

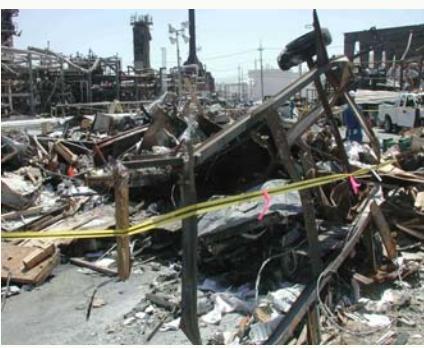
U.S. Chemical Safety and Hazard Investigation Board



July 2012 Public Hearing
**Using Performance Indicators
to Drive Improvement –
CSB Overview**
July 23, 2012



Why Study Indicators?



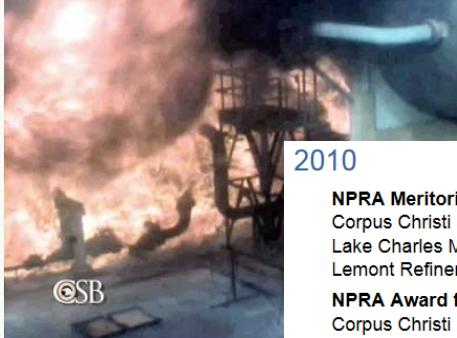
Current Investigations		Completed Investigations	
INVESTIGATION #	SEARCH	Employee Participation	July Public Hearing
ACCIDENT TYPE			
GSI			
SIGN UP FOR OUR NEWS RELEASES			
Enter Email Address			
<p>Dow Chemical Enterprise, Inc., Polar Fireworks Disassembly Explosive and Fire On April 8, an explosion occurred at a fireworks storage facility near Wenzhou, China. According to media reports, the incident occurred in a breaker used to store confiscated fireworks at Chongming Island.</p> <p>Certis Industries Fire and Explosion Two workers were killed after an explosion as a result of a bus and explosion that occurred at the Certis Industries facility located in Louisville, KY. The facility produces calcium carbide.</p> <p>AL Solutions Fatal Dust Explosion An explosion ignited through the New Cumberland, AL, Solutions titanium plant in West Virginia on December 1, 2010. Sixty-eight firemen were injured. The workers were processing titanium powder.</p> <p>Milford Refrigerated Services America Relocation The CSB is investigating an unlicensed ammonia release at the Milford Refrigerated Services, a ammonia and brine tank farm in Tishomingo, Alabama. 17 tons south of mobile which were more than 100 feet away.</p> <p>Hornbeam Holding Company Fatal Explosion and Fire</p>			

2

www.csb.gov

 U.S. Chemical Safety and Hazard Investigation Board

CSB Investigations and Indicators CITGO



2010

NPRA Meritorious Award for Safety Performance:
 Corpus Christi Refinery - 0.5 TRIR
 Lake Charles Manufacturing Complex - 0.3 TRIR
 Lemont Refinery - 0.5 TRIR

NPRA Award for Safety Achievement:
 Corpus Christi Refinery – 1.8 MM employee hours
 Corpus Christi Refinery – 1 year
 Lake Charles Manufacturing Complex - 1.0 MM employee hours
 Lemont Refinery - 1.2 MM employee hours
 Lemont Refinery - 3 years

3

www.csb.gov

 U.S. Chemical Safety and Hazard Investigation Board

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	Slips, trip, falls, etc.
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, well kick response, # of kicks	Recordable injury rate, days away from work, timely refresher training, # of behavioral observations

www.csb.gov



OSHA and Safety Performance



- OSHA primarily measures safety performance using personal injury rates, including in high hazard facilities
- OSHA's premier awards program, VPP, primarily based on personal injury rates
- VPP facilities continue to have potential catastrophic incidents and hazards
- OSHA's inspection priorities mostly based on personal injury rates

www.csb.gov



What CSB Investigations Reveal About Reliance on Personal Injury Rates



Valero McKee Refinery propane fire – Sunray, Texas - 2007



Bayer CropScience pesticide waste tank explosion – Institute, West Virginia - 2008

 U.S. Chemical Safety and Hazard Investigation Board 

What CSB Investigations Reveal About Reliance on Personal Injury Rates



Tesoro Anacortes Refinery had been scheduled to receive a NPRA safety award a few weeks after a 2010 fire and explosion that resulted in seven deaths

www.csb.gov

 U.S. Chemical Safety and Hazard Investigation Board 

CSB Study of Performance Indicators

- CSB investigations typically examine process safety risks and deficiencies tied to incident events
- Incident investigations usually identify precursor events that led to the incident; similarly, indicators reveal safety gaps before an incident occurs
- One goal of the use of indicators is to drive continuous safety improvement

8
www.csb.gov



Leading and Lagging Indicators

- Lagging indicators provide important data about process safety failures but allow for changes only after something has gone wrong
- Emphasizing leading indicators can have a more preventative impact by identifying safety system deficiencies before potentially serious outcomes occur

9

www.csb.gov

Lessons from Grangemouth

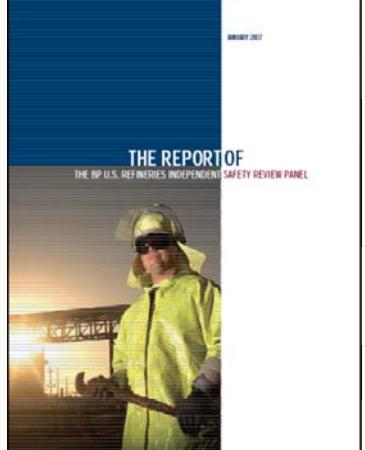
www.csb.gov

 U.S. Chemical Safety and Hazard Investigation Board



Lessons from Texas City

- CSB recommended formation of independent panel – Baker Panel
- CSB and Baker Panel reports both noted:
 - Lack of focus on process safety
 - Inadequate performance measurement indicators



11
www.csb.gov

 U.S. Chemical Safety and Hazard Investigation Board

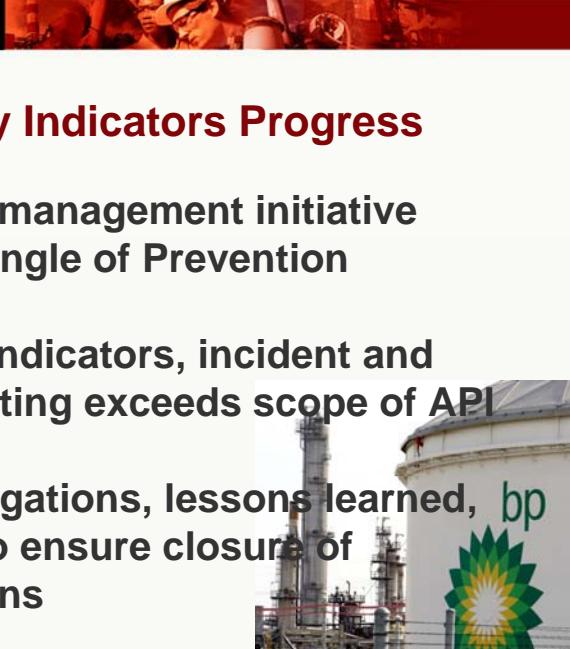


Lessons Learned for Industry

- Focus on personal safety overshadowed process safety
- BP incentives program did not include incentives to improve process safety measures
- A good personal safety record does not equal a good process safety record

12
www.csb.gov

 U.S. Chemical Safety and Hazard Investigation Board



BP Texas City Indicators Progress

- Joint labor and management initiative
- Using USW Triangle of Prevention program
- Use of leading indicators, incident and near miss reporting exceeds scope of API 754
- Includes investigations, lessons learned, and follow-up to ensure closure of recommendations

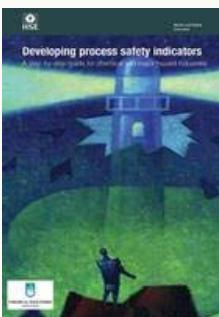
13

www.csb.gov

 U.S. Chemical Safety and Hazard Investigation Board



History of Major Hazard Indicators



- UK regulators' strategic aim: by 2015, “all major hazard establishments and duty holders will measure their performance on the control of major hazard risks by way of key leading and lagging performance indicators.”

www.csb.gov

U.S. Chemical Safety and Hazard Investigation Board

History of Major Hazard Indicators

Process Safety Performance Indicators for the Refining and Petrochemical Industries

Process Safety Leading and Lagging Metrics
... You don't improve what you don't measure
(July Release - Oct. 20, 2010)

ANSI/API RECOMMENDED PRACTICE 754
FIRST EDITION, APRIL 2010

GUIDANCE ON DEVELOPING SAFETY PERFORMANCE INDICATORS
related to Chemical Accident Prevention, Preparedness and Response
FOR INDUSTRY
Second edition, 2008

OECD IOMC

CCPS An AIChE Industry Technology Alliance

www.csb.gov

U.S. Chemical Safety and Hazard Investigation Board

CSB Indicators Lessons Learned

- Indicators must be **targeted** to reduce risks
- A concurrent goal is to measure safety culture
- Indicators must be comprehensive, considering:
 - organizational and human factors
 - process safety issues
 - technical issues

www.csb.gov



Attributes of Effective Indicators

- Compiled and analyzed collectively
- Normalized and standardized for comparison
 - Company- and industry-wide
- Statistically robust
- Not susceptible to “gaming”
- Actionable

www.csb.gov



Indicators Must Drive Improvement



- Effective indicators are precursor events – they must follow from the activity to be avoided
- Workforce and management need appropriate incentives to collect and report performance data
- Role of regulator
 - Improving accuracy
 - Making incremental improvements

www.csb.gov



Where do we go from here?



- Collected data must be incorporated into process safety management systems and used to drive performance improvement
- Regulators can use it to target inspections, audits, and investigations
- Continuous improvement: preventing major accidents