

Bringing HSE Management Systems from Oil & Gas to Rail



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Factors shaping the HSE Management Systems in Oil & Gas in the US

- Increased federal and state regulation since 1970
- Incidents such have pushed the industry to manage risks
- High penalties of of non-compliance
 - Environmental as well as Safety
- Society pressure and reduced acceptance for consequences of incidents and non-compliances

Overview

- 23,000 employees
- Canada (coast to coast)
- US through Midwest to the Gulf of Mexico
- 8 major facilities
- >250 medium to small facilities
- Crown corporation until privatized in the 1990's

Challenges to HSE performance

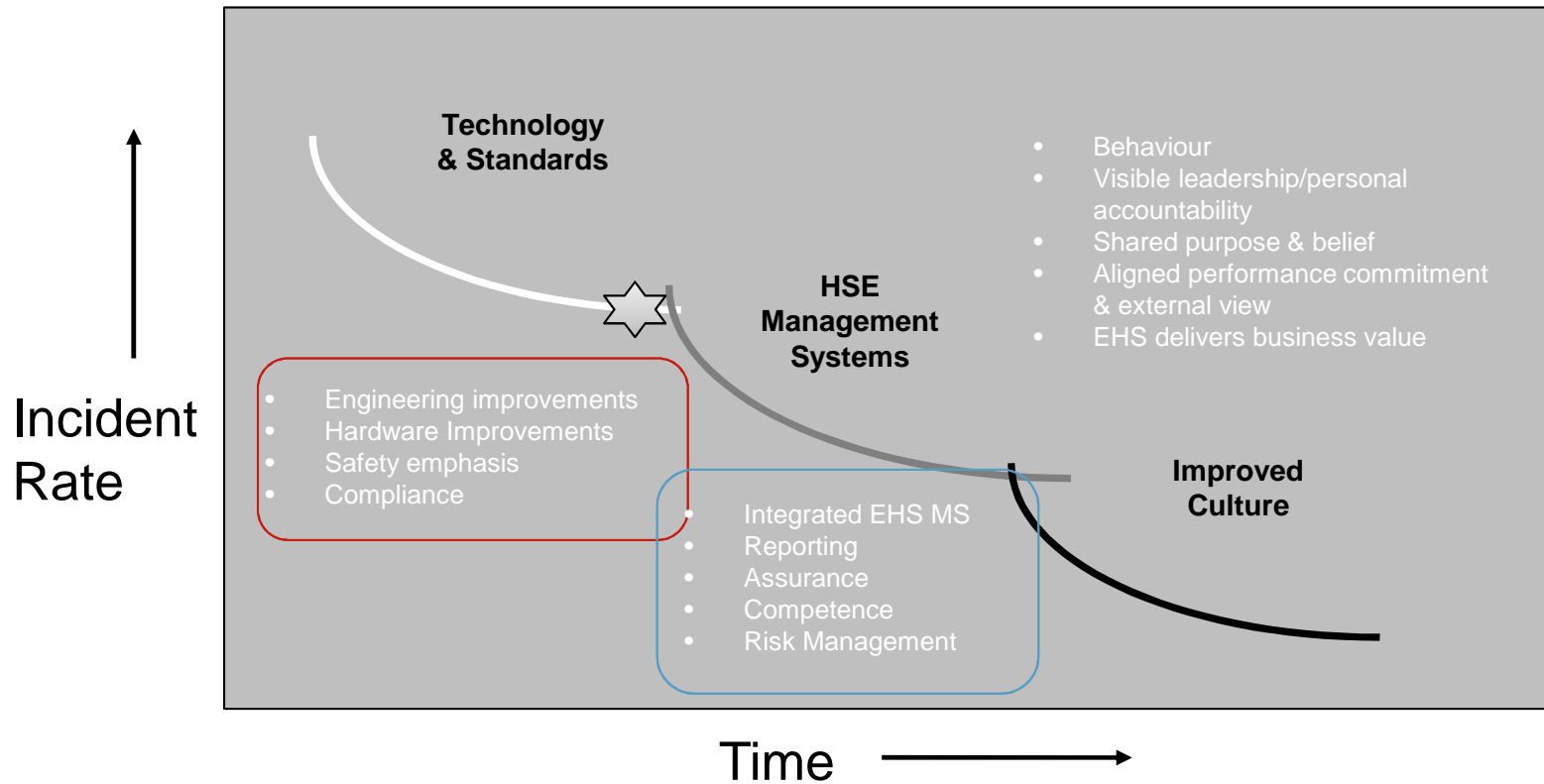
- Historical focus on individual accountability to follow procedural controls (rules)
- Historical focus on infrastructure and mechanical improvements
- Heavy industry with 150 year old technology, not easily automated
- New program in US: Positive Train Control

The path to improved HSE performance



A Worn Path

Improvements to hardware, rules and processes will only get you so far – the best of the best have the right culture.



CN invested in technology and hardware improvements to improve safety of Operations, the next step is to improve HSE Management Systems.

- Incident Reporting, Investigation, Learning Program
 - Event reporting & notification
 - Incident investigating,
 - Learning from incidents
- Major Risk Management Process (Risk Register)
- Internal HSE Audit Program
- HSE Compliance Management System
- Modular IT System for HSE
- Other HSE Systems:
 - Updated HSE Metrics
 - Policies & Procedures
 - Strategic Planning

- Event reporting
 - Incidents to include all types of HSE incidents
 - Near misses
 - Barrier Failures
- Incident Investigations
 - Investigation commensurate to actual or potential severity
- Learning from Incidents
 - Organizational Learning at corporate level
 - Site level learning from internal/external incidents
 - Team level learning – safety discussions
 - Individual learning – hazard awareness

Investigation Program – Levels of Investigation



Level of Investigation	Expected number per year	Actual Severity (Safety)	Actual Severity (Environmental)	Actual Severity (Regulatory)	Potential Severity (Safety)	Investigation Leader	Methodology	Report length	Number of required investigators
Tier 3	~15	Permanent injury (amputation), fatality, Major FRA accident	Major environmental cleanup	NOV with fine >\$1M, US Regulatory Compliance Order	Near miss with potential for multiple fatalities	Investigation SME	Root Cause Failure Analysis	15+ pages	3
Tier 2	~450	FRA reportable injury, FRA reportable accident, Main Track Authority Violation	Release requiring regulatory reporting	NOV with fine <\$1M, TC AMPs and sec31 & 32 orders	Potential for permanent injury (amputation), fatality or Major FRA accident	Trained investigation leader	5-why	5-10 pages	>100
Tier 1	>2000	first aid, minor accident/derailment	Minor release (restricted to CN Property)	FRA violations, TC letters of safety concerns, Permit exceedance, Audit findings, Self identified potential non-compliances,	Near misses with potential for FRA Injury, accident, derailment	Supervisor of injured employee	After Action Review, Specific Checklists based on type of event	2-3 pages	>200

¹ Major FRA accident is a train accident that involves a fatality, a release of hazardous materials leading to evacuation or reportable injury, or damage to railroad property of \$1,500,000 or more. 49CFR219.201

Corporate-level organizational learning

- Identify major incidents within industry, generally external
- Evaluate barriers in place to prevent incident
- Identify opportunities to establish new or improve existing barriers

Site-level learning from internal/external incidents

- Corporate issues learning opportunities to sites with suggestions to address risks
- Each site evaluates the local risk and selects relevant improvements

Team-level learning – safety discussions

- Corporate issues safety discussion materials based on internal/external incidents
- Each relevant team reviews the material, discusses if and how the incident could occur within their work area
- The team identifies and implements improvements

Individual learning – hazard awareness

- Corporate issues information to individuals to raise their awareness for key hazards using incidents to demonstrate the hazard

Overview of CN Risk Management Process

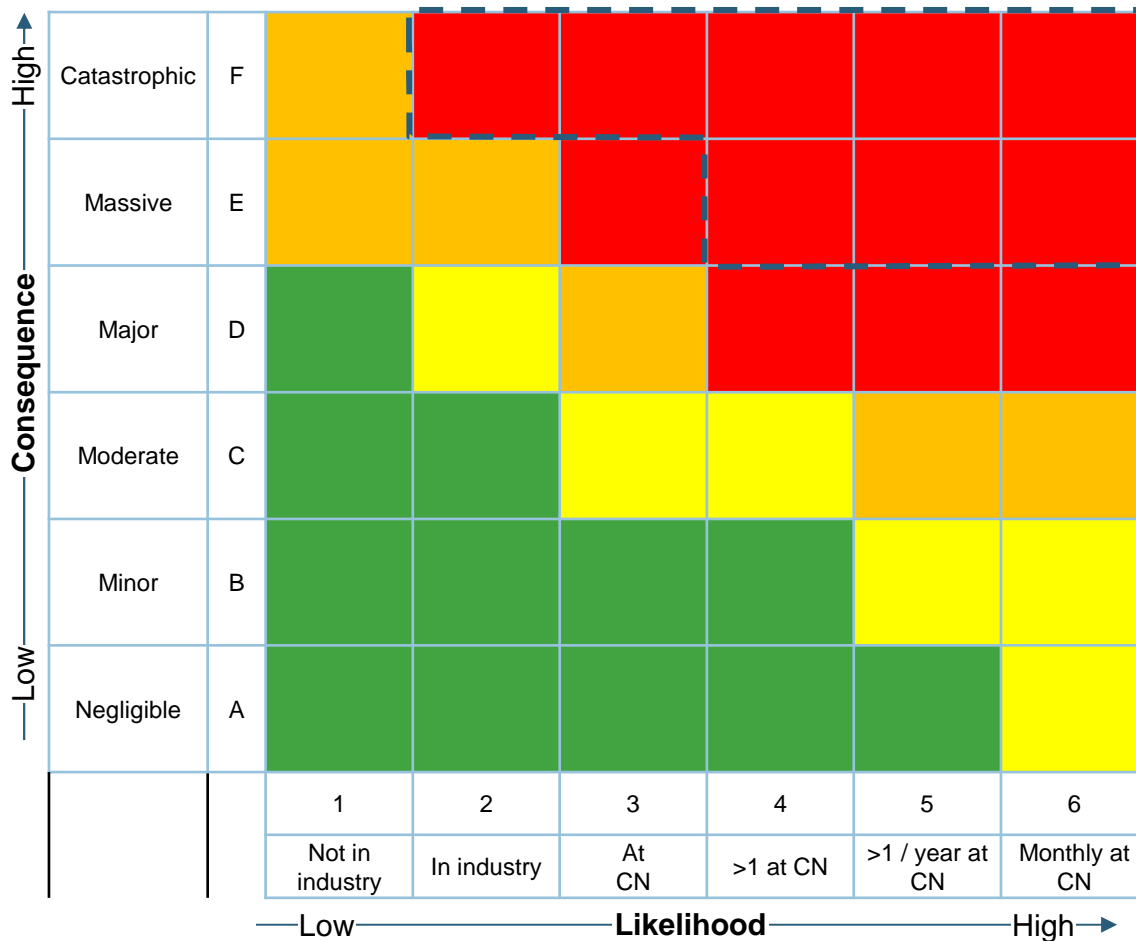
- Identify highest consequence HSE risk events that could occur in CN
- Categorize these risk events by consequence, likelihood, and type of event
- Identify and evaluate the barriers in place to prevent the occurrence of these events
- Evaluate the need to strengthen existing barriers or add new barriers to prevent the likelihood or consequence of these events
- Establish project plans and obtain management approval for the mitigation improvement projects.
- Provide overview of risks, barriers, mitigation improvements to management on an annual basis (RiskFest) expected to be scheduled in the next month.

The bowtie model



Risks were identified throughout the organization with subset risks surfacing as the top risks which will be prioritized for initial mitigation development

CN Risk Matrix



Important notes:

- Ratings based on feedback from CN stakeholders during workshops
- Consequence is based on the worst credible scenario


Collisions (12)

Derailments (8)

Property damage (4)

Personal injury (13)

Multimodal (14)

 Top risks to be prioritized for initial mitigation development

Establish Manager for Risk Process (1Q2018)

Risk Mitigation Plans

- Develop project plans for the key mitigations identified in 2017 to improve barriers preventing the top risk events to CN
- Obtain management approval to implement the mitigation plans

Evaluate Second Tier of Risk Events

- Hold workshops with subject matter experts to evaluate barrier strength
- Develop mitigation options and mitigation plans

RiskFest 4Q 2018

Program Objective: Identify HSE potential non-compliances and develop corrective actions to reduce risks of non-compliance

Program Description

- US and Canadian regulatory requirements for Environmental, Occupational Health & Safety, and Transportation Safety.
- New program developed and piloted in 2017
- 2018 Activity: Major rail yards in Canada and US
- Audits consists of 6 auditors for 1 week.
- Auditors are trained HSE SMEs from other regions
- New system to track actions to closure

Steps to Implement a HSE Compliance Management System

- Identify HSE regulatory requirements and where they apply in CN
- Identify accountability for meeting the HSE requirements
- Establish recurring compliance tasks to support compliant implementation
- Establish procedures/instructions for completing the compliance tasks
- Document completion of the tasks and collect supporting documentation
- Establish verification process to confirm the completion of the compliance tasks

Overview

CN is planning a modular HSE software implementation.

Scope – the following are possible modules to be implemented in the new HSE IT Platform

First Priority

- *Event reporting*
- *Incident Investigation*
- *Corrective and Preventative Action Management*
- *Risk Management*
- *Job Hazard Analysis*
- *Safety Observations*
- *Chemical Substances Management*
- *Regulatory Compliance Management*
- *Audit*
- *HSE Inspection*
- *Management of Change*

Possibly Later

- *Work Permitting*
- *Industrial Hygiene*
- *Occupational Health*
- *Waste management*
- *Waste Water management*
- *Air Quality Management*
- *Contamination Management*
- *Document Repository and Management*

HSE Metrics

- Update metrics to include H&S, compliance, leading indicators

HSE Management Systems

- Provide overarching structure for HSE management systems (EMS, SMS, etc)
- Implement processes to support HSE
 - Action Item Management
 - Management of Change
 - Strategic Planning
 - Document Management
 - Records Management

Questions?