety Standards
49 CFR Part 214

214.103 Fall protection, generally.

(a) Except as provided in paragraphs (b) through (d) of this section, when employees work twelve feet or more above the ground or water surface, they shall be provided and shall use a personal fall arrest system or safety net system . . .

Canadian National
Life Safety Rule Book

Section II

Rule 1H: Comply with all IC rules and policies that relate to our job task(s).

Section III

E-6, Rule 1: Comply with all company requirements for fall protection.

IC Operating Rules

General Rule B: Employees will report to and comply with instructions from supervisors who have the proper jurisdiction.

On Track Safety Rule 1005: When working near or observing equipment, communicate with the equipment operator and make sure everyone understands:

1) ...
2) Location of employees working around and observing equipment
3) Operator's blind spots
4) ...
5) When duties require one to be near the equipment, stay outside the 15-foot safe area.

Exception: The equipment operator and employee must jointly establish a safe location for the employee to occupy when duties require the employee to be within the 15-foot safe area.

Fall Protection Manual

General Safety Requirements:

4) The Foreman may allow employees to move over the bridge, at his discretion, without tying off provided that they do not step over or approach unprotected openings or step on the field side of the running rails. No work may be done without tying off.

SUMMARY FOR FE-32-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Burlington Northern Santa Fe Corporation
Location: Argyle, Iowa
Region: Region 6

Month: October
Date: Oct. 30, 2003
Time: 1:30 p.m., CST

Data for Fatally Injured Employee(s)

Track Foreman
60 years old
28 years of service
Last rules exam: Feb. 2, 2003
Last safety training: May 28, 2003
Last physical: Unknown

Data for All Employees (Craft, Position, Activity)

Craft: Maintenance of Way

Positions:

Medill Section Gang
Foreman
Number of Members and Specific Roles Not Mentioned

Fort Madison Section Gang
Fatally Injured Foreman
Two Additional Gang Members

Surfacing Gang
Foreman
Two Tamper Operators
Ballast Regulator Operator

SUMMARY FOR FE-32-03 CONTINUED
SELECTED FACTORS CONTINUED

Data for All Employees Continued

Union Pacific Auto Rack Train, Train Symbol AGBPX-30
Engineer
Other crew members not mentioned

Contractor (who performed maintenance of a truck performance detector)

Activities: Track Maintenance. Specifics follow:

Medill Section Gang: Changing out an insulated joint plug.
Fort Madison Section Gang: Assisting a Contractor with maintenance of a truck performance detector.
Surfacing Gang: Tamping various locations between Argyle and Medill, including above detector.

EVENT

While directing track maintenance activities, a Track Foreman was struck by an on-coming freight train and fatally injured.

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The Foreman of the Fort Madison Section Gang (who was fatally injured) was found in violation of railroad operating rules because he fouled the adjacent track without track authority or protection.

PCF No. 2

Investigators concluded that because the Foreman was next to a tamper in full operation, he did not hear the approaching train's whistle until its arrival at the accident site.

PCF No. 3

Investigators concluded that the joint briefing was inadequate because it did not include information on the hazards of live track.

REPORT:	**FE-32-2003**	
RAILROAD:	Burlington Northern Santa Fe Corporation (BNSF)	
LOCATION:	Argyle, Iowa	
DATE & TIME:	Oct. 30, 2003; 1:30 p.m., CST	
EVENT[1]:	While directing track maintenance activities, a Track Foreman was struck by an on-coming freight train and fatally injured.	
EMPLOYEE:	Craft:	Maintenance of Way (MOW)
	Activity:	Track Maintenance
	Occupation:	Track Foreman
	Age:	60 years
	Length of Service:	28 years
	Last Rules Exam:	Feb. 2, 2003
	Last Safety Training:	May 28, 2003
	Last Physical:	Unknown

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Oct. 30, 2003, an MOW Foreman, with 28 years of railroad experience, was providing on-track protection for a Contractor engaged in the maintenance of a truck performance detector in BNSF's Marceline Subdivision, of the Chicago Division, near Argyle, Iowa. This maintenance took place on a 3-degree, 4-minute, right-hand curve, at milepost (MP) 251.4, on Main Track No. 2.

Three work groups (the Medill Section Gang, Fort Madison Section Gang, and a small surfacing gang) had joint track authority in the area between Argyle and Medill, Missouri. The three groups held a joint briefing first thing in the morning concerning the planned work for the day. The Medill Section Gang would be changing out an insulated joint plug at MP 259; the Fort Madison Section would be assisting a Contractor with the maintenance of a detector at MP 251.4; and the surfacing gang would be tamping various locations between Argyle and Medill, with work to do at the detector at MP 251.4. During the briefing, the surfacing gang was

[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.

instructed not to proceed west of Hinsdale crossing (320th Street, DOT No. 004-971B), at MP 251.15, without first contacting the Foreman working with the Contractor. The Foreman would then assist with the tamping around the detector.

The first track authority was granted to the Foreman of the Medill section gang, then to the Foreman of the Fort Madison section gang, and last to the Foreman of the surfacing gang. All Foremen contacted the others prior to entering their joint limits, as required.

The surfacing gang, comprising two Tamper Operators and one Ballast Regulator Operator, approached the work area of the Fort Madison section gang's Foreman, as per joint track authority. The Machine Operator in the lead machine, a Jackson 6700 tamper, stopped east of the road crossing at MP 251.15 and began to dismount to walk down to the Foreman's location. Seeing this, the Foreman contacted the Machine Operator, via radio, and instructed him to work around the road crossing, as they needed more time to complete their task. A short time later, the Machine Operator observed the Foreman beginning to pick up his tools. The Machine Operator stopped tamping and walked down to talk with the Foreman. The Foreman instructed the Machine Operator to move the machines back, east of the road crossing, so he could set his truck off the rail.

After clearing the road crossing and setting off the truck, the Foreman and the surfacing gang conducted a job briefing to discuss the task to be performed. The Lead Tamper Operator was instructed to proceed to the location to be surfaced just east of the east sensor units of the truck performance detector. When the machine got close to the area around the detector sensors, the Foreman would assist the Operator in tamping so as not to damage the performance detector.

The Machine Operator proceeded down to the location to be tamped and began to work. The Foreman walked between Main Track No. 1 and Main Track No. 2, to the detector's sensor, approximately 880 feet from the center line of the road crossing. The Foreman passed the tamper on the north side of the track between Main Track No. 1 and Main Track No. 2. He passed in front of the tamper, which was heading west, and sat in the clear by the sensor, on the south side of Main Track No. 2. When the tamper approached the sensors, the Foreman communicated via handheld radio with the Tamper Operator that he would notify him when he was within three ties of the sensor. The Foreman chose a position between Main Track No. 1 and Main Track No. 2 to make his observation of the tamper's work heads. The Foreman notified the Tamper Operator that he was at the third tie, and the Tamper Operator took the tamper out of production mode and put it into switch mode. This would give him more control of the work heads. The Foreman guided the Tamper Operator around the sensor via radio, letting him know when to clamp the rail with his tamper.

After tamping the first tie west of the sensor, the Foreman came up to the tamper, opened the door, and told the operator he could clamp now, use all four heads, and continue on his own.

The Foreman shut the tamper door and moved to a position standing on the south side of Main Track No. 1 at the end of the ties and continued to observe the tamper.

At the time of the accident, the sky was clear, and the temperature was 70° F.

THE ACCIDENT

At approximately 1:30 p.m., CST, a BNSF MOW Foreman was struck by a Union Pacific Railroad (UP) Auto Rack Train, Train Symbol AGBPX-30. The train was traveling west at a recorded speed of 45 mph, on Main Track No. 1. (The posted speed for this area was 45 mph for freight trains.) The train crew had gone on duty in Fort Madison, Iowa, at 12:10 p.m. CST, en route to Kansas City, Missouri. After sounding the whistle for the Hinsdale highway-rail grade crossing at MP 251.15, the Engineer of the UP train saw track machines on Main Track No. 2 and a man standing on Main Track No. 1, across from a tamper. He immediately began to sound the whistle again and applied an emergency application to the train's air brake system, but indicated he did not believe the Foreman ever looked up. After being struck, the Foreman's body was thrown approximately 89 feet west, landing on the front buggy of the tamper. The Foreman was pronounced dead at the scene.

POST-ACCIDENT INVESTIGATION

FRA has conducted interviews with the BNSF surfacing gang, Medill section Foreman, and both remaining members of the Fort Madison section gang. Interviews were also conducted with the UP train crew, the Contractor maintaining the detector, and the deceased Foreman's wife. The interview with the deceased's wife revealed that the Foreman had recently received a good checkup with a doctor, and the only prescription drug he was taking was for high blood pressure. She described her husband as well rested the day of the accident and could think of no reason her husband would have been distracted.

A re-enactment, performed on Oct. 31, 2003, revealed that from where the Foreman stood to the point where the westbound train on Main Track No. 1 could first be seen was a distance of approximately 823 feet, with an elapsed warning time of approximately 13 seconds. It was also determined that the position of the Foreman next to the tamper, while in full operation, would have made it very difficult to hear the approaching train whistle until its arrival.

Post-accident toxicology tests performed on the UP train crew revealed negative results. A postmortem toxicology test on the deceased Foreman revealed negative results.

APPLICABLE RULES

In summary, investigators found the Foreman in violation of BSNF's MOW operating rules because he fouled the adjacent track without track authority or protection. They also concluded that the Foreman, along with the three members of the surfacing gang, provided an incomplete job briefing which did not include hazards of live track. The following specific Federal regulations as well as railroad operating and safety rules were violated:

Burlington Northern Santa Fe
Maintenance of Way Operating Rules

1.20 Alert to Train Movement

6.0 Movement of Trains, Engines and On-Track Equipment

6.3 Occupying or Fouling Track

6.3.1 Track Occupancy

Burlington Northern Santa Fe
Maintenance of Way Safety Rules

S-1.1 Job Safety Briefing

S-13.1.3 Tracks
C. Fouling Track

S-25.1 Job Safety Briefing

Code of Federal Regulations Title 49
Part 214 Railroad Workplace Safety
Subpart C - Roadway Worker Protection

§214.313 Responsibility of individual roadway workers.

§214.313(a)

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

§214.313(b)

(b) A roadway worker shall not foul a track except when necessary for the performance of duty.

§214.313(c)

(c) Each roadway worker is responsible to ascertain that on-track safety is being provided before fouling a track.

§214.315 Supervision and communication.

§214.315(a)

(a) When an employer assigns duties to a roadway worker that call for that employee to foul a track, the employer shall provide the employee with a job briefing that includes information on the means by which on-track safety is to be provided, and instruction on the on-track safety procedures to be followed.

§214.315(b)

(b) A job briefing for on-track safety shall be deemed complete only after the roadway worker has acknowledged understanding of the on-track safety procedures and instructions presented.

SUMMARY FOR FE-34-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Massachusetts Bay Commuter Railroad
Location: Wellesley, Massachusetts
Region: Region 1

Month: December
Date: Dec. 6, 2003
Time: 8:20 p.m., EST

Data for Fatally Injured Employee(s)

Bridge and Building Mechanic (Watchman/Lookout)
59 years old
15 years of service
Last rules training: Jan. 15, 2003
Last safety training: June 8, 2003
Last physical: N/A

Data for All Employees (Craft, Position, Activity)

Craft: Maintenance of Way

Positions:

Massachusetts Bay Commuter Railroad (MBAX) MOW Gang
Foreman
Fatally injured Bridge and Building Mechanic
Other Bridge and Building Mechanic

MOW Supervisor

CSX Freight Train Q 420-06
Engineer
Conductor

CSX Dispatcher

Activity: The gang was clearing snow from the commuter passenger station's platforms, walkways, and stairways.

SUMMARY FOR FE-34-03 CONTINUED

SELECTED FACTORS CONTINUED

EVENT

A Bridge and Building Mechanic, acting as Watchman/Lookout for the rest of the MOW gang, was fatally injured when struck by an on-coming freight train.

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

At the time of the accident, the fatally injured Bridge and Building Mechanic was distracted from his role as Watchman/Lookout because he was performing other duties (operating a snow blower to remove snow from pedestrian walkways), in non-compliance with Federal regulations and railroad safety rules concerning roadway worker protection.

PCF No. 2

The Foreman also acted in non-compliance with the above Federal regulations and railroad safety rules when he instructed the fatally injured employee to perform other duties in addition to his role as Watchman/Lookout.

PCF No. 3

The investigation revealed that MBAX gangs routinely used train approach warning to provide on-track safety due to an historic reluctance of CSX to issue MBAX work gangs foul time (a safer method.

PCF No. 4

Although the CSX crew reported that the train's headlight was on at the time of the accident, the remaining MBAX crew reported that it was not. Investigators could not establish who was correct. However, the near blizzard conditions limited visibility for all concerned, despite overhead illumination at the station.

PCF No. 5

According to statements provided by the CSX Dispatcher and train crew, they were not aware that an MBAX snow removal gang was working at the Wellesley Farms passenger station. Since all rail traffic over this section of the railroad (CSX freight, Amtrak passenger, and Massachusetts Bay Transit Authority commuter trains) operated under a contract agreement with

SUMMARY FOR FE-34-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS CONTINUED

PCF No. 5 Continued

MBAX, there should have been communication between MBAX and the CSX Dispatcher, especially considering the inclement weather conditions.

REPORT: **FE-34-2003**

RAILROAD: Massachusetts Bay Commuter Railroad (MBAX)

LOCATION: Wellesley, Massachusetts

DATE & TIME: Dec. 6, 2003; 8:20 p.m., EST

EVENT[1]: A Bridge and Building (B&B) Mechanic, acting as Watchman/Lookout for the rest of the MOW gang, was fatally injured when struck by an on-coming freight train.

EMPLOYEE:	Craft:	Maintenance of Way (MOW)
	Activity:	The gang was clearing snow from the commuter passenger station's platforms, walkways, and stairways.
	Occupation:	B&B Mechanic acting as Watchman/Lookout for the rest of the crew
	Age:	59 years
	Length of Service:	15 years
	Last Rules Training:	Jan. 15, 2003
	Last Safety Training:	June 8, 2003
	Last Physical:	N/A

CIRCUMSTANCES PRIOR TO THE ACCIDENT/INCIDENT

At 6 p.m. on Dec. 6, 2003, three MBAX MOW employees reported for duty at the railroad's maintenance facility in Readville, Massachusetts. The 3-person crew comprised a Foreman and two B&B Mechanics. Due to a severe winter storm and a heavy accumulation of snow in the Boston area, the crew was called to work an overtime assignment to clear snow from commuter passenger station platforms, walkways, and stairways. After speaking with their Supervisor and receiving their job assignments, the three men loaded two gasoline-powered snow blowers and a salter attachment into a company truck and departed Readville.

They arrived at the Wellesley Farms commuter passenger station at approximately 7:45 p.m. Before exiting the truck, the Foreman conducted a job briefing and assigned one of the employees to perform the duties of Watchman/Lookout to provide train approach warning for the crew. The Foreman would

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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.

operate a Kubota tractor to remove snow from the Track No. 2 platform while the other Mechanic was to operate the snow blower to remove snow from the pedestrian walkways.

At 9 a.m., on Dec. 6, 2003, following their statutory off-duty time, the two crew members (Engineer and Conductor) for CSX, Incorporated (CSX) Freight Train Q 420-06 reported for duty at the railroad's yard in Selkirk, New York. Following routine pre-departure duties, the crew departed Selkirk Yard at 1:36 p.m., operating the 76-car train east en route to Beacon Park Yard in Boston. The train stopped at North Yard in Framingham, Massachusetts, and the crew cut off 59 cars before departing Framingham at approximately 8 p.m. Prior to leaving North Yard, the crew communicated with the CSX Dispatcher via radio. The crew departed, eastbound, on signal indication, with four locomotives (623, 5117, 6228 and 6221) and 12 trailing freight cars. According to statements provided by the CSX Dispatcher and train crew, they were not aware that an MBAX snow removal crew was working at the Wellesley Farms passenger station.

The Wellesley Farms passenger station was located in Wellesley, Massachusetts, at MP 12.5 on the Boston Subdivision of CSX's Albany Division. At this location, the railroad comprised two east/west (timetable direction) main line tracks (Track No. 1, to the north, and Track No. 2, to the south). The outdoor station comprised two, track-level, asphalt passenger platforms located on the north and south sides of the tracks. The platform on the north side was for westbound (or outbound) passengers and the platform on the south side was for eastbound (or inbound) passengers. An asphalt pedestrian walkway crossed over the two tracks through a 10-foot wide opening in a chain-link fence separating the two tracks. The station was illuminated by overhead lighting, which was mounted on poles along the south side of the station.

Rail traffic over this section of the railroad included CSX freight, Amtrak passenger, and Massachusetts Bay Transit Authority (MBTA) commuter trains operated under a contract agreement with MBAX. Train movements over the line were dispatched by CSX from the railroad's dispatch center located in Selkirk, New York. Maximum authorized timetable speed for freight trains operating on both Track No. 1 and Track No. 2 was 40 mph. There were no speed restrictions in place at the time of the accident.

At the time of the accident, the National Weather Service, located in Taunton, Massachusetts, reported near blizzard conditions with sustained winds of 15 mph. The high temperature was 32° F, and the low was 22° F. The service called for a total snow accumulation of 26 inches with considerable drifting.

THE ACCIDENT

The B&B Foreman was operating a Kubota tractor, plowing snow on the Track No. 2 platform. He had completed one pass westward and then turned the tractor around in the parking lot to make a second pass. As he drove the tractor back onto the platform, heading east, he observed the Watchman/Lookout with a snow blower, facing south on the pedestrian walkway within the gage of Track No. 1. He also observed the other Mechanic who was operating a snow blower in a northerly direction on the pedestrian walkway to the south of Track No. 1. After hearing a locomotive horn, he looked over his left shoulder and saw the eastbound train rapidly approaching on Track No. 1. He observed the two men attempting to dive clear of the oncoming train as it passed.

The Mechanic who was operating the snow blower northward observed the approaching train when it was approximately 30 yards from his location. He heard the horn and yelled a warning to his co-worker, and then observed the co-worker attempt to dive away from the approaching train toward the north side of the tracks.

Departing Framingham, CSX Train Q 420-06 operated eastbound on Track No. 1, approaching Wellesley Farms station. The lead locomotive's (CSX 623) event recorder data indicated the train speed was 42 mph. The Engineer was seated at the controls of the locomotive on the right side of the cab. The Conductor was seated on the left side of the locomotive cab. Visibility was poor due to the heavy snow fall. As the train approached Wellesley Farms Station, the Engineer activated the locomotive's crossing bell. When the Engineer first observed the two individuals on the track ahead, he sounded the locomotive horn and applied the dynamic brakes.

The Conductor was going over paperwork when he heard the Engineer activate the bell and sound the horn. He first observed the individual approximately 400 to 500 feet in front of the train. The Conductor turned away and did not witness the impact.

As the front of the locomotive passed the individuals' location, the Engineer and Conductor both heard an impact, but did not know whether they had struck the men or just the snow blower. The train continued traveling a distance of 2,250 feet before coming to a full stop. At approximately 8:20 p.m., the Engineer made an emergency radio call to the CSX Dispatcher to report the incident.

When the train had passed, the Foreman saw that one of the Mechanics was in the clear. The Foreman made an emergency radio transmission from the radio in his tractor. The Foreman and B&B Mechanic discovered the injured employee laying in the snow on the Track No. 1 platform. Since the employee was conscious at that time, they removed snow from around him, and placed a jacket over him to keep him warm until emergency responders arrived at 8:29 p.m.

Personnel from the following emergency response agencies responded: the American Medical Response Ambulance Service; the Wellesley Fire Department; the MBTA Police Department; the Wellesley Police Department; and the Massachusetts State Police Department.

The injured employee was treated by EMT personnel at the scene before being transported to Newton-Wellesley Hospital by local ambulance. He was pronounced dead at 9:03 p.m. by the attending physician at the hospital.

POST-ACCIDENT INVESTIGATION

The Chief Medical Examiner's office performed an autopsy on the fatally injured employee. The Standard Certificate of Death indicates the cause of death as multiple injuries due to blunt trauma.

Post-accident toxicology tests performed on the deceased were negative. The crew members of Train Q 420-06 and the CSX Dispatcher were not tested.

Data collected from the event recorder mounted on the lead locomotive (CSX 623) of Train Q 420-06 was downloaded and analyzed by railroad personnel. The relevant data indicated actions taken by the Engineer were consistent with the post-accident statements made by the two train crew members. The

locomotive data also indicated a 4-second blast of the horn and application of the dynamic brakes prior to point of impact.

Mechanical inspection of the involved locomotive revealed no defective conditions that caused, or contributed to the cause, of the accident. Post-accident statements of the train crew indicated that the locomotive headlight was on. However, the MBAX Foreman and the surviving Mechanic stated that they did not see a locomotive headlight prior to the accident. The event recorder does not have the capability of recording whether the locomotive headlight was on or off.

FRA conducted interviews with relevant railroad employees involved in the accident. The MBAX B&B Foreman stated that MBAX crews routinely used train approach warning to provide on-track safety due to a historic reluctance of CSX to issue MBAX work crews foul time. He also stated that the fatally injured employee was a qualified and experienced employee who routinely performed the duties of Watchman/Lookout.

Conclusion and Analysis

The fatality of the railroad employee was ruled accidental by law enforcement authorities who investigated the accident. The railroad snow removal crew was utilizing train approach warning (as that term is defined in 49 CFR, Part 214) for on-track safety of the crew.

The fatally injured railroad employee was trained and qualified by the railroad to perform the duties of Watchman/Lookout and had routinely performed such duties. He was assigned by his Supervisor to perform the role of Watchman/Lookout by providing train approach warning for the snow removal gang. However, at the time of the accident (and as instructed by the Foreman), the employee was otherwise engaged performing duties which diverted his attention from his assigned role as Watchman/Lookout.

A contributing factor of the accident, near blizzard conditions limited visibility for the members of the snow removal crew as well as for the train crew.

APPLICABLE RULES

49 CFR, Part 214, Subpart C - Roadway Worker Protection

§214.329 Train approach warning provided by Watchmen/Lookouts

Roadway workers in a roadway work group who foul any track outside of working limits shall be given warning of approaching trains by one or more Watchmen/Lookouts in accordance with the following provisions:

(a) Train approach warning shall be given in sufficient time to enable each roadway worker to move to and occupy a previously arranged place of safety not less than 15 seconds before a train moving at the maximum speed authorized on that track can pass the location of the roadway worker.

(b) Watchmen/Lookouts assigned to provide train approach warning shall devote full attention to detecting the approach of trains and communicating a warning thereof, and shall not be assigned any other duties while functioning as Watchmen/Lookouts.

§214.335 On-track safety procedures for roadway work groups

(a) No employer subject to the provisions of this part shall require or permit a roadway worker who is a member of a roadway work group to foul a track unless on-track safety is provided by either working limits, train approach warning, or definite train location in accordance with the applicable provisions of §§214.319, 214.321, 214.323, 214.325, 214.327, 214.329 and 214.331 of this part.

(b) No roadway worker who is a member of a roadway work group shall foul a track without having been informed by the roadway worker responsible for the on-track safety of the roadway work group that on-track safety is provided.

MBAX and NORA Safety Rules

Roadway Worker Protection Manual

329. Train Approach Warning Provided by Gang Watchmen/Advance Watchmen

Gang watchman and advance gang must:

(a) Give their entire attention to watching for trains, engines, and maintenance machinery, and warning roadway workers, and must not perform, even momentarily, any other duties.

SUMMARY FOR FE-35-03
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Union Pacific Railroad
Location: San Antonio, Texas
Region: 5

Month: December
Date: Dec. 7, 2003
Time: 12:12 a.m., CST

Data for Fatally Injured Employee(s)

Switch Foreman (Remote Control Locomotive)
37 years old
5 years, 9 months of service
Last rules training: Jan. 20, 2003
Last safety training: Jan. 20, 2003
Last physical: Feb. 7, 2003
Last related efficiency test: Dec. 6, 2003

Data for All Employees (Craft, Position, Activity)

Craft: Transportation and Engine

Positions:

YEY36R Switching Crew
Foreman (Lone Worker)

YEY26R Switching Crew
Foreman
Helper

Yard Master
Manager of Yard Operations
Manager of Train Operations

Activity: Switching with remote control locomotives

EVENT

A Switch Foreman (remote control locomotive operation) was fatally injured when struck by rail equipment during a switching move.

SUMMARY FOR FE-35-03 CONTINUED

POSSIBLE CONTRIBUTING FACTORS

PCF No. 1

The fatally injured employee failed to comply with railroad operating rules which required employees, when standing, walking, or working between or near tracks, to keep a careful lookout in both directions for trains, locomotives, cars, or other equipment, and expect movement at any time, on any track, in either direction.

PCF No. 2

The fatally injured employee failed to properly line both switches of the crossover for the intended route, prior to moving the locomotive.

PCF No. 3

Investigators concluded that at the east end, wheel yard cross-over, the switch may have malfunctioned (failed to remain in position) at the time of the accident, based on its performance as observed during a re-enactment. They attributed this malfunction to a defect of the switch machine which controlled the switch points at that location.

PCF No. 4

FRA investigators analyzed the carrier's operational testing data (and FRA's inspection findings) for the time period when remote control locomotive operations began to the date of the accident (February - December, 2003). They concluded that railroad management's oversight of the monitoring and enforcement of operating rules concerning switching operations at this location was deficient.

REPORT: **FE-35-2003**

RAILROAD: Union Pacific Railroad (UP)

LOCATION: San Antonio, Texas

DATE & TIME: Dec. 7, 2003; 12:12 a.m., CST

EVENT[1]: A Switch Foreman (operating a remote control locomotive) was fatally injured when struck by rail equipment during a switching move.

EMPLOYEE:	Craft:	Transportation and Engine (T&E)
	Activity:	Switching with Remote Control Locomotives
	Occupation:	Switch Foreman (Remote Control Locomotive)
	Age:	37
	Length of Service	5 years, 9 months
	Last Rules Training:	Jan. 20, 2003
	Last Safety Training:	Jan. 20, 2003
	Last Physical:	Feb. 7, 2003
	Last Related Efficiency Test:	Dec. 6, 2003

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The YEY36R Foreman reported for duty at the East Yard's west-end shanty at 11 p.m. on Dec. 6, 2003. Prior to contacting the Foreman, the Yard Master informed the YEY26R crew members (who had completed an afternoon job) that they would be held over to work overtime. The Yard Master instructed the YEY26R Foreman to put their locomotives in the stub track directly in front of the west-end shanty, short-term the locomotives, and step inside the shanty to talk with him about the continued work plan. Both the YEY36R and YEY26R crews performed remote control locomotive switcher jobs.

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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.

While the YEY26R crew members were in the shanty, they handed their remote control transmitter (RCT) belt packs to the YEY36R Foreman. The YEY26R crew completed a job briefing with the YEY36R Foreman to transfer use of their remote control power to his job.

According to the Yard Master, the YEY36R Foreman informed him that his Helper had not reported for duty. The Yard Master advised the Foreman that the extra board was exhausted and that no one was available to fill the Helper position. The Yard Master asked the YEY36R Foreman to work the job as a lone worker. The Yard Master instructed the Foreman to proceed to Track No. 003, handle his switch list (44 cars) in smaller cuts, about five moves, and then tie up, and go home.

At approximately 12:15 a.m., the Yard Master monitored the afternoon job, as the crew completed its locomotive inspection and performed operational and safety checks, linking their remote control transmitters to the UP 797 locomotive consist.

At 12:30 a.m., the YEY26R Foreman (UP 797) requested to activate Remote Control Zone 2. At that time, the Yard Master looked at the west end jobs and observed that the YEY36R consist was stationary on the wheel yard lead. The Yard Master attempted to contact the YEY36R Foreman two or three times to see if he was ready to proceed to Track No. 3. The Yard Master stated there was no answer. The Yard Master then called the west end shanty, via telephone and intercom, and received no answer. Finally, the Yard Master radioed the YEY26R Foreman, asking if he had seen the YEY36R Foreman, and was told no. The Yard Master assumed the YEY36R Foreman was in the shanty restroom. At approximately 12:45 a.m., the Yard Master again looked at the west end jobs and observed the YEY36R consist in the same stationary position.

The Yard Master attempted to contact the Foreman several more times. He then called the Manager of Yard Operations (MYO), informing the officer that he could not establish communication with the YEY36R Foreman. The Yard Master and MYO agreed to jointly search for the Foreman. They began a ground search of the west end shanty area and finally the locomotive consist, where they found the YEY36R Foreman. The MYO immediately ran to his vehicle and called the Manager of Train Operations to report the accident. The MYO instructed the Yard Master to call 911 and report the emergency. The 911 dispatch center received the call at 1:02 a.m., assigning response officers who arrived at 1:10 a.m.

At the time of the accident, the temperature was 39° F. It was dry with a calm wind; the sky was clear, and there were no impediments to visibility.

THE ACCIDENT

The YEY36R Foreman began his work after releasing the hand brakes on his light engine consist and recovering full service brake application in four minutes, 53 seconds. The Foreman, utilizing UP709 and UP337, executed three light-engine moves, the third of which resulted in his fatal injury. The first was a 643-foot westward move from the stub track, stopping west of the west wheel yard lead cross-over switch (inner loop). Move 2 was an eastward 673-foot movement on the wheel yard cross-over, stopping just east of the east wheel yard cross-over switch, where he had intended to line the switch for movement through the cross-over to the

train yard lead, outer loop. The final move was westward for 286 feet on the same wheel yard cross-over, where he was struck and killed at approximately 12:12 a.m. The elapsed time from the first RCT control input to the final stop was seven minutes, 31 seconds.

POST-ACCIDENT INVESTIGATION

An Inspector-In-Charge (IIC) was assigned the investigation and arrived on scene at 9 a.m. that same day. Additional Inspectors were requested, including, from the Federal Railroad Administration (FRA), a Track Inspector and Motive Power & Equipment (MP&E) Inspector, and from the State of Texas, a Signal & Train Control Inspector. The National Transportation Safety Board (NTSB) responded by sending two investigators who arrived later that evening.

FRA's investigators inspected the remote control locomotive consists involved, UP 709 & UP 337. The MP&E inspector stated that there were several defects taken on each unit; however, the nature of the defects would neither cause nor contribute to the accident.

FRA's investigators inspected all track components of the switches in the accident area, in particular, the east end wheel yard's cross-over switch. The inspection revealed the track in the accident area complied with FRA Class 1 safety standards and did not cause or contribute to the accident.

Cattron-Theimeg, the remote control system manufacturer, responded to the accident and completed analysis of the remote control systems involved in the accident. An FRA MP&E inspector participated in the inspection and testing, corroborating the process. The manufacturer provided documentation, verifying the remote control system had operated correctly.

FRA and State S&TC inspectors inspected the power switch machines and found problems in this area. According to the on-scene railroad representative, as soon as the scene was released by local law enforcement, the switch points were inspected and revealed no obstruction.

Arriving at the accident site, FRA investigators initially interviewed the on-scene railroad representative for an overview of the incident, following that up with numerous interviews at the scene. Both Yard Masters and crews had indicated the switches had failed on numerous occasions and stated that they had requested that the wheel yard cross-over switch be re-evaluated.

The on-scene railroad representative directed the Manager of Signal Maintenance (MSM) to test the wheel yard cross-over switch again. After 20-25 operations, the switch failed to function on four occasions. The switch points remained in their original position after the button was pushed, even though the switch machine's electric motor energized, pumping the hydraulic pump, and making sounds as though the switch points were being repositioned.

Tests were completed with a finding that the number 8 terminal on the Wago strip held a number 10 power supply wire, providing 220 volts. The MSM determined that the number 10 wire was intermittently corrupt, allowing the motor to lose power at any given time. When the wire was disturbed, it would occasionally cause a power interruption, which would prevent the mechanism from working as designed.

The loss of power caused the switch machine motor to fail to complete it's design cycle, stopping after the switch points were positioned. The switch machine cycle could only be completed by initiating a second push-button response. The second push-button response caused the machine to perform a partial cycle which replicated the machine functions and sounds for repositioning the switch, but did not actually move the switch points to the desired position. The switch points remained in the position attained prior to the power interruption.

The MSM attempted to resolve the problem by removing the number 10 wire and re-sizing and re-installing it in the number 8 terminal. Additional tests were made with no further failures.

At approximately 2:30 p.m., the on-scene railroad representative was informed by other investigating officers that the same switch had failed again. FRA was informed and observed additional switch malfunctions. The on-scene railroad representative called the MSM back to further examine the switch. The MSM tested the switch again, finding the same malfunction.

After reviewing manufacturer installation and maintenance specifications, the MSM found that, instead of the number 10 wire, the specifications called for a smaller, number 14 wire to be installed in the number 8 terminal. The MSM believed that to be the problem and directed the switch machine to be removed from service immediately and replaced with a new one. FRA instructed the MSM to seal the removed switch machine, pending FRA inspection. The change-out was completed later that day with an alternative installation, utilizing a number 14 jumper wire connected to the number 8 terminal and finally connected to the existing number 10 wire, with a wire nut.

NTSB and FRA personnel observed the carrier's re-enactment of the remote control locomotive's movements, according to the event recorder information downloaded from the transmitter unit. There were four re-enactments which took place, two during the day and two at night. All were performed less than 24 hours after the incident had occurred.

After the second of the two night re-enactments, the FRA IIC observed the following event occur: The remote control consist was turned over to a yard crew. One crew member boarded the east end of the consist and moved it from the wheel yard lead through the cross-over to the train yard lead. The second crew member walked to Track No. 1's power switch, which was lined for reverse movement. The switch point indicator light progressed from green to red to yellow. Approximately 8-10 seconds later, just prior to the consist going over the switch, the switch lined back for the lead (a facing point move) and the switch point indicator lights progressed from yellow to red to green. The crew was able to stop the consist movement short of the switch. The second crew member lined Track No. 1's power switch and removed the electrical power from the switch to insure it would not line back. There was no obstruction in the points.

Analysis and Conclusions

Prior to moving the locomotive consist involved in the fatality, Union Pacific investigators measured and marked Locomotive UP 709's L-1 wheel (229'3" from the wheel yard cross-over switch point) and downloaded the event recorder. FRA established the wheel yard cross-over switch point as the bench mark for measurement analysis of factual information.

During the YEY36R Foreman's final remote move, the most logical sequence of action presumes the Foreman's intention was to line the power switch for movement through the cross-over to the train yard lead and walk to the west end train yard cross-over switch to line it for his next move: a routine event for west end jobs. However, when the deceased was discovered, the east end wheel yard switch was not lined for the cross-over. The switch was lined for the wheel yard lead.

Analysis of the event recorder's remote equipment "communication path" provides vital information correlating the events of this accident. Further, it provides circumstantial information as to when and where the RCT may have been separated from the deceased's body and finally lodged between the R-1 traction motor and wheel.

According to Cattron-Theimeg's design engineers, the "communication path" between the remote transmitter and receiver is designed to interrogate one time per second. An example would be a control input via the transmitter, one second, and a command output via the receiver, the next second. "Active" indicates communication did occur between the transmitter and receiver and "Inactive" indicates communication did not occur between the transmitter and receiver. An interrogation will continue to occur, alternately, from the transmitter direct to the receiver and then indirectly to the repeater tower and receiver until communication is re-established by either path. In either case, control input and command output occur one second apart.

Before reading the event recorder sequence review, the East Yard video tape re-enactment for a visual perspective of the train movement, and a review of the East Yard video tape of the power switch operation (made after the replacement switch was installed) were conducted. While progressing through the time/distance sequence, consider the distance location is wheel L-1 and that the end plate of the locomotive is eight feet forward of the L-1 wheel.

This is the sequence of remote control transmitter (RCT) inputs, receiver outputs, system communication path, and event time/distance comparisons for this accident:

> 00:06:50-00:10:29 - The Foreman's RCT communicated with the receiver "Active" - "Direct" through the first move.
>
> 00:10:30-00:10:47 - Through the second move, the RCT communicated with the receiver "Active" - "Repeater."
>
> 00:10:48-00:12:14 - During the third and final move, the RCT communicated with the receiver "Active" - "Repeater." From the beginning of the Foreman's remote control operations, to this time, there were no breaks in the communication path.

00:11:54 - Beginning the final move westward, the Foreman selected 10 mph. The remote control receiver accelerated the engines to 12.8 mph. At this point, the computer was applying independent brake to decelerate the consist back to 10 + or - 0.5 mph.

00:12:12:70, (122'10") - The first disturbed ballast occurred between the tracks, on the wheel yard lead and probable location of the point of impact of the deceased. This location would place the Foreman on a straight line walking path, to the west-end train yard cross-over switch he intended to line next. The locomotive was traveling at 12.65 mph, (velocity, 18.55 ft/sec).

00:12:13:60, (135'8") - This was the probable location where the deceased body made contact with the ground after being propelled from the point of impact. From the location of the second disturbed ballast between the tracks, continuous drag marks were displayed to the paved crossing.

00:12:15 - The RCT attempted to communicate with the receiver "Not Active"- "Direct." First communication break.

00:12:16, (170'3") - The RCT communicates with the receiver "Active"- "Direct" with the command "Speed, Select, Stop." Transmitter and receiver re-establish a communication path.

> UP 709's end-plate arrived at the east end of the cross walk traveling at 11.45 mph, (velocity, 16.79 ft/sec). It was 8 feet in front of wheel L-1).
>
> The east end of a 10-foot wide paved crosswalk began at 165'6." It was paved slightly below level with the track rails and ended at 175'6." The cross walk clearance was 7.5" between the locomotive end plate and the pavement. Based on physical evidence and event recorder information, the east edge of the cross walk was the probable location where the remote control transmitter and safety vest were torn from the deceased's body at impact. Additionally, the time line and respective distance of the transmitter selections, receiver response commands, distances, and physical location strongly support that the stop command was selected when the RCT impacted with the paved cross walk. The Foreman was a large man, six feet tall, weighing 270 pounds at his last physical.
>
> The Foreman's safety glasses, ear plugs, and remote light were located just east of the paved cross walk (163'10"). The Foreman's handheld radio and holster were located on the paved cross walk (166'4"). The radio and holster were torn from the safety vest.
>
> The Foreman's body was discovered just beyond the west end of the paved crosswalk (183'4") between the tracks at the rear of the leading locomotive, in the opening between traction motor no. 4 and the locomotive end-plate.
>
> > 00:12:17, (185'3") - The RCT communicated with the receiver: "Not Active" - "Repeater" and then a second communication break occurred.

At the same time, the receiver commanded the remote consist to initiate a stop based on the last input selected from the transmitter, which had occurred one second prior. This was the probable location where the remote control transmitter and safety vest was dragged prior to becoming lodged in the traction motor.

00:12:18-00:12:19, (198'3" and 210'3" respectively) - The RCT communicated with the receiver "Not Active"- "Direct" while still decelerating to a stop by the previous stop command, and third communication break. These were probable locations where the remote control transmitter and safety vest continued to be dragged just prior to becoming lodged in the traction motor.

00:12:20-00:12:24 - The RCT communicated continuously with the receiver "Active" - "Direct." The transmitter and receiver established and maintained a communication path until the removal and testing of the transmitter, during the investigation. This was the probable location where the remote control transmitter and safety vest became lodged and remained between the traction motor and wheel. The RCT was found, in an upright position, between the traction motor and R-1 wheel at a slight angle of approximately 20 to 30 degrees.

00:12:24, 229'3" - This is where wheel L-1 and thus the locomotive consist stopped.

Close examination of the RCT, after it's removal from the traction motor, revealed deep scratches, gouges, and abrasions on the controls with pavement imbedded in the control box. The position of the remote control transmitter levers were recorded upon removal: Independent Override - Release Position, Automatic Override - Release Position, Reverser - Neutral, Speed Selector - Stop.

The family of the deceased declined to provide information regarding a circadian rhythms schedule or any history about possible over-the-counter or prescription drug use. Mandatory Federal drug and alcohol testing was performed on the deceased. Test results were positive.

FRA's experts in Forensic Toxicology carefully reviewed the test results and determined that drug or alcohol impairment was not a factor in this accident. The blood test indicated the deceased was positive for the carboxyl metabolite of marijuana (THCA) at 5.5 ng/ml with no apparent drug, hydroxy metabolite (THC), present at detectable levels. No urine was available for testing.

The cause of the fatality was failure to comply with Carrier operating rule 81.1.1, Walking On or Near Tracks.... When standing, walking, or working between or near tracks, keep a careful lookout in both directions for trains, locomotives, cars, or other equipment, and expect movement at any time, on any track, in either direction. Do not rely on hearing the approach of a train or equipment. Since remote operations began on this Service Unit, this rule was tested in 209 events with 1 failure (0.5% failure rate).

The primary factor contributing to the fatality was failure to comply with Carrier operating rule 8.2, Position of Switches... requiring that a crew member ...must make sure the switches and

derails are properly lined for the intended route... Since remote operations began on this Service Unit, this rule was tested during 250 events with one failure and one hearing (0.4% failure rate).

An additional contributing factor was failure to comply with Carrier operating rules 81.1.2, Precautions near Passing Trains or Equipment...When near passing trains...stand clear of all tracks when trains are approaching or passing in either direction. Do not stand on one track while trains are passing on an adjacent track...

FRA investigators analyzed the carrier's operational testing data for the time period when remote control locomotive operations began to the date of the accident, February-December, 2003. Eleven months of information was analyzed and provided the following findings:

- The deceased was tested as a licensed Remote Control Operator (RCO) in 28 events with no failures.

- The Service Unit tested 627 RCO events, with seven failures and one hearing (1.3% failure rate). The RCO failures were recorded during the first month after the first RCO class was licensed and functioning in that role. No other failures occurred from March 12, 2003, to the date of the accident.

- The Service Unit tested 6,417 combined events, RCO and conventional with 233 failures and 8 hearings, (3.6% failure rate).

- The Service Unit tested 250 events for rule 8.2, Position of Switches, with 1 failure and 1 hearing (0.4% failure rate).

- FRA inspections for this Service unit, during the same time period, found 144 defects out of 504 units (28.7% failure rate). Specifically, FRA performed 87 inspections with eight failures (9.1% failure rate). The failures were non-Federal, Railroad Safety Rules defects, in the S330 series, handling switches.

These findings lead to the conclusion that management oversight regarding monitoring and enforcement of operating rules involved with yard switching operations at this location was deficient.

Investigators concluded that the east end, wheel yard cross-over switch may have malfunctioned (failed to remain in position) at the time of the incident, based on its performance as observed during the investigation. This condition occurred during the inspection and testing of the switches involved in, and installed around, the immediate area of the fatality.

During a re-enactment of the incident, a failure of the switch machine which controls the switch points at the east end, wheel yard cross-over did occur. After the button, which activates the switch machine, was pushed, the machine made movements and sounds as though it were moving the switch points from the normal (straight track) to the reverse (cross-over) position, but the switch points did not move and remained lined for the straight track.

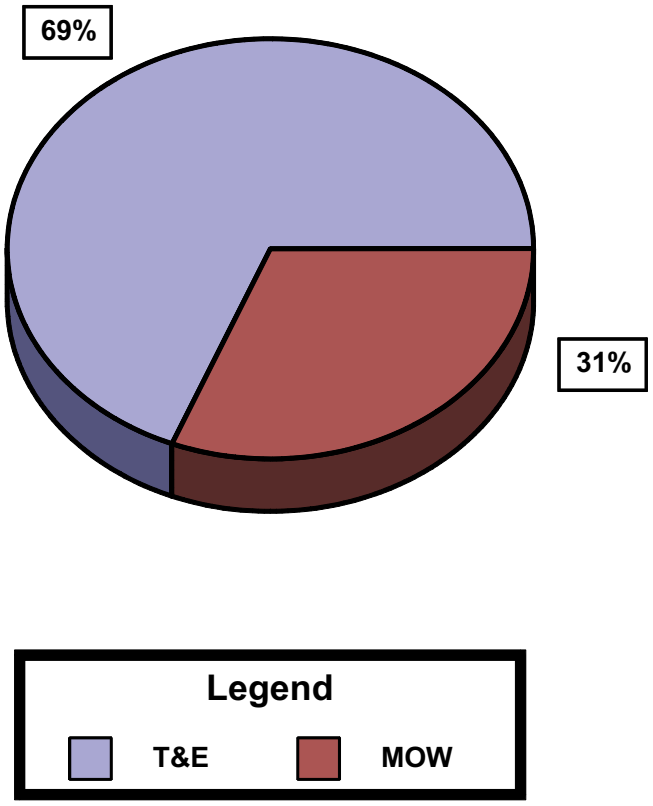
APPENDICES A THROUGH I

(BAR AND PIE CHARTS)

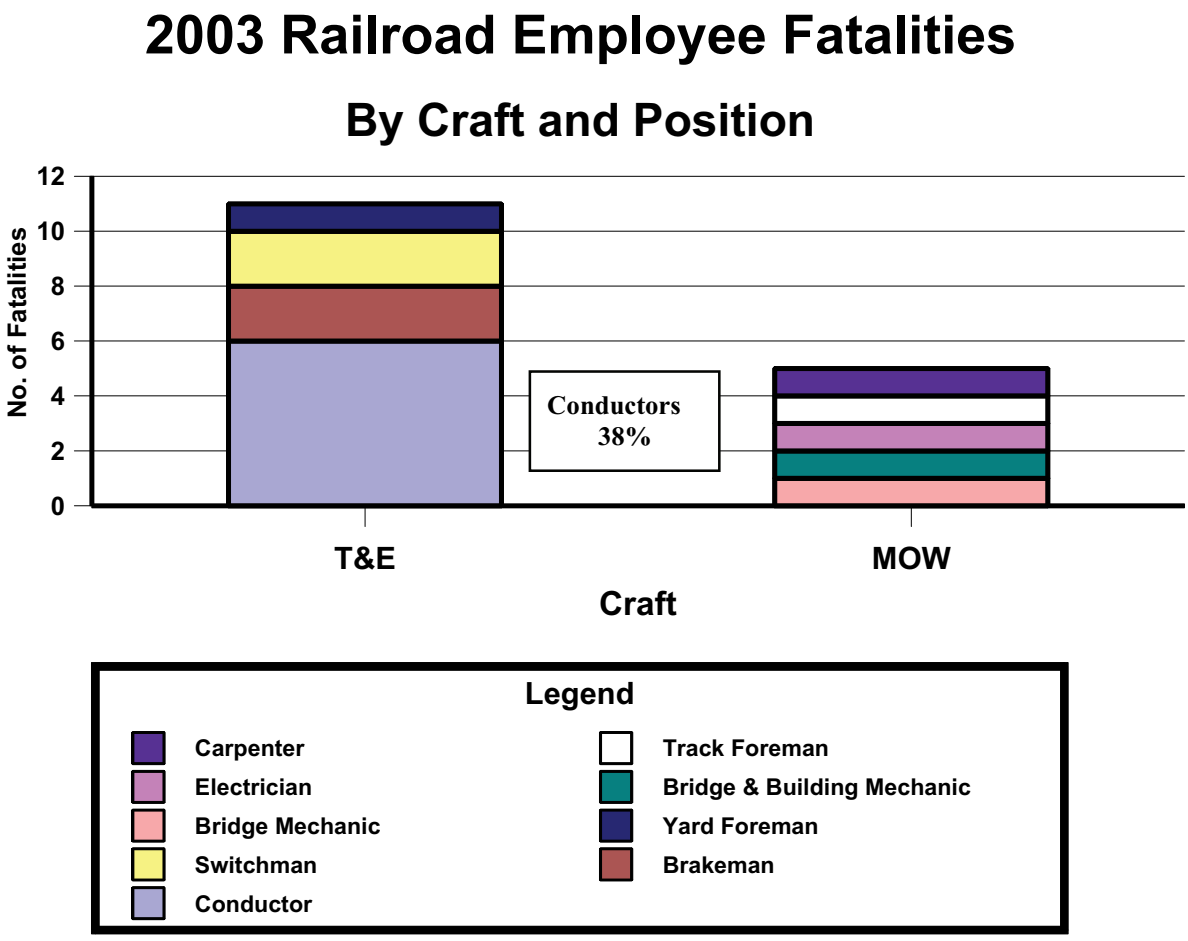
APPENDIX A

2003 Railroad Employee Fatalities

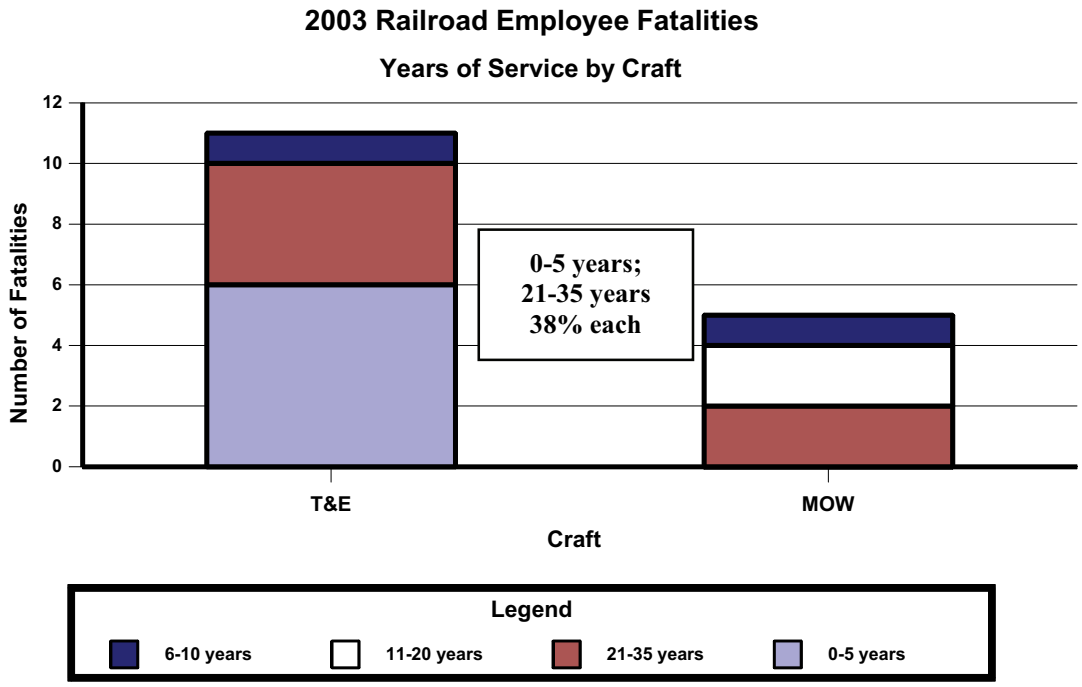
By Craft



APPENDIX B

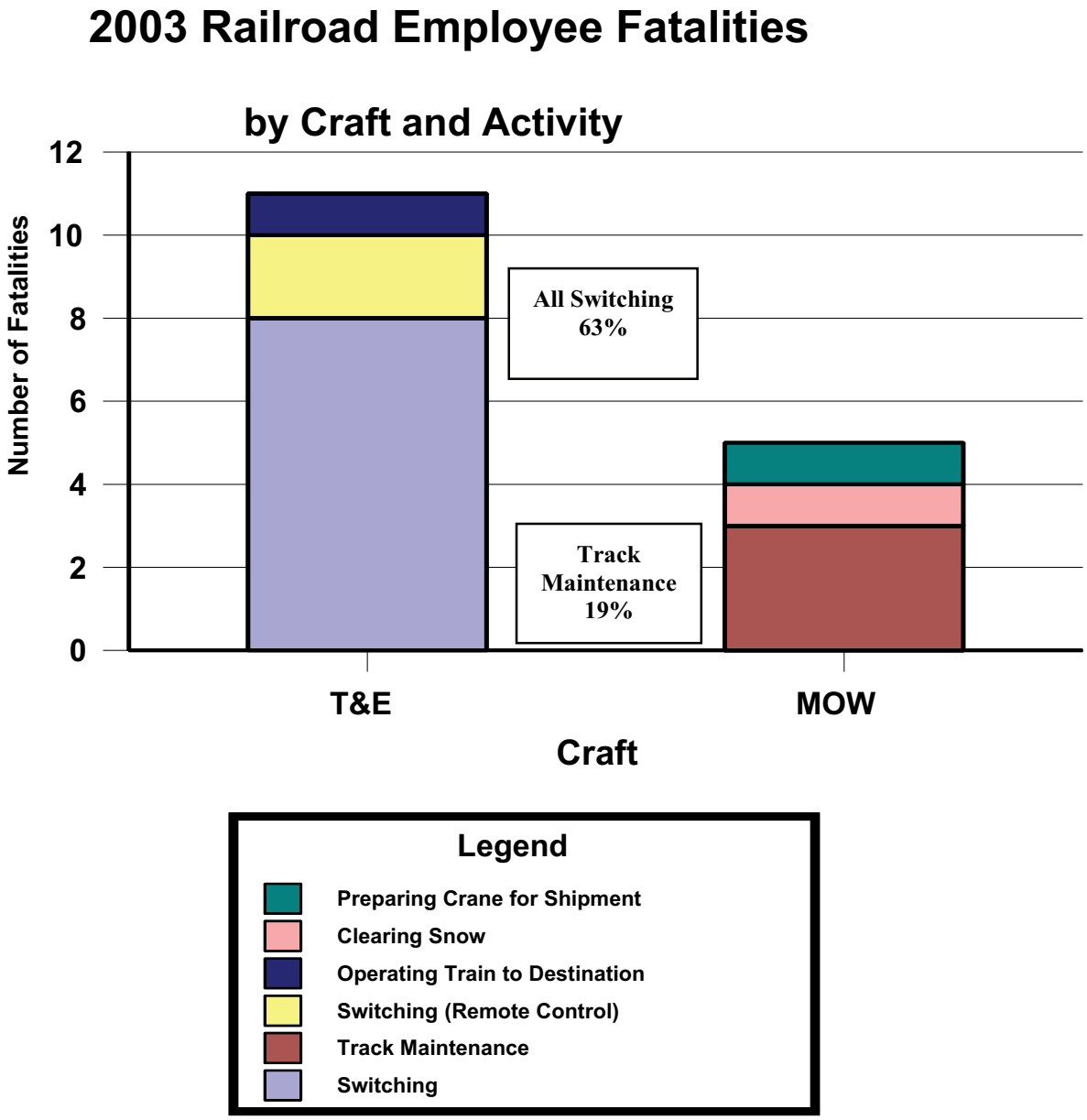

2003 Railroad Employee Fatalities
By Craft and Position
No. of Fatalities
12
10
8
6
4
2
0
Conductors
38%
T&E
MOW
Craft
Legend
Carpenter
Electrician
Bridge Mechanic
Switchman
Conductor
Track Foreman
Bridge & Building Mechanic
Yard Foreman
Brakeman

APPENDIX C

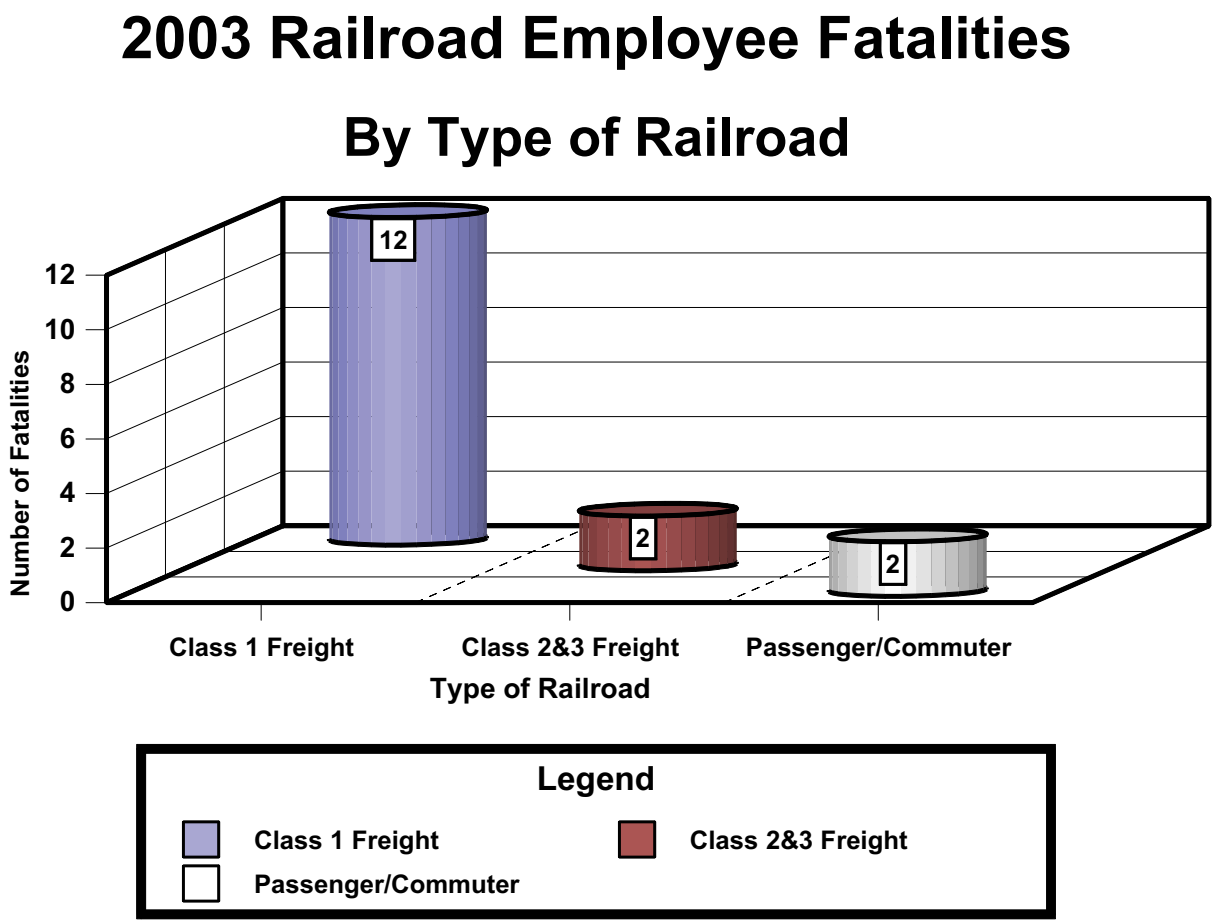

2003 Railroad Employee Fatalities
Years of Service by Craft
Number of Fatalities
12
10
8
6
4
2
0
0-5 years;
21-35 years
38% each
T&E
MOW
Craft
Legend
6-10 years
11-20 years
21-35 years
0-5 years


2003 Railroad Employee Fatalities
Age Ranges by Craft
Number of Fatalities
12
10
8
6
4
2
0
36 years
and older
75%
T&E
MOW
Craft
Legend
18-25 years
26-35 years
36-45 years
46-55 years
56-65 years

APPENDIX D

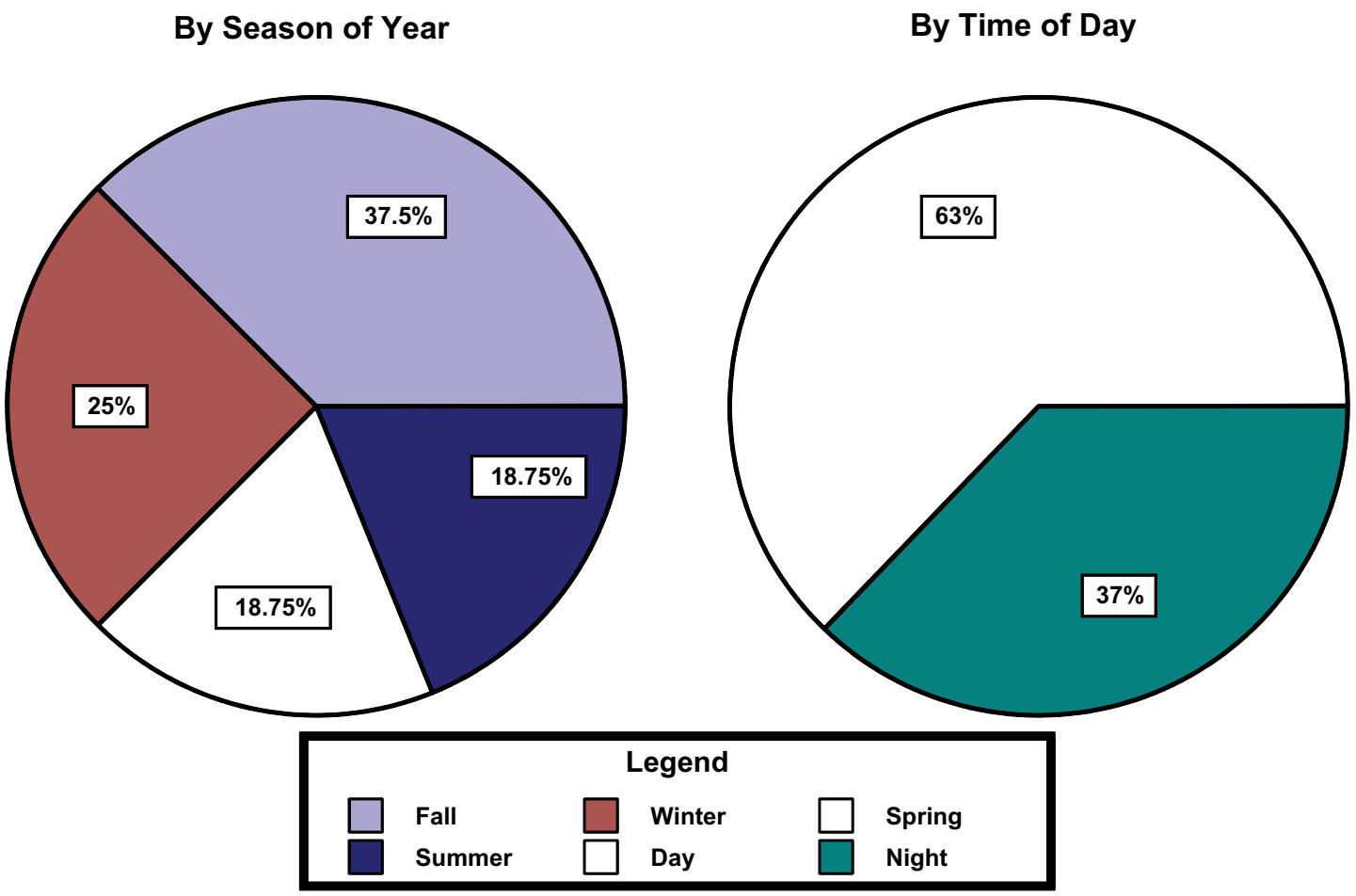

2003 Railroad Employee Fatalities
by Craft and Activity
Number of Fatalities
12
10
8
6
4
2
0
All Switching
63%
Track
Maintenance
19%
T&E
MOW
Craft
Legend
Preparing Crane for Shipment
Clearing Snow
Operating Train to Destination
Switching (Remote Control)
Track Maintenance
Switching

APPENDIX E


2003 Railroad Employee Fatalities
By Type of Railroad
Number of Fatalities
0
2
4
6
8
10
12
12
2
2
Class 1 Freight
Class 2&3 Freight
Passenger/Commuter
Type of Railroad
Legend
Class 1 Freight
Class 2&3 Freight
Passenger/Commuter

APPENDIX F

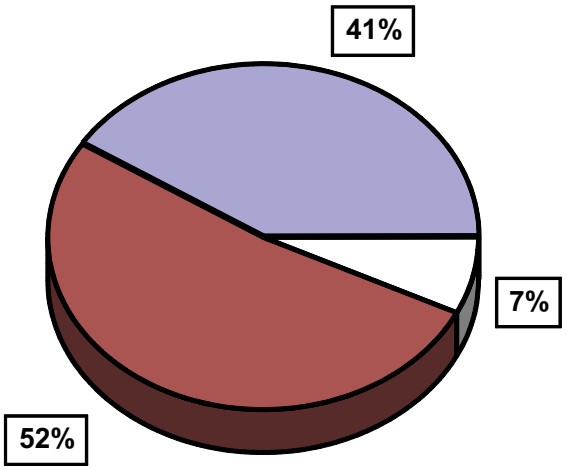
2003 Railroad Employee Fatalities



APPENDIX G

2003 Railroad Employee Fatalities

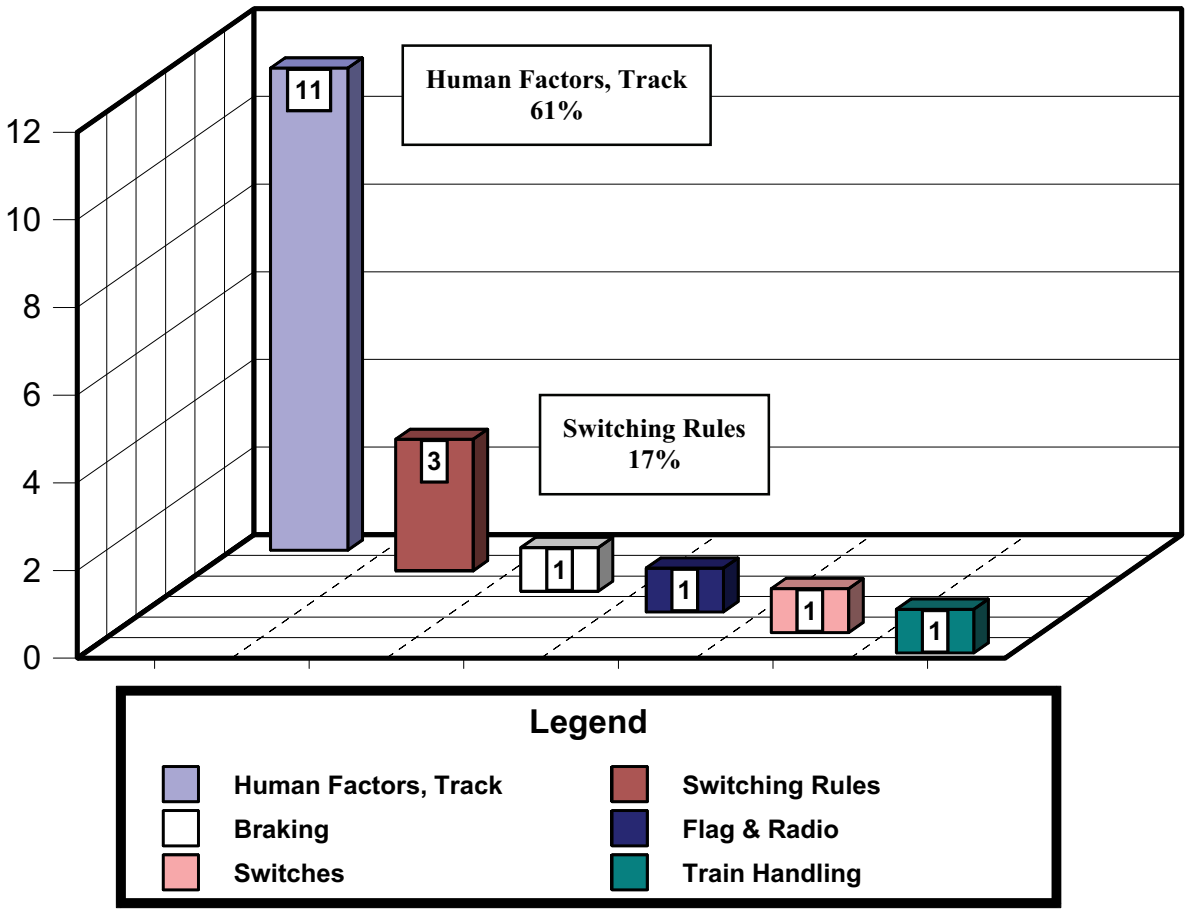
Major Possible Contributing Factor Categories



APPENDIX H

2003 Railroad Employee Fatalities

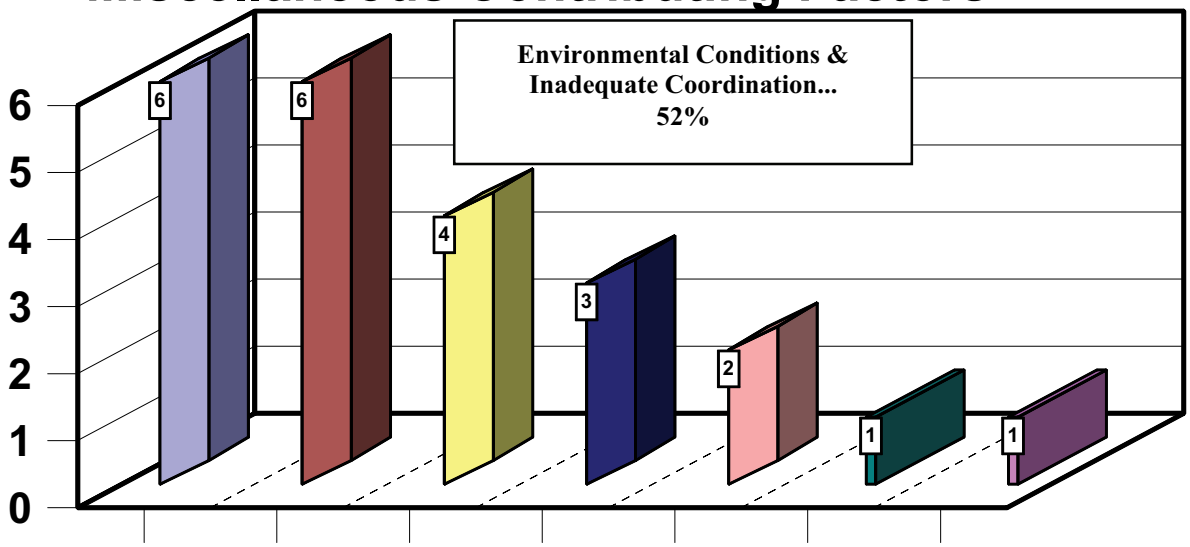
Train Operation & Human Factors Involved



APPENDIX I

2003 Railroad Employee Fatalities

Miscellaneous Contributing Factors



Legend

- Environmental Conditions
- Inadequate Coordination/Communication
- Employees Unprepared
- Systemic Problems
- Unusual Operational Situations
- Inexperience
- Highway Collisions