

OVERVIEW OF 2006 RAILROAD EMPLOYEE FATALITIES

EXECUTIVE SUMMARY

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

This document contains the following materials:

- Narrative reports which provide in-depth coverage of 2006's railroad employee fatalities, helping readers to visualize the accident scene and chain of events leading up to the fatalities, and the post-accident investigation process;
- *Summaries, preceding each narrative report, which highlight important elements of each 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 “The rail cars that struck the Conductor were set in motion by a mismatch coupling.”

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

- *Overall findings for the 2006 fatalities (see Pages 2-7)* which identify *who* the 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 2006, approximately 72 percent of all fatalities had three or more PCFs. Approximately 43 percent had five or more PCFs. Fatalities ranged in complexity from only one PCF to six PCFs.*

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

- The Conductor violated a railroad operating rule by stepping between moving rail equipment in an attempt to make an adjustment;
- The rail cars that struck the Conductor were set in motion by a mismatch coupling;
- In non-compliance with railroad operating rules, the Conductor used a brake stick to apply a hand brake on a rail car with a bent brake wheel;
- The Conductor failed to apply a hand brake to both rail cars involved in the incident, in non-compliance with the railroad's operating rules, which require one hand brake for one car and two hand brakes for two cars;
- The Conductor had received no training by the railroad in the operation of the brake stick;
and
- The railroad's efficiency testing did not include compliance with railroad rules regarding getting on and off equipment or use of the brake stick.

FINDINGS

WHO were most of the fatally injured employees?

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

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

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

- ***Position: Conductors***

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

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

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

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

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

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

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

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

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

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

- ***Activity: Switching***

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

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

WHERE did most of the railroad employee fatalities occur?

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

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

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

WHEN did most of the fatalities occur?

- ***Season: Summer***

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

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

(See [Appendix F](#), pie chart entitled “2006 Railroad Employee Fatalities by Season of Year.”)

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

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

(See [Appendix F](#), pie chart entitled “2006 Railroad Employee Fatalities by Time of Day.”)

WHY did most of the fatalities occur?

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

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

- **Most PCFs: Train Operation/Human Factors¹**

- In 2006, 50 percent of all PCFs to the year's fatalities were Train Operation/Human Factors, followed closely by approximately 46 percent which were Miscellaneous Contributing Factors².
- In 2006, the remaining approximately 4 percent of all PCFs were Mechanical and Electrical Failures. Specifically, they included a coupler mismatch (high/low), and unsafe equipment (i.e. a cutting torch that was too short to repair the track safely).

(See [Appendix G](#), 3-D pie chart entitled “2006 Railroad Employee Fatalities: Major Possible Contributing Factor Categories.”)

Break-down of Train Operation & Human Factors

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

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

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

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

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

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

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

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

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

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

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

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

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

Break-down of Miscellaneous Contributing Factors

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

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

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

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

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

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

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

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

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