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# Assuring an Adequate Safety Culture in Production Operations

**Kenneth E. Arnold**

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# Outline

- ▶ **What do we mean by “Culture of Safety?”**
- ▶ Why do we need an improved Culture of Safety?
- ▶ How do we accomplish a Culture of Safety?
- ▶ How do we assess that we have an adequate Culture of Safety?
- ▶ What are the roles of the Operator and the Regulator?
- ▶ Conclusions and References

# What is a Culture of Safety?

- ▶ A culture is a set of “shared values and beliefs that interact with an organization’s structures and control systems to produce behavioral norms.” -*B. Uttal*
- ▶ Traits of an institution with a Good Culture of Safety:
  - Leadership communication
  - Problem identification and resolution
  - Acceptance of personal accountability
  - Planning and control of work processes
  - Continuous learning
  - Freedom to raise concerns

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# Why Do We Need an Improved Culture of Safety?

- ▶ Both the President's Commission on Offshore Drilling and the NAE Macondo Blowout Report concluded: Sweeping reforms required for fundamental transformation of industry's **safety culture**
- ▶ A culture that supports safety in **design** is important
- ▶ A culture that supports safety in **operations** is critical

# The Human Factor

- ▶ 80% of major accidents are caused by human error
- ▶ Macondo:
  - Results of negative pressure test misinterpreted
  - Outflow from well overlooked
- ▶ Piper Alpha:
  - Failure to record removal of relief valve
  - Failure to recognize gas alarm associated with putting pump in service
- ▶ P-36:
  - Opened valve to tank while vent blocked
  - Left water tight doors open after work completed

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# Accomplishing a Culture of Safety

- ▶ From an organizational perspective there must be:
  - **Mechanisms** Establishing Structure and Control - specify what is needed and check that it is being done
  - **Actions** Establishing Safety Norms - encourage the application of Safety Culture traits
- ▶ From an individual perspective there must be:
  - **Mechanisms** Establishing Competency – knowledge of the structure, control and norms, and ability to perform
  - **Actions** Establishing Motivation - showing that individuals actually act and are rewarded in accordance with behavioral norms

# Safety Management Systems Are Essential

- ▶ Need to manage safety as we do any other activity
- ▶ API RP 75 Elements:
  - Purpose, Objectives and Commitment
  - Safety Information
  - Hazards Identification and Analysis
  - Operating Procedures
  - Safe Work Practices and Job Safety Analysis
  - Emergency Response and Control
  - Training
  - Management of Change
  - Quality Assurance and Mechanical Integrity
  - Incident Investigation
  - Audits and Follow-up

# Does Implementing a Safety Management System Accomplish a Safety Culture?

- ▶ A properly functioning SMS addresses the **“mechanism”** elements necessary to create a culture of safety
  - Organization – a structure and system of controls
  - Individual – training and competency
- ▶ SMS does not address the **“action”** elements
  - Organization – actions establishing behavioral norms
  - Individual – actions proving motivation
- ▶ SMS is a “necessary” but not “sufficient” element in creating a culture of safety
- ▶ Just having a SMS does not assure an adequate culture of safety

# Setting Company Behavioral Norms and Encouraging Individual Motivation

- ▶ The job of the leadership of the company
  - Not just Board, CEO, Asset Manager, etc.
  - Leadership is every supervisor
- ▶ Does not happen by:
  - Statements from the CEO and Human Resources
  - Postings in company internal and external communications
  - Punishing or rewarding individuals for KPIs or INCs
  - Safety minutes prior to meetings
- ▶ Does happen by:
  - Thousands of individual actions by leadership at all levels

# Examples of Setting Norms- Both Good and Bad Examples

- ▶ **Asset Manager Meets Profitability Targets**
  - Cuts maintenance budget, leak develops leading to corporate fines
  - Corporate response- Manager rewarded for meeting targets no personal consequence. Fines blamed on “over-zealous” regulator
- ▶ **Corporation Meets Established Safety KPIs**
  - Major accident occurs with loss of life and major environmental impact
  - Corporate response- Directors rewarded with bonuses for meeting KPIs
- ▶ **Foreman Shuts In Gas Plant**
  - Misunderstood indications, no need to shut in
  - Corporate response- Manager personally thanks foreman and protects production target

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# Setting Safety KPIs

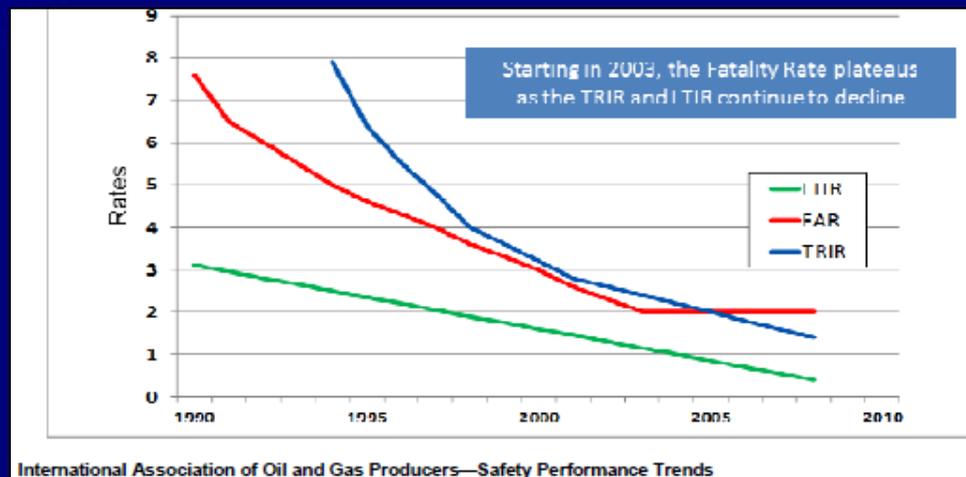
- ▶ Heinrich's Theory of Accident Prevention(1931):
  - Safety in industry is depicted as a triangle
  - Direct relationship between low consequence incidents (e.g. LTI, doctor cases, small spills) and fatalities
  - Reducing low consequence incidents reduces the number of fatalities
  - Addressing the root cause of low consequence incidents will reduce fatalities



# Are LTIs, Doctor Cases, Spills, etc. good predictors of major events?

## ► Industry data shows this may be true for certain types of accidents but not for others:

- Although KPIs for low consequence incidents have declined in recent years, fatality rates have more or less stabilized
- There is no correlation between MMS Safety Awards and future fatality rates or very, very rare/very high consequence events
- Safety milestone celebration on rig the day before Macondo blowout

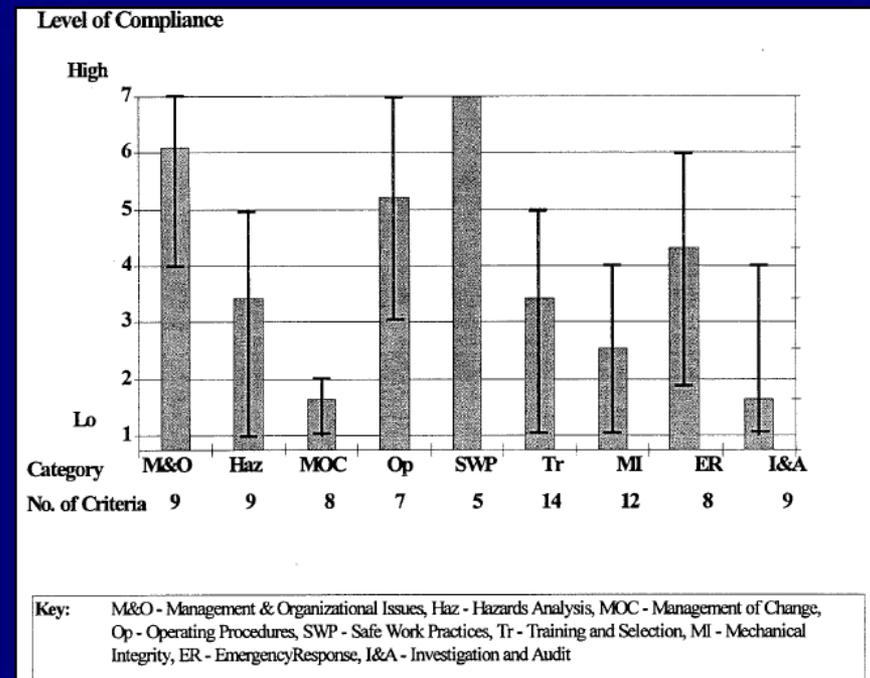


# Assessing the Mechanism Aspects of a Safety Culture (Procedures, Training, Competencies)

- ▶ Requires assessing the SMS
  - Does it exist on paper
  - Does it cover all required elements
  - Does it cover the elements in sufficient detail
  - Is there proper documentation
- ▶ Possible with a pass-fail system
- ▶ A pass-fail assessment of SMS compliance assesses the mechanisms aspects but not the action aspects (norms and motivation) necessary for a culture of safety

# Assessing the Action Aspects(Norms and Motivations)

- ▶ Do the norms and motivations actually exist
- ▶ Requires onsite observations, knowledgeable evaluators and subjective judgment
  - It cannot be pass-fail
  - There will always be room for improvement
- ▶ California State Lands Commission audit process
  - Interviewers utilize a set of questions in 9 areas
  - Qualitative score and review with top management



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# Role of the Operator

- ▶ Establish cultural norms and promote behaviors
  - SPE Technical Section on Human Factors, Summit Paper, “The Human Factor, Process Safety and Culture”, 2012
- ▶ Independent internal audits to assess where improvements can be made:
  - Risk based
  - Trained and certified auditors
  - Team with required expertise and knowledge of operations
  - Management engagement with closeout
- ▶ An audit which does not find something which can be improved concerning action aspects is not a good audit

# Role of Regulator- Objectives

- ▶ Help industry move from a “compliance attitude” toward a culture of safety
  - Utilize a pass-fail compliance and punishment mode for inspection of specific regulations (e.g. set pressures of safety devices, timing and results of specified tests)
  - Utilize a more collaborative approach in auditing SMS to assess the level of safety culture and encourage improvements
  
- ▶ Issuing punishment for insufficient documentation leads to attitude of “compliance equals safety” and does NOT influence behavior

# Transportation Research Board Report Recommended an Holistic Approach

## ▶ Inspections:

- Necessary to establish a presence
- INCs for those items which lend themselves to pass-fail
- Observations on how SEMS is being utilized

## ▶ Audits:

- Require and review operator's SMS audit plans
  - Qualifications of teams
  - Quality of audit
  - Close out reports
- Perform Regulator initiated audits

## ▶ Whistleblower System

## ▶ Disseminate information

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# Conclusions

- ▶ Lord Cullen: “The operating staff had no commitment to working to the written procedure; and ... the procedure was knowingly and flagrantly disregarded”.
- ▶ If we are going to make a step change in safety it is NOT through increased documentation, testing and punishment
- ▶ Both the Operator and Regulator have a role to play in making this happen.
- ▶ A change in safety requires a change in attitudes and actions on the part of both management and worker

# References

- ▶ National Academy of Engineering and National Research Council, “Macondo Well Deepwater Horizon Blowout”, 2012:
  - Need for Safety Culture: Recommendation 5.5
- ▶ “National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, Report to the President”, 2011:
  - Need for Safety Culture: Chapter 8
- ▶ Transportation Research Board of the National Academies, Report 309, “Evaluating the Effectiveness of Offshore Safety and Environmental Management Systems”, 2012
  - Definition of Safety Culture and Role of SEMS: Chapter 2
  - Role of BSEE: Chapter 5
- ▶ SPE 156847, “Stepping Out of the Triangle and Into the Field”, 2012
  - Limitations of Heinrich Triangle
- ▶ SPE Technical Section on Human Factors, Summit Paper, “The Human Factor, Process Safety and Culture”, 2012
  - Establishing a Culture of Safety

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