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WHAT IS THE CSB?

- An *independent* U.S. federal agency
  - investigating chemical accidents
  - promoting prevention – public knowledge

- Authorized by Congress in 1990

- Five Board Members; approx 45 staff

- Modeled after NTSB

- Intent of CSB investigations are to get to root cause(s) and make recommendations toward prevention

- Not regulatory; no enforcement authority

CSB Investigation Approach

- Formal analysis to identify underlying technical, human factor, management system, organizational and regulatory causes of the incident.
  - Beyond immediate technical events and individual actions
- Analysis of Safety Systems
  - Not just how they are set up but how the systems work in real life (interviewing employees at all levels within organization)
  - Why conditions or decisions leading to accident were seen as normal, rational, or acceptable prior to the accident

Process Safety - Personal Safety: Two distinct safety disciplines

	Process Safety	Personal Safety
Scope	Complex technical and organizational systems	Individual injuries
Prevention	Management systems: design, mechanical integrity, hazard evaluation, MOC	Procedures, training, PPE
Risk	Incidents with catastrophic potential (injuries, fatalities, environ, property)	Slips, trip, falls, etc. (injuries, fatalities)
Primary actors	Senior executives, engineers, managers, operations personnel	Front line workers, supervisors
Safety Indicators: Leading and Lagging Examples	HC releases, inspection frequency, PSM action item closure, repair backlog	Recordable injury rate, days away from work, timely refresher training, # of behavioral observations

BP Texas City

- **March 23, 2005**

- **Blowdown drum**

- **Liquid hydrocarbon**

- **Vapor cloud explosion**

- **15 deaths/180 injuries**

- **Baker Panel**

BP Texas City
Key Organizational Findings

- Personnel checked off safety procedures as done when incomplete

- An absence of reporting of abnormal situations for fear of blame, reprisals

- No emphasis on learning from mistakes to prevent worse incidents

- Failure to respond to multiple internal surveys revealing deep problems

Baker panel findings

- BP had not provided effective process safety leadership
- BP had not established an open trusting relationship between management and the workplace
- Lack of a unifying process safety culture
- Personal Safety emphasis; not process safety
  - Reliance on low LTIR gave misleading risk indicator
- Cost cutting pressures seriously degraded infrastructure
  - Mgmt failed to assess impact of cost and staff reductions on safety

Safety Culture Survey - Attributes

- the degree to which the **workforce feels "empowered"** as to process safety

- the extent to which the workforce feels free to **report safety-related incidents**

- the **process safety awareness**, knowledge, and competency of the workforce;

- relationships and **trust** between different workforce / management and contractors

- whether **deviations** from policies and procedures are tolerated;

- the extent of **information flow** at all levels

- whether the workforce has a **shared belief that safety comes first**, regardless of financial, scheduling, or cost objectives; and

- the extent to which the workforce is **vigilant about process safety risks**, continuously tries to reduce them, and seeks to learn from incidents and near misses.

Percentages of Disagree/Tend to Disagree Responses to Survey Item: "I believe a culture exists at this refinery that encourages raising process safety concerns."

	Carson	Cherry Point	Texas City	Toledo	Whiting
Operators	8	1	23	30	9
Maint	15	2	23	38 (*)	9
HSE	3	4	29	16 (*)	13
Engineering	5	4	17	15	8
Ops Mgt	0	5	7	7	5
Maint Mgt	0 (*)	0 (*)	16	**	0

Percentage Disagree / Tend to disagree:
"After a process related incident, accident or near miss, management is more concerned with correcting hazards than assigning blame or issuing discipline"

Category	Carson	Cherry Point	Texas city	Toledo	Whiting
Operators	16	7	46	50	25
Maint	18	5	44	60 (*)	21
HSE	3	0	27	5 (*)	10
Engineering	5	0	15	15	0
Ops Mgt	5	0	17	5	7
Maint Mgt	4 (*)	0 (*)	24	**	9

September 2, 2014

Percentage Disagree / Tend to Disagree:
"When a process safety issue is involved, I can challenge decisions made by supervisors without fear of negative consequence"

Category	Carson	Cherry Point	Texas City	Toledo	Whiting
Operators	12	9	28	25	17
Maint	16	12	30	25 (*)	23
HSE	0	4	17	16 (*)	10
Engineering	8	4	10	19	5
Ops Mgt	2	7	9	9	5
Maint Mgt	0 (*)	6 (*)	16	**	3

Deepwater Horizon (DWH) Incident

- **April 20th, 2010**

- **11 deaths**

- **17 serious Injuries**

- **~5 million barrels of oil spilled in Gulf**

- **Tremendous Economic Impact**

Presidential Commission Report Safety Culture – Oil and Gas Industry

"Government oversight must be accompanied by **sweeping reforms** that accomplish no less than a fundamental transformation of its **safety culture**"

(page 217, emphasis added)

Presidential Commission Chief Counsel's report

- All technical errors can be traced back to management errors by companies involved
- BP did not fully appreciate all of the risks that Macondo presented
- BP did not adequately supervise the work of its contractors, who in turn did not deliver to BP all the benefits of their expertise

Presidential Commission on Decision Making

- Several key decisions variously:
  - Addressed one risk while increasing overall risk profile
  - Failed to take full advantage of shore-based expertise
  - Over-reliance on individual preferences and experience
  - Lacked guidance from established best practices

NAE/ NRC Report Findings

- "The lack of a strong safety culture resulting from deficient overall systems approach is evident in the multiple flawed decisions that led to the blowout."

- ".. Failed to appreciate or plan for the safety challenges presented by the Macondo well."

Safety Culture Model

Value	Artifact	Comment
Recognized value	Normalization of Deviance	Unified culture??
Learning Driven	Encourage Reporting	Mgt wants reports? No retaliation?
Resiliency (safety conscious)	Tolerate inadequate systems	Challenge : Low probability / high consequence
Accountability	Retain safe workers	Safe workers vs. safe system
Integrated in all activities	Work pressures	When convenient or even under pressure
Leadership Clear	Mgt commitment to safety	Top down and bottom up leadership

Cautions / Challenges

- "the popularity of the concept has been counterproductive and there is a danger of it becoming meaningless" (Fleming, 'Regulator's Guide to Safety Culture and Leadership')

- Overemphasis on the sharp end (front line worker) rather than the blunt end (organizational / management)

- Risk Tolerance
  - How is it defined and who defines it

- Safety culture study / change must consider inequalities of power and authority

- Safety culture is not simply a "moral commitment to safe behavior"

What Safety Culture *shouldn't* be

- The sum of employee questionnaire responses
- Only concerned with employee safety behavior or behavior based safety programs
- Easy to change
- An excuse for doing nothing
- An alternative to sound engineering controls and practices
  - Adopted from Fleming "Regulator's Guide to Safety Culture and Leadership"

Challenges going forward

- Personal Safety vs. Process Safety and safety culture

- Impact of Regulatory Oversight

- Safety culture must be part of organizational culture – not add on

- Measurement of safety culture

- How do you fix a 'bad' safety culture?

How safety culture 'problems' are 'fixed'

" Although invocation of safety culture seems to recognize and acknowledge systemic processes and effects, it is often conceptualized to be measureable and malleable in terms of the attitudes and behaviors of individual actors, often the lowest-level actors, with least authority, in the organizational hierarchy."

(Silbey 2009)

Leadership and Safety Culture

- Measuring Safety – absence of failure ≠ effective systems
- Resilience – recognizing and staying within the boundaries of safety
- Being aware of subtle pressures that resource limitations and competition have on process safety
- If Management doesn't want to hear, people stop talking
- Complacency   - doing it this way for years and never had a problem

Contact the CSB

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