Risk Reduction – What it is and How it Works

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Chief Safety Officer
Federal Railroad Administration

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Today’s Presentation

1. Introduce Risk Reduction.
2. Explain How it Works.
3. Explain How it can be Applied.
4. Describe the Status of FRA’s new Risk Reduction Regulations.
5. Describe Labor’s Role in Risk Reduction.
6. Questions and Discussion.
The Railroad Safety Improvement Act of 2008 contained numerous requirements for new regulations including:

» Positive Train Control
» Conductor Certification
» Training Standards
» Roadway Worker Protection
» Risk Reduction Programs
» And others…
Impetus of RSIA

Graniteville, SC
January 6, 2005

9 Dead
250 Injured
5400 Evacuated 2 weeks
Impetus of RSIA

Chatsworth, CA
September 12, 2008

26 Killed, 131 Injured
Rail Safety Improvement Act of 2008

The Act requires the following:

Not later than 4 years after the date of enactment of the Rail Safety Improvement Act of 2008, the Secretary of Transportation, by regulation, shall require each railroad carrier that is a Class I railroad, a railroad carrier that has inadequate safety performance (as determined by the Secretary), or a railroad carrier that provides intercity rail passenger or commuter rail passenger transportation ... to develop a railroad safety risk reduction program ... that systematically evaluates railroad safety risks on its system and manages those risks in order to reduce the numbers and rates of railroad accidents, incidents, injuries, and fatalities.
A Risk Reduction Program … systematically evaluates railroad safety risks on its system and manages those risks in order to reduce the numbers and rates of railroad accidents, incidents, injuries, and fatalities.
Many Names for Risk Reduction

Risk Reduction Programs

Safety Management Systems

Hazard Management Systems

System Safety Program

Hazard Analysis

C3RS

Safe 2 Safer
Many Names for RRP and RRP Programs

Risk Reduction Programs

Safety Management Systems

Hazard Management Systems

System Safety Program

Hazard Analysis

C3RS

Safe 2 Safer

Different Flavors of the Same Concept
Risk Reduction – What is It?

The Traits:

• It is a structured, documented, systematic process to identify potential hazards and appropriate methods for their elimination or control.

• A continuous process that should ideally be applied throughout all phases of a system life cycle.

• A method for documenting both hazards and mitigation strategies.

• It is both PROACTIVE – prevents accidents and REACTIVE – learns from accidents
Identifying and mitigating hazards is a key component of Risk Reduction Programs.

Methods of Identification:

– Data Analysis
– Physical Observations by Expert Panels or Safety Committees
– Close Call Reports
– Accident Investigation
Benefits of Hazard Analysis

HAZARD ANALYSIS:

• Allows hazards to be identified and documented
• Allows relative Risk to be Calculated
• Allows Hazards to be Prioritized
• Provides priorities in Mitigating Hazards
Definition of Risk

RISK = Hazard Severity x Hazard Frequency

– Risk is not necessarily a Pure Number like an Accident Rate
– Dependent on the Definition of Severity
– Dependent on the Approach to Identifying Frequency

However –

Risk allows head to head comparison and prioritization of different Hazards.
Hazard Identification Process

• A kind of “safety brainstorming”, to identify as many hazards as are possible and credible.

• Works best with “Expert Panels”* that:
  – Conduct site surveys,
  – Interview site personnel,
  – Review data such as accident/ injury records, equipment records/ failures, other systems data, etc.

* AKA Hazard Management Teams
How many potential hazards can you identify in this picture?
Crossovers can cause or escalate a derailment and result in secondary collisions.
Highway overpass is potential source of vehicles or other objects falling on track.
Freight cars indicate siding where equipment can roll out and foul main line.
Unprotected bridge support could be damaged in a derailment and cause a collapse.
Railroads Should Develop Hazard Analysis Models

• The Hazard Analysis Model should include:
  – Severity Definitions
  – Frequency Definitions
  – Risk Matrix
  – Recommended Responses
  – Hazard Management Plan

• Military Standard 882 contains a valid approach
The Hazard Model should be Customized for the Railroad

Hazard Analysis Model:

– The analysis method selected should be robust and comprehensive.
– The method should be detailed enough to assist in managing risk.
– The method should identify and document the hazards and hazard mitigation.
– The method should be designed to provide long term hazard management assistance as the system changes and matures.
RRPs need Hazard Severity and Probability Definitions

• The railroad must decide on what hazard severity and probability definitions to use.

• Definitions must be in terms that are easily understood and applied.

• Frequency of events can be defined as the number of events that can reasonably be expected during a year of operation or the life of the fleet.
## Sample Hazard Probability Categories: MS-882

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>LEVEL</th>
<th>SPECIFIC INDIVIDUAL ITEM</th>
<th>FLEET OR INVENTORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQUENT</td>
<td>A</td>
<td>Likely to occur frequently</td>
<td>Continuously Experienced</td>
</tr>
<tr>
<td>PROBABLE</td>
<td>B</td>
<td>Will occur several times in life of an item</td>
<td>Will occur frequently</td>
</tr>
<tr>
<td>OCCASIONAL</td>
<td>C</td>
<td>Likely to occur sometime in life of an item</td>
<td>Will occur several times</td>
</tr>
<tr>
<td>REMOTE</td>
<td>D</td>
<td>Unlikely but possible to occur in life of an item</td>
<td>Unlikely but can reasonably be expected to occur</td>
</tr>
<tr>
<td>IMPROBABLE</td>
<td>E</td>
<td>So unlikely, it can be assumed occurrence may not be experienced</td>
<td>Unlikely to occur, but possible</td>
</tr>
</tbody>
</table>

- **FREQUENT** likely to occur frequently, continuously experienced.
- **PROBABLE** will occur several times in the life of an item.
- **OCCASIONAL** likely to occur sometime in the life of an item.
- **REMOTE** unlikely but possible to occur in the life of an item.
- **IMPROBABLE** so unlikely, it can be assumed occurrence may not be experienced.
## Sample Hazard Severity Categories: MS-882

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SEVERITY</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Catastrophic</td>
<td>Death, system loss, or severe environmental damage.</td>
</tr>
<tr>
<td>II</td>
<td>Critical</td>
<td>Severe injury, severe occupational illness, major system or environmental damage.</td>
</tr>
<tr>
<td>III</td>
<td>Marginal</td>
<td>Minor injury, minor occupational illness, or minor system or environmental damage.</td>
</tr>
<tr>
<td>IV</td>
<td>Negligible</td>
<td>Less than minor injury, occupational illness, or less than minor system or environmental damage.</td>
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</tbody>
</table>
The Hazard Assessment Approach

The Hazard Management Team would be responsible for:

– Documenting the Hazard
– Determining severity
– Determining frequency or probability of occurrence.
– Determining whether to eliminate, control, or accept the hazard
### Hazard Risk Index (HRI)

<table>
<thead>
<tr>
<th>HRI #</th>
<th>Description</th>
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<tbody>
<tr>
<td>1 A, 1B, 1C, 2A, 2B, 3A</td>
<td>Unacceptable, eliminate hazard.</td>
</tr>
<tr>
<td>1D, 2C, 2D, 3B, 3C</td>
<td>Undesirable, upper management decision to accept or reject risk.</td>
</tr>
<tr>
<td>1E, 2E, 3D, 3E, 4A, 4B</td>
<td>Acceptable with management review</td>
</tr>
<tr>
<td>4C, 4D, 4E</td>
<td>Acceptable without review</td>
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</table>

### Hazard Assessment Matrix 882C

<table>
<thead>
<tr>
<th>FREQUENCY OF OCCURANCE</th>
<th>HA锌ARD CATEGORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 CATASTROPIC</td>
</tr>
<tr>
<td>(A) FREQUENT</td>
<td>1A</td>
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<tr>
<td>(B) PROBABLE</td>
<td>1B</td>
</tr>
<tr>
<td>(C) OCCASIONAL</td>
<td>1C</td>
</tr>
<tr>
<td>(D) REMOTE</td>
<td>1D</td>
</tr>
<tr>
<td>(E) IMPROBABLE</td>
<td>1E</td>
</tr>
<tr>
<td>Hazard Number</td>
<td>Hazard Description</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>1.1</td>
<td>Cab Car Grade Crossing Collision with Industrial Vehicle</td>
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“What can make an accident more severe?”

- Train Speed
  - Yard
  - Mainline
- Drop from Height
  - Bridges
  - Elevated Track
- Striking a fixed Object
  - Bridge support
  - Bridge structure

- Fire Potential
- Submersion
- Other
Mobile Alabama Amtrak Accident - September 22, 1993
Lead Locomotive after striking the end of a through girder bridge
at about 72 mph.
Mobile Alabama Amtrak Accident
September 22, 1993
Submerged Passenger Cars
RRP Teams Identify Hazards and Mitigations

RRP Hazard Management Team consists of:

- Knowledgeable individuals
- Representatives from
  - System Safety
  - Operations
  - Mechanical
  - Track and Signals
  - Labor
  - Joint users
  - Contract operators
  - Host railroads
  - Other Stakeholders (EMS, State DOT, FRA, etc.)
Personal Bias Should be Set Aside

Other qualified individuals may participate, but, the Expert Panel should remain INDEPENDENT!
FRA is Currently Developing RRP Requirements

**System Safety Rule:** commuter and intercity passenger railroads.

- Product of the RSAC System Safety Rule Task Group
- NPRM Issued in September 2012 (consensus)
- Final Rule planned for Fall 2013
FRA is Currently Developing RRP Requirements

Risk Reduction Rule: Class I Freight Railroads

- Product of the RSAC Risk Reduction Working Group
- NPRM planned for Fall 2013 (consensus)
- Final Rule planned for Spring 2014
The Act requires the following:

... Each railroad carrier required to submit a railroad safety risk reduction program under subsection (a) shall consult with, employ good faith and use its best efforts to reach agreement with, all of its directly affected employees, including any non-profit employee labor organization representing a class or craft of directly affected employees of the railroad carrier, on the contents of the safety risk reduction program.
There are Additional Roles for Labor in RRP Programs

Potential Areas for Labor Participation:

- Close Call Programs
- Hazard Management Teams
- Expert Panels
- Risk Reduction Program Reviewers
Final Points:

• A Risk Reduction Program cannot reach its full potential to improve rail safety without participation of the individuals who operate the system.

• The role for labor as reviewers and participants in Risk Reduction Programs is vital for the success of the program.

• Labor needs to stand up and be counted!
Questions & Discussion