Safety Management Systems in Hazardous Materials Transportation

Association of Transportation Law Professionals

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Safety Management

• Safety is a cross-cutting priority for every transportation operation, regardless of mode.

• For the NTSB, how an organization manages safety, has become a key data point when conducting an accident investigation.
Safety Management Systems

• A Safety Management System is a systematic approach to managing safety.

• SMS involves the necessary organizational structures, accountabilities, policies, and procedures.
Safety Management Systems

• Decide to manage safety
  – Make safety a core value starting at the top of the organization
  – Identify and manage the hazards endemic within the organization
  – Monitor and assess the safety performance of the organization
  – Actively promote safety at all levels of the organization
San Bruno, CA  September 9, 2010

- Natural gas pipeline rupture in residential neighborhood
- 8 Fatalities
- 38 homes destroyed
- 70 homes damaged
The NTSB San Bruno Report

• **Accident Causes:**
  - Inadequate quality assurance / quality control program
  - Inadequate integrity management program
  - Regulatory exemption from pressure testing
  - Flawed emergency response procedures

• NTSB Report: identifies this as an “organizational accident”
San Bruno and Safety Management

Organizational accident

– multiple contributing causes
– Involve people at numerous levels within an organization
– Characterized by a pervasive lack of proactive measures to ensure robust safety culture
San Bruno and Safety Management

The investigation revealed:

– “multiple deficiencies with PG&E’s practices”
– Some deficiencies were found to be factors in previous PG&E incidents.
– Multiple deficient operational procedures and management controls led to hazardous conditions that grew over time.
– Such factors must be addressed to improve PG&E’s safety management practices.
San Bruno and Safety Management

PG&E, as an organization, lacked a comprehensive strategy to manage the overall safety of its operations.
Q: How could SMS have possibly changed the outcome?

**Identified deficiencies:**

- Poorly defined critical safety roles (SCADA operators)
- Lax drug and alcohol testing program
- Poor record keeping/unaware of the state of its actual assets in the ground
- Ineffective integrity management program.

**A:** An effective SMS, through hazard/threat assessment and monitoring, would have brought such deficiencies to light.
Marshall, Michigan  July 25, 2010

- 1 Million gallon crude oil spill from an Enbridge pipeline
- $1 Billion cleanup cost - most costly on-shore cleanup in US history
The NTSB Marshall Report

**Accident Causes:**

- Pervasive organizational failures at Enbridge
  - Deficient Integrity Management procedures
  - Inadequate control of personnel
  - Poor public awareness program
- Inadequate integrity management oversight
- Inadequate emergency response resources and procedures
The NTSB Marshall Report

• NTSB Report:
  – PC: “pervasive organizational failures at Enbridge”
  – Conclusion: “Pipeline safety would be enhanced if pipeline companies implemented safety management systems”
Recommendation

For the American Petroleum Institute to develop a safety management system standard for hazardous materials management.
(draft standard in development)
Marshall and Safety Management

Q: How could an effective SMS have possibly changed the outcome?

Identified deficiencies:

- Ineffective integrity management program.
- Poorly trained/supervised SCADA operators/operations.
- Deviance from policy/procedures.
- Inadequate public awareness and emergency response plans and insufficient resources.

A: An effective SMS, with true commitment from the top, appropriate policies/procedures and effective hazard/threat assessment and monitoring.
Cherry Valley, IL  June 19, 2009

• 19 Ethanol tank cars derailed
• 13 punctured, ethanol ignited
• $7.9 Million property damage

• 1 Fatality
• 9 Injuries
The NTSB Cherry Valley Report

• Accident Causes:
  – Multiple communication and emergency response failures at different levels across organizations.
  – Failure to effectively analyze and mitigate hazardous conditions.
The NTSB Cherry Valley Report

- NTSB Report:

  “Inadequacies and lapses in safety critical operations that were present in this accident suggest a lack of quality control and a weakness in CN’s safety culture. CN was either unaware or did not respond effectively to the existing risks and failures that ultimately led to the accident.”

- Conclusion: Had CN implemented an effective SMS, these factors would have been identified and corrected.
The NTSB Cherry Valley Report

Recommendations

• FRA, to incorporate safety management systems and associated key principles into risk reduction programs.

• CN, to incorporate SMS principles in emergency communications plans.
Q: How could an effective SMS have possibly changed the outcome?

Identified deficiencies:
- Inadequate grade crossing identification/emergency contact information.
- Poorly operated/managed dispatching division.
- Inadequate internal communications system.

A: An effective SMS, providing hazard identification and risk assessment, could have enabled the inadequacies and failures to be identified and corrected.
Goodwell, OK  June 24, 2012

- Head on collision between two freight trains
- Diesel fuel fire
- 3 Fatalities
- $14.8 million damage
The NTSB Goodwell Report

• Accident Causes:
  – Train crew’s failure to respond to signals
  • Engineer’s degraded eyesight
  • Conductor was disengaged from duties
  – Lack of a positive train control system
  – Ineffective medical examination process.
The NTSB Goodwell Report

• NTSB Report:
  – Conclusions:
    • Crews would have benefited from Crew Resource Management training (CRM).
    • Non-punitive peer audit programs are an important element of an effective SMS (e.g. Line Operations Safety Audit (LOSA))
    • Establishment of an SMS by UP could have avoided this accident.
Q: How could an effective SMS have possibly changed the outcome?

Identified deficiencies:
- Poor CRM.
- Noncompliance with procedures.

A: An effective SMS would ensure compliance with policies/procedures; programs in support of CRM and LOSA, would improve hazard identification and risk assessment by providing opportunities to mitigate the risks/hazards identified.
Lac-Megantic, Quebec July 6, 2013

- 62 Tank cars derailed, caught fire
- 1.5 Million gallons of crude oil spilled
- 47 Fatalities
- 41 Buildings destroyed
Safety Management

- **NTSB Forum**: “Safety Culture: Enhancing Transportation Safety”

- Cross modal forum for the purpose of elevating the topic, intended to raise awareness, discuss best practices, and promote dialogue.
Safety Management

The forum covered:

• Research Perspectives on Organizational Accidents
• Techniques to Enhance Organizational Safety
• Organizational Leadership Perspectives on Safety Culture
• Non-Transportation Perspectives on Safety Culture
• Safety Culture Management and Oversight in Transportation
• Companies and their Safety Culture Experiences
Safety Management

• An effective SMS can reduce and prevent accidents and accident-related loss of lives, time, and resources