

Reducing Accidents in the Oil and Gas Industry

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Background

- Practicing and teaching system safety engineering for 30 years.
- Own a 20 year-old company doing safety engineering (Safeware)
- Experience in almost all industries
 - Aerospace (aviation and space exploration)
 - Defense
 - Transportation (automobiles, trains, air traffic control)
 - Oil and Gas, Chemicals
 - Nuclear Power
 - ...
- Member of the Baker Panel on the BP Texas City oil refinery explosion



Common Factors in Major Accidents

- Flaws in safety culture
 - Culture is the shared values and norms on which decisions are based
 - “Culture of Denial”
 - Our industry is just more risky
 - Accidents are inevitable
 - “Stepping off a curb and being hit by a car”
 - Unrealistic risk assessments
 - Only hear good news, arguments that safety is improving
 - “Compliance Culture”
 - Impact of moratorium?



Common Factors in Major Accidents

- Lack of real commitment to safety by leaders
 - Think accidents are the price of production
 - Don't see long term impacts of accidents on the bottom line, that safety pays
 - Most important factor in distinguishing safe companies from unsafe ones.
 - More than mere sloganeering is required



Common Factors in Major Accidents

- Confusion between occupational safety and system safety
 - Using “days off from work” as a measure of system safety
 - Managing to the wrong feedback
- Inadequate hazard analysis and design for safety
 - Focus on recovery after adverse events
- Flawed communication and problem reporting systems
- Management of change procedures not followed



Common Factors in Major Accidents

- Focus on changing humans rather than changing the system in which humans work
- Inadequate causal analysis of incidents/accidents
 - Focus on operator error or technical failures
 - Ignore systemic and management factors
 - Leads to a sophisticated “whack a mole” game
 - Fix symptoms but not process that led to those symptoms
 - In continual fire-fighting mode
 - Having the same accident over and over

One Additional Misconception

“High-consequence, low-~~probability~~” accidents
frequency

- Major losses occur because operating under conditions of high risk
 - Not a matter of “if” but only “when”
- Complex systems migrate toward states of high risk
- Accidents take a while to happen, so readjust our estimates of likelihood down over time although risk probably increasing.

A Systems Approach to Safety

Nancy Leveson, *Engineering a Safer World*: MIT Press,
2010 (?)

Download draft from:

<http://sunnyday.mit.edu/safer-world>

