57th Canadian Chemical Engineering Conference - 2007

“Chemical Process Safety after BP Texas City”

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Edmonton, Alberta
October 29, 2007
Disclaimer

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Today’s presentation

• The Chemical Safety Board
• Recent accidents/Investigations
• BP Texas City
• Process Safety Management
• Lessons learned from CSB investigations
What is the CSB?

- The CSB is an **independent** U.S. federal agency charged with investigating chemical accidents
- Authorized by United States Congress in 1990 (Clean Air Act-reauthorization)
- Modeled after the NTSB
- Professional investigation staff
- Located in Washington, DC
What does the CSB do?

- We investigate accidents in the chemical industry.
- We determine root causes
- We make recommendations

Our goal is prevention.
We Are an Open, Public Agency

Information is essential for safety. We rely on the media to inform the public.

- Regular public statements and interviews
- Press conferences
- Public meetings
- Investigation Reports and Digests
- Safety Bulletins
- Videos
- Website www.csb.gov
How is the CSB different from EPA, OSHA and NRC?

- The CSB independently investigates accidents and makes its findings public
- We are not an enforcement/regulatory agency
- We do not assess fines or penalties
- Can Issue subpoenas
Investigation Criteria

- Deaths or injuries onsite or offsite
- Property losses
- Offsite impact
- Public/Environmental
- Incidents with broad national significance
- Resources available
Types of Accidents That We Investigate

- Accidents in chemical plants, oil refineries and facilities using chemicals
- Toxic gas releases
- Explosions
- Other fatalities e.g. confined space
In a typical year

- Incidents evaluated by the CSB – 650
- CSB Investigations – 8 to 12
Types of facilities involved in our investigations

- Large chemical companies 7
- Small chemical companies 20
- Large oil and gas operations 4
- Small oil and gas operations 7
- General industry 9
- General studies of chemical hazards 5
Current Investigations

5 Oct 2006
EQ Hazardous Waste Plant
Apex, NC
Explosion & Fire
16,000 residents evacuated
Current Investigations

22 Nov 2006
CAI/Arnel Chemical Plant
Danvers, MA
Explosion
Property Damage
Current Investigations

30 Jan 2007
Little General Store
Ghent, WV
4 Killed – 5 seriously injured
Propane storage tank
Current Investigations

16 February, 2007
Valero Refinery
Sunray, TX
Propane Fire
Leak in Deasphalting Unit
Three workers seriously burned
Current Investigations

17 July 2007
Barton Solvents
Valley Center, KS
~ Six Thousand
Evacuated
Extensive damage to Facility
Current Investigations

25 July, 2007
Southwest Industrial Gas
Dallas, TX
Fire and Explosion
Three workers injured, two critically
Acetylene cylinders launched into community
October 3, 2007
Epoxy Coating Operation
Enclosed Space Fire
Five Deaths from Smoke Inhalation
Other significant accidents of varying types we’ve investigated include........
Synthron  (Photo: Todd Huffman  The Morganton News Herald)
Chlorine release – Festus, Missouri

- Small chlorine repackaging facility
- Two chlorine railcars on site
- Semi-rural location
- Trailer park over the fence line
- Volunteer FD and Hazmat team
What happened?

- Hose ruptured because of corrosion
- Emergency shutdown valves on railcar failed to operate
- Facility emergency response equipment immediately inundated
And of Course the Big One...
British Petroleum
Texas City, TX
March 23, 2005
INCIDENT SUMMARY – TEXAS CITY

- During startup
- Raffinate tower
  - overfilled
  - Over- pressurized
- Blow- down drum filled
- Vapor cloud formed
- Trailers too close
INCIDENT SUMMARY – TEXAS CITY

- Flammable vapor cloud
- Explosions
- Fire and toxic release
- 15 deaths
- 180 injuries
- Offsite property damage
CSB URGENT RECOMMENDATIONS

• August 17, 2005 (Urgent)
  – BP commission independent panel
    To assess/report safety mgmt and culture

• October 25, 2005 (Urgent)
  – API new criteria for safe trailer placement
  – API & NPRA issue safety alerts to
    Ensure trailer placement away from hazards

• October 31, 2006
  – API & OSHA – blowdown drum & stack
URGENT RECOMMENDATION (Aug 05)

The CSB issued an urgent recommendation that BP form an independent panel to study their safety culture.

Known as the Baker Panel
INDEPENDENT BAKER PANEL

- Prompted by CSB recommendation
- James A Baker III
- Released January 2007
- Focus on Process Safety
- Ten recommendations
BAKER PANEL RECOMMENDATIONS

1. Process Safety Leadership
2. Integrated & Comprehensive PSM
3. Process Safety Knowledge & Expertise
4. Process Safety Culture
5. Clearly Defined Expectations & Accountability for PS
6. Support for Line Management
7. Leading & Lagging Performance Indicators for PS
8. Process Safety Auditing
9. Board Monitoring
10. Industry Leader
“BP has not provided effective process safety leadership. A safety culture is forever. Complacency is a great danger. I am not so naive to believe these problems are confined to BP. BP tended to have a short-term focus.”
A Primary Lesson Learned from CSB Investigations

• A series of seemingly small events can conspire to make a huge event

• For example....
CSB Investigations Reveal Gaps:

*Hazard Awareness*

- Process Hazard Analysis incomplete
- Easily accessed information not used
- Operating personnel or technical experts not included
- Limited or no review of past incidents
CSB Investigations Reveal Gaps:

**Written Procedures**

- Many not written or are ad hoc
- Often irrelevant, outdated, unusable and unused
- Procedures not enforced
- No procedures for emergency or upset operations
CSB Investigations Reveal Gaps: 
**Training**

- Little formal structured or documented training
- Not reinforced
- Little training in abnormal situations mgmt
CSB Investigations Reveal Gaps: 
**Maintenance/MOC**

- Critical equipment not working or neglected
- Maintenance requests unfulfilled
- MOC Procedures not followed / don’t exist
- Poor or no maintenance of safety systems
- Supervisory oversight deteriorated or none
- Safety start-up inspections and permits bypassed by supervision, contractors and employees
CSB Investigations Reveal Gaps:

Emergency Preparedness

• Workers unaware of hazards or emergency plans to address hazards

• Emergency response organizations not prepared for site specific event of any size

• Public notification poor or nonexistent

• Public not trained in what to do
CSB Investigations Reveal Gaps:

**Audits**

- Superficial / None
- Little follow-up
- Don’t recognize path to impending disaster or change anything
The Keys to a Successful Chemical (or other) Process Safety Program

- Senior management knowledge and commitment
- Process safety knowledge
- Process hazard analysis
- Hire and train the right people
- Pre-startup safety review
- Mechanical integrity
- Safe work permits
- Management of change
- Incident investigation
- Emergency planning and response
- Community outreach
So what is the cautionary tale that should be heeded by all industry or facilities engaged in dangerous processes or processing/handling/storing hazardous materials?
Be Vigilant!
• Questions?
• Comments?
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