RP 1173 Pipeline Safety Management Systems

Curtis G. “Skip” Blake
Safety Management can be defined as:
... the reduction of risk to a level that is as low as is reasonably practicable.

Safety Culture

Safety culture is a reflection of "the attitudes, beliefs, perceptions and values that employees share in relation to safety".

"I think we need to take another look at your risk management strategy..."
Why Should I Care

- Energy Industry has had several high profile incidents
  - Operational Errors
  - Relaxed safety systems requirements
  - Friction between owners, operators and contractors
  - Unusual operations
  - Media hype
  - Public perception

Deepwell Horizon Offshore 2010
Explosions and spills across the United States

Marshall, MN July 25, 2010

Marcellus Drilling Rig June 7, 2010

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Contributing factors from the aspect of pipeline materials, installation and operation came together in a perfect storm which were further complicated by issues of training, quality control, poor internal and external communications, lack of understanding, threat recognition and oversight.
The NTSB issues an accident report following the investigation. These reports are available online for reports issued since 1996, with older reports coming online soon.

The reports listing is sortable by the event date, report date, city, and state. Click on any of those headings to sort the data.

<table>
<thead>
<tr>
<th>Title</th>
<th>Event date</th>
<th>Report date</th>
<th>City</th>
<th>State</th>
<th>NTIS #</th>
<th>NTIS #</th>
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<tbody>
<tr>
<td>Large Crude Oil Spill from Damaged Enbridge Energy Pipeline</td>
<td>9/7/2010</td>
<td>9/30/2013</td>
<td>Romeoville</td>
<td>IL</td>
<td>PAB-13-03</td>
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<tr>
<td>Enterprise Products Natural Gas Pipeline Excavation Damage, Rupture, and Fire</td>
<td>6/7/2010</td>
<td>9/9/2013</td>
<td>Cleburne</td>
<td>TX</td>
<td>PAB-13-02</td>
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<tr>
<td>Explosion, Release, and Ignition of Natural Gas</td>
<td>12/24/2008</td>
<td>5/18/2010</td>
<td>Rancho Cordova</td>
<td>CA</td>
<td>PAB-10-01</td>
<td></td>
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</tbody>
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James Reason’s Accident Model

• “Swiss Cheese”
  - Major accidents happen when all the layers holes line up.

The layers of cheese represent the protective safety culture layers of management, supervision, reporting, learning, training, system design, protective equipment and devices, rules and procedures and Divine intervention that would prevent a catastrophic loss.

Gas Distribution Vs. Transmission

National, Gas Distribution, All Reported Incidents: Count 1994-2013

All Reported Incidents vs. Years (1995-2010)

Source: PHMSA Significant Incidents Files, Sept 3, 2014

National, Gas Transmission, All Reported Incidents: Count 1994-2013

All Reported Incidents vs. Years (1995-2010)

Source: PHMSA Significant Incidents Files, Sept 3, 2014
AOPL Significant Improvements

Major Spill Causes

- Corrosion: -79%
- Third Party: -78%
- Equip/Non-Pipe: -22%
- Material/Seam/Weld: -31%
- Operator Error: -57%

3 yr. avg. 1999-2001 to 2010-2012

# of Pipeline Releases

-62%

3 yr. avg. 1999-2001 to 2010-2012

# of Barrels Released

-47%

(in thous.) 3 yr. avg. 1999-2001 to 2010-2012

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Perceived SMS Faults

- Insufficiencies in leadership,
- An acceptance of deviation,
- Complacency,
- A lack of communication,
- Little or no training on new procedures
- Little or no understanding of the law, company policy, good engineering practice and material selection.
Accountability

- Stakeholders are demanding accountability
  - Leadership
  - Stockholders
  - Employees
  - Customers
  - Congressional
  - Public at large
  - Regulatory agencies
  - Industry related groups affected by fallout
Stakeholder Relationships

- Design & Engineering
- Operations
- Training
- Company Stockholders
- Energy Company
- Safety Culture
- Financial
- Ratepayers

How Can I Impact Pipeline Safety?

- General Public
- Emergency Officials
- Local Officials
- Excavators
- Federal Agencies
- State Regulators
- Pipeline Safety Advocates
- Property Developers/Others
Logic Of Investing In A PSMS

Reasons and drivers for adopting such a system:

- **Ethical** – we have a moral obligation to deliver our product without injury to our own employees, ratepayers, stockholders, the environment and general public.

- **Legal** – In a court of law we are bound by the regulatory system we are governed by.

- **Financial** – Accidents cost way more than that what we invest in safety systems.
• Meaningful metrics in IM
  – NTSB recommendation to PHMSA to develop
  – On July 10, 2014 issued:
    Guidance\(^1\) for Strengthening Pipeline Safety Through Rigorous Program Evaluation and Meaningful Metrics
  – Note: This document is to provide guidance describing methods to evaluate and measure IM program effectiveness.
    • This document is not a regulation and creates no new legal obligations.
NTSB 2012 Recommended Action

- SMSs continuously identify, address, and monitor threats to the safety of company operations by doing the following:

1. Proactively address safety issues before they become incidents/accidents.
2. Document safety procedures and requiring strict adherence to the procedures by safety personnel.
3. Treat operator errors as system deficiencies and not as reasons to punish and intimidate operators.
4. Require senior company management to commit to operational safety.
5. Identify personnel responsible for safety initiatives and oversight.
6. Implement a non-punitive method for employees to report safety hazards.
7. Continuously identify and address risks in all safety-critical aspects of operations.
8. Provide safety assurance by regularly evaluating (or auditing) operations and contractors to identify and address risks.
What A PSMS Should Look Like

- RP1173 Defines what constitutes such a procedure
- Simplified
  - Plan,
  - Do,
  - Check,
  - Act
PSMS RP1173 What Does It Mean

- Pipeline Safety Management System Standard API RP 1173 (Recommended Process)
- Pursuing continuous improvement by making pipelines and operations safer
- A coordinated (also termed holistic) approach to ensure the methods and practices we use to protect our plant, operations and stakeholders which will ultimately reduce avoidable incidents and accidents
- Practiced by the aviation, nuclear and similar high profile industries
Other Industry Models - DuPont

- DuPont Is A Very High Profile Manufacturer
  Has 22 elements

RP 1173 has 10 Elements

1. Leadership and Management Commitment
2. Stakeholder Engagement
3. Risk Management
4. Operational Controls
5. Incident Investigation and Evaluation
6. Safety Assurance
7. Management Review and Continuous Improvement
8. Emergency Preparedness and Response
9. Competence, Awareness and Training
10. Documentation and Recordskeeping
Canada’s Safety Culture Initiative

- SAFETY is an overriding value and priority
- Everyone is aware of known hazards and vigilant to new threats
- Employees feel empowered and recognized for making safe decisions
- No one would hesitate to report a safety hazard, the commitment of an error or the introduction of a threat without fear of reprisal or disciplinary action; even the most junior
- Everyone works safely with or without people watching
- Everyone is continuously learning from their own experiences, and those of others with the goal of advancing safety.
Canada’s National Energy Board

• Safety Culture Drivers
  – Driver #1 – Production Pressure
    • Example
      – I.e.; It’s cold delivery pressures are falling
      – We can’t do any overtime
  – Driver #2 – Complacency
    • Example
      – Oh it’s OK we’ve exceeded MAOP before
      – It’s never been a problem before
  – Driver #3 – Accepting Deviations
    • Example
      – It’s been like that since I began working here
  – Driver #4 – Tolerance of Inadequate systems and resources
    • Example
      – Poor communications and inadequate funding of projects
Safety Culture Deterrents

- Deterrent #1 – Leadership committed to doing it safely
  - Example
    - Competent engineering designs, practices and funding
    - Do it right or don’t do it
- Deterrent #2 – Vigilance
  - Example
    - Management by walking around and seeing it done properly
    - Ensuring everybody knows the right way to get it done
- Deterrent #3 – Empowerment and Accountability
  - Example
    - You have a duty to make it safe and you are expected to do it
- Deterrent #4 – Resiliency
  - Example
    - Able to resolve difficult situations and adjust resources
Coordinated Industry Approach

- Oil, Gas, Regulatory Initiative
  - API
  - AOPL
  - AGA
  - APGA
  - GPTC
  - INGAA
  - NAPSR
  - PHMSA

American Petroleum Institute
American Gas Association
American Public Gas Association
GAS PIPING
National Association of Pipeline Safety Representatives
U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration
RP 1173 Pipeline Safety Management Systems
1) Embrace a joint set of safety principles,

2) Undertake continuous industrywide safety improvement efforts,

3) Report annually on industrywide pipeline safety performance, and

4) Annually assess and pursue high priority pipeline safety initiatives.
AOPL/API Approach
Safety Excellence Program

• In 2014, the liquid pipeline industry is launching its Pipeline Safety initiative.
• It reflects the shared values and commitment we have to building and operating safe pipelines.
• One of those pipeline safety values is communicating with stakeholders.
• Pipeline operators are committed to sharing publicly the results of industrywide safety performance.
• At its heart, Pipeline Safety Excellence™ is about continuously improving pipeline safety until we reach the ultimate goal of zero incidents.
AOPL & API 2012 Joint Principles

- Zero Incidents
- Organization-Wide Commitment
- A Culture of Safety
- Continuous Improvement
- Learn from Experience
- Safety Systems for Success
- Employ Technology
- Communicate with Stakeholders
INGAA’s Approach

Zero pipeline incidents

A robust safety culture is critical to success

Will require assessing threats, prioritizing risk, & remediating flaws

Executing this plan is a long-term commitment

Continuous improvement is at the core

Includes active two-way stakeholder communication
## VIII. Appendices

### Linking Recommendations to Standards and Regulations

|---------|-----------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------|

### Building Confidence in Pipeline Safety

*The role of management systems in achieving our goal of zero incidents*

An INGAA IMCI White Paper
October 2012
INGAA Regulatory Approach

- Begin with B31.8s
Continuous Improvement is the Goal

Meeting Roll Out RP 1173
July 02, 2014 Alexandria, VA

Plan, Do, Check, Act

Continuous Improvement is the Goal
Guidance for Strengthening Pipeline Safety Through Rigorous Program Evaluation and Meaningful Metrics

Or

How to comply with:
49CFR195 Liquids
49CFR192 Gas Xmsn
49CFR 192 Gas Dist.
ADB-2012-10 (12/5/2012)
1. Leadership and Management Commitment
2. Stakeholder Engagement
3. Risk Management
4. Operational Controls
5. Incident Investigation
6. Safety Assurance
7. Management Review
8. Emergency Preparedness and Response
9. Competence, Awareness and Training
10. Documentation and Recordskeeping
Plan – Assess The Exposure

Do – Develop an E-Plan with:
1. Operational Controls
2. Establishes competence
3. Provide training
4. Document plans and required goal metrics
5. Engage stakeholders
   Internal
     Employees, Owners
   External
     Public, Regulatory & E Responders

Check – Investigate, Evaluate

Act – Change For The Sake Of Continuous Improvement
Conclusion
Achieving SMS Success

- Process safety leadership
- Risk identification and assessment
- Risk management
- Review and improvement

RP 1173 Pipeline Safety Management Systems
Then came the bomb

- Hello! Distribution operators
• Up to this point 192 & 195 Reference
  – Guidance¹ For Strengthening Pipeline Safety Through Rigorous Program Evaluation and Meaningful Metrics
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#1 Element - Leadership

- What must leadership do to make this work?
  - Accountability For Resource Allocation
    Shall Be Assigned To An Executive with Responsible Authority
  - Top Management to 1st line supervisor must make resources available to build a safety culture
    • Time  Money  Manpower  13 Points of Guidance / Direction
  - Top Management to 1st line supervisor must be committed to the elements and lead by example
    • No Ignoring the principles of the anticipated safety culture
    • Provide goals and accountability for what is expected
    • Build a dialogue and promote openness without retribution for reporting errors omissions or personal inadvertent mistakes
    • Provide feedback on progress and be flexible to change things that aren’t working
#2 Stakeholder Engagement

- PSMS Plan Shall Provide A Methodology For Two Way Communication and Engagement With:
  - Internal Stakeholders
    - All Owners, Employees, Contractors and Suppliers
  - External Stakeholders
    - Regulatory, Public, Abutters, Responders, other public agencies

- PSMS Plan Shall Provide Designated Personnel
  - To Interact & Describe the Goals, Methods and Organization of the Safety Management System
  - Those Persons Who Will Receive and Distribute Necessary Operating Communications
RP 1162 External Stakeholders

- Inform Abutters, Public, Emergency Responders, Public Agencies, Excavators and Other Affected Parties
  - 195.440 and 192.616
  - Good Guideline Follow PHMSA Form 21 Public Awareness Program Effectiveness Inspection, July 21, 2011, Rev 0

- Pipeline Safety
  - Damage Prevention
  - Emergency Response
  - Emergency Contacts
  - General Pipeline Awareness

- Measuring effectiveness
  - Need to How we are doing getting The Word out to our Stakeholders
    - PAPERS the Public Awareness Program Effectiveness Research Survey (PAPERS),
Risk Management

- Murphy’s Law Assessment Of The System
  - The bigger the length and complexity of the system the greater the risk of individual type failures.
  - Break it down into components, materials, & product composition.
  - Determine failure modes and frequencies. (Likelihood and consequences)
  - Go after the most human interactive catastrophic scenarios first
    - Protect Life first and property second
  - Threats and hazards are more than just pipeline components
    - Organizational Attitude – “Nothing ever happens here,” We’re too small”
    - Culture with no sense of responsibility, inclusion or empowerment
    - Lack of system knowledge and operating principles
    - Disgruntled or complacent employees, contractors, irate abutters and customers, Product supply, Environmental, Terrorism, public lack of confidence,
    - Lack of Financial and resource support
    - Lack of oversight, sharing of knowledge and failing to learn from others mistakes
Operational Controls

• O & M Plan
  - Define how your system will be constructed, maintained and operated - and stick to it! Conduct annual reviews
  - Ensure that as components, procedures and processes change, everyone gets training (MOC)
  - Temporary, infrequent or unusual operations need to be supervised closely. Tailgates prior performing any work. Especially hot taps, purging and pressure testing.

• E-Plan
  - Test the response system to make sure it works. Consider distances, environmental, civil disruption and vandalism, supply curtailments and equipment resource sharing consortiums. Learn from others incidents.
  - Police, fire and first responder liaison is important prior to incidents

• MOC’s
  - A process of documenting and defining change risks and responsibility
Use of contractors

- The use of contractors or outsourcing operating functions must be documented in the PSMS
  - Designate who is responsible for the contractor – Internal/External
  - Contractor must adopt and perform to the principles
  - Contractors must have safety orientation and training in policies
  - Contractors must be evaluated (Inspection)
  - Contractors must be aware of and communicate risks
  - Contractors must participate in MOC process and procedure
Operational Control-Stop Order

• If you see something; Say something
  – Any person on the job site that recognizes a discrepancy, impending failure or hazardous situation is obligated and encouraged to communicate his perspective.
  – The spirit of this premise is to be able to bring all employees into the process without fear of ridicule or repercussions.
  – This includes the most junior of positions to the most senior of executives.

• No safety question gets left unresolved
Incident Investigation

- Secure the incident scene,
- Protect people and the environment,
- Maintain and recover important evidence and testimony.
Safety Assurance

- Audit your programs
  - Did you meet your goals
  - Do your employees know the program and expected results
  - Analyze your collected data
  - Performance evaluations
Management Review & Continuous Improvement

• Management signs off on yearly audit
  – Based on goal progress make adjustments and sets new or continuing priorities
Emergency Preparedness and Response

• Ensure that all materials, training and resources are available to meet anticipated possible scenarios
  – Sister Industry company contacts
  – Suppliers
  – Contractor capabilities
Competence, Awareness and Training

• Operator Qualification
  – Technically competent
  – Safety, CPR, First Aid formalized programs
  – Awareness by experience
• If it isn’t on paper it never happened
  – Meaningful