

U.S. Chemical Safety and Hazard Investigation Board






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

July 23, 2012



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Why Study Indicators?

Current Investigations

INVESTIGATION:

ACCOUNT TYPE:

CITY:

SEARCH

- Donahue Enterprises, Inc. Fecal Fertilizer Disassembly Explosion and Fire**
Investigation Report: April 20, 2012
On April 12, an explosion occurred at a fertilizer storage facility near Hialeah, Florida. According to media reports, the incident occurred in a boiler used to store carbonated fertilizer at Donahue. [Learn More](#)
- Cardale Industries Fire and Explosion**
Investigation Report: March 22, 2012
The incident arose when an electric short-circuit ignited as a result of a fire and explosion that occurred at the Cardale Industries facility located in Louisville, KY. The facility produces carbon canals. [Learn More](#)
- Alc Solutions Pallet Shelf Explosion**
Account Closed/Archived: April 19, 2012
An explosion occurred through the floor of a combined U.S. Tackles business plant in West Virginia on December 8, 2011, fatally injuring three workers. The workers were processing storage products. [Learn More](#)
- Midwest Refrigerated Services Ammonia Release**
Investigation Report: April 19, 2012
The CSB is investigating an ammonia ammonia release at the Midwest Refrigerated Services, a warehouse and distribution center in Theodore, Alabama. 17 tons worth of ammonia were more than 120. [Learn More](#)
- Homebased Hobby Company Field Explosion and Fire**
Investigation Report: April 19, 2012

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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

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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

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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

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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

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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

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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

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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

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Lessons from Grangemouth

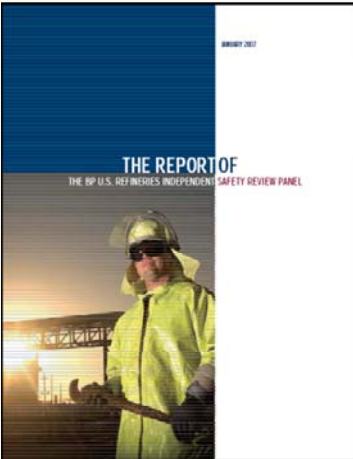


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Lessons from Texas City

- 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



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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


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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



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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."

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History of Major Hazard Indicators



Process Safety Performance Indicators for the Refining and Petrochemical Industries


ANSI/API RECOMMENDED PRACTICE 754
FIRST EDITION, APRIL 2010

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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



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Attributes of Effective Indicators

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

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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

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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