





CSB Investigations and Safety Culture

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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
 - Focus is on improving safety NOT assigning blame
- Addressing the immediate cause **ONLY** prevents that exact accident from occurring again.



Investigative Approach

- 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
- More emphasis on Organizational and Social Causes
 - Safety culture
 - Organizational Structure
 - Cost Pressures
 - Regulatory Gaps and ineffective enforcement
 - Performance Agreements or bonus structure



Myths about Errors

- No events = no human error problems.
- Training will solve human problems.
- Significance determines culpability.
- Experience means error-free performance.
- Errors are the cause of accidents.
- Errors are bad.



'person' vs. 'system' view of error

- Person Centered View
- Focus on the individual, excluding other factors
- Individual responsibility and blame -careless, at fault, 'bad'
- Solution: change behavior / remove the individual

- System View
- Focus on factors that influence errors
- Human beings are fallible, errors to be expected
- Solution: change system / conditions of work

BP Texas City

- March 23, 2005
- Blowdown drum
- Liquid hydrocarbon
- Vapor cloud explosion
- 15 deaths/180 injuries
- Baker Panel





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



Lessons Learned (?) from BP Texas City

Key Organizational Findings

- Personnel checked off safety procedures as done when incomplete (**Reluctance to Simplify**)
- An absence of reporting of abnormal situations for fear of blame, reprisals (**sensitivity to operations**)
- No emphasis on learning from mistakes to prevent worse incidents (**Preoccupation with failure**)
- Failure to respond to multiple internal surveys revealing deep problems (**Preoccupation with failure**)



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



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**





Personal vs. major hazard safety

- BP and Transocean primarily measure safety performance using worker injury data
- BP executives on the rig to mark safety record
- Safety bonuses and awards are largely based on injury data

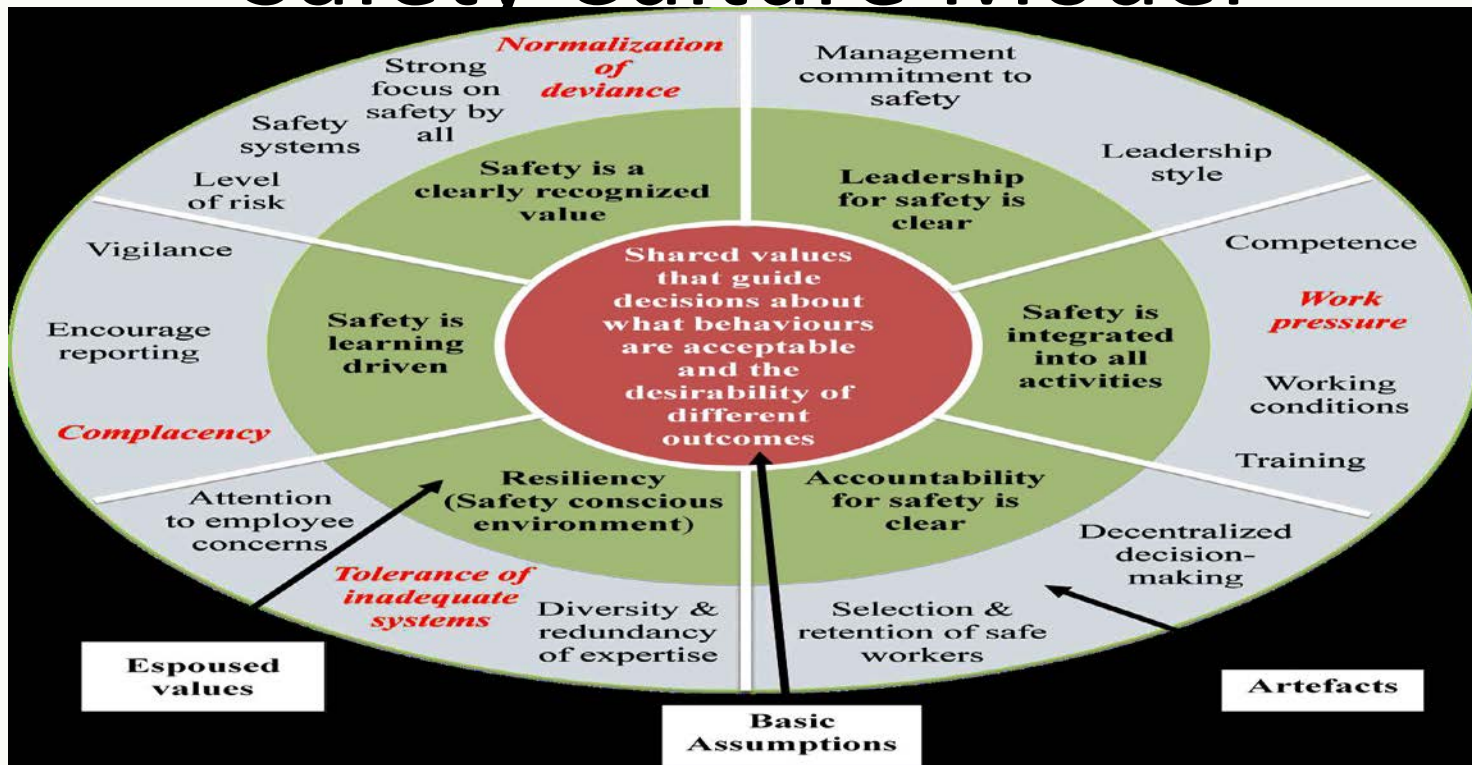


Safety Culture

- Big risk for big reward
 - Commercial risk vs. safety
- Plan for worst
 - Considered 'low' safety risk; environmental mitigation focused on spill vs. stopping a well flow
- Focus on personal safety
- Pay attention to warning signs
 - Prior incidents
 - Prior audit reports
- Question data and pay attention to anomalies
- Raise concerns ; stop work authority
- Complacency – no 'big' accidents so start to not be concerned with little things
- Normalization of Deviance (acceptance of deviance)



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



Safety Culture and Safety Outcomes

- Study Conducted by Mark Fleming of Saint Mary's University, Canada
- Reviewed 17 offshore disasters to identify cultural causal factors
 - 14 contained cultural causes
 - Tolerance of inadequate systems or resources (10)
 - Normalization of deviance (9)
 - Complacency (8)
 - Work pressure / cost (4)

Chemical Facility Incidents

DuPont Yerkes
New York

Hot Work Incident

Found inadequate
PHA



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Challenges going forward

- Personal Safety vs. Process Safety and safety culture
- Impact of Regulatory Oversight
- Need to integrate 'safety' into production; not an extra layer -
- Measurement of safety culture
- Issue of multiple cultures
- Delta of what is thought to be happening and what is happening
- How do you fix a 'bad' safety culture?



Contact the CSB

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