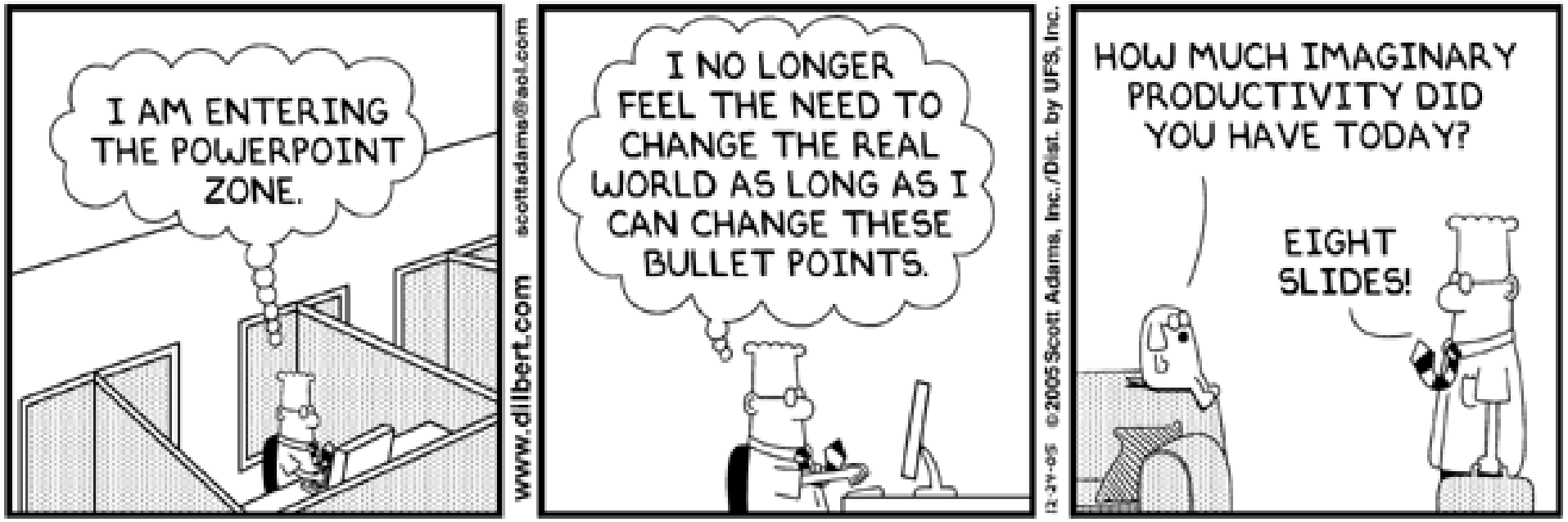
Recent Developments on Process Safety in California

Bill Hoyle
CSB Senior Investigator; retired
April 12, 2016

Before we begin



Presentation overview

- Review of Chevron and ExxonMobil incidents
- Community organizing and 2013 report
- Governor's Refinery Task Force
- CSB investigations
- RAND Cost Benefit Study
- California proposed PSM regulation

Refinery safety: a widespread problem

- frequency and severity of refinery PSM incidents has not gone down
- refineries are less than 1 percent of PSM covered facilities yet are the subject of nearly 30 percent of CSB investigations
- PSM standard has not been updated since issued it was 24 years ago— it is badly outdated

BP Texas City - 3/23/2005

BP Texas City

BP Texas City disaster

- 15 killed, 180 injured
- key findings included:
  - performance evaluations and bonuses mostly based on meeting cost cutting goals
  - check the box approach to operations
  - near miss reports not investigated
  - personal safety focus detracted from importance of process safety

National Academy of Sciences activity

- examination of safety culture in the offshore oil and gas industry— has lessons for the refinery sector
- two-year study; diverse committee members
- final report due in 2016
- report will include recommendations to industry and government agencies

Safety hearings

California oil refinery regulation changes

- 2012 Chevron Richmond refinery fire caused a reported 15,000 people to seek medical attention; 19 employees caught in the explosion barely escaped injury or death
- Chevron paid $2 million in fines and restitution; pleaded no contest to six misdemeanor counts and was put on a three-and-a-half year probation

Refinery Safety Collaborative

Refinery Safety Collaborative formed and consisted of the United Steel Workers (USW) Local 5 and USW International, Communities for a Better Environment, the Asian Pacific Environmental Network, the Natural Resources Defense Council, and the California and national offices of the BlueGreen Alliance.

The coalition, which formed under the aegis of the Labor Occupational Health Program at UC Berkeley.

A Social Movement Emerged

Streets Were Blocked

A Refinery Action Collaborative was organized, Nov 15, 2012 with USW Local 5, USW International, CBE, APEN, BlueGreen Alliance, NRDC,

Refinery Safety in California: Labor, Community and Fire Agency Views

SUMMARY REPORT

March 27, 2013

Revised June 4, 2013

Michael P. Wilson, PhD, MPH
University of California, Berkeley

Prepared for:
Office of Governor Jerry Brown
Interagency Task Force on Refinery Safety

CENTER FOR OCCUPATIONAL AND ENVIRONMENTAL HEALTH (COEH)
LABOR OCCUPATIONAL HEALTH PROGRAM

LOHP

COEH

Berkeley

Governor's Interagency Refinery Safety Working Group

- Governor Brown established the Interagency Refinery Safety Working Group following the August 2012 Chevron fire.
- Participating agencies and departments:
  - California Environmental Protection Agency (Cal/EPA); Air Resources Board (ARB); Department of Toxic Substances Control (DTSC); State Water Resources Control Board (SWRCB)
  - Labor and Workforce Development Agency (LWDA); Department of Industrial Relations (DIR) Office of the Director; Division of Occupational Safety and Health (Cal/OSHA)
  - Governor's Office of Emergency Services (OES)
  - California Energy Commission (CEC)
  - California Technology Agency (CTA)
  - Department of Finance (DOF)
  - Department of Public Health (DPH)
  - Office of the State Fire Marshal (OSFM)

California Governor's refinery task force

- Governor's task force led by CAL-OSHA and CAL-EPA issued a report and recommendations in February 2014
- draft proposed regulations published for comment; many meetings held
- I worked with CalOSHA and CalEPA for four months in early 2014
- New fees collected and PSM staff tripled

Industry support

I applaud Governor Jerry Brown's Interagency Working Group on Refinery Safety for delivering a thoughtful final report that considered perspectives from industry leaders, safety experts, and concerned citizens… we support the Working Group's efforts and are working with state agencies and inspectors to strengthen and safety protocols at refineries throughout California.

WSPA President Catherine Reheis-Boyd

RAND Corporation Report

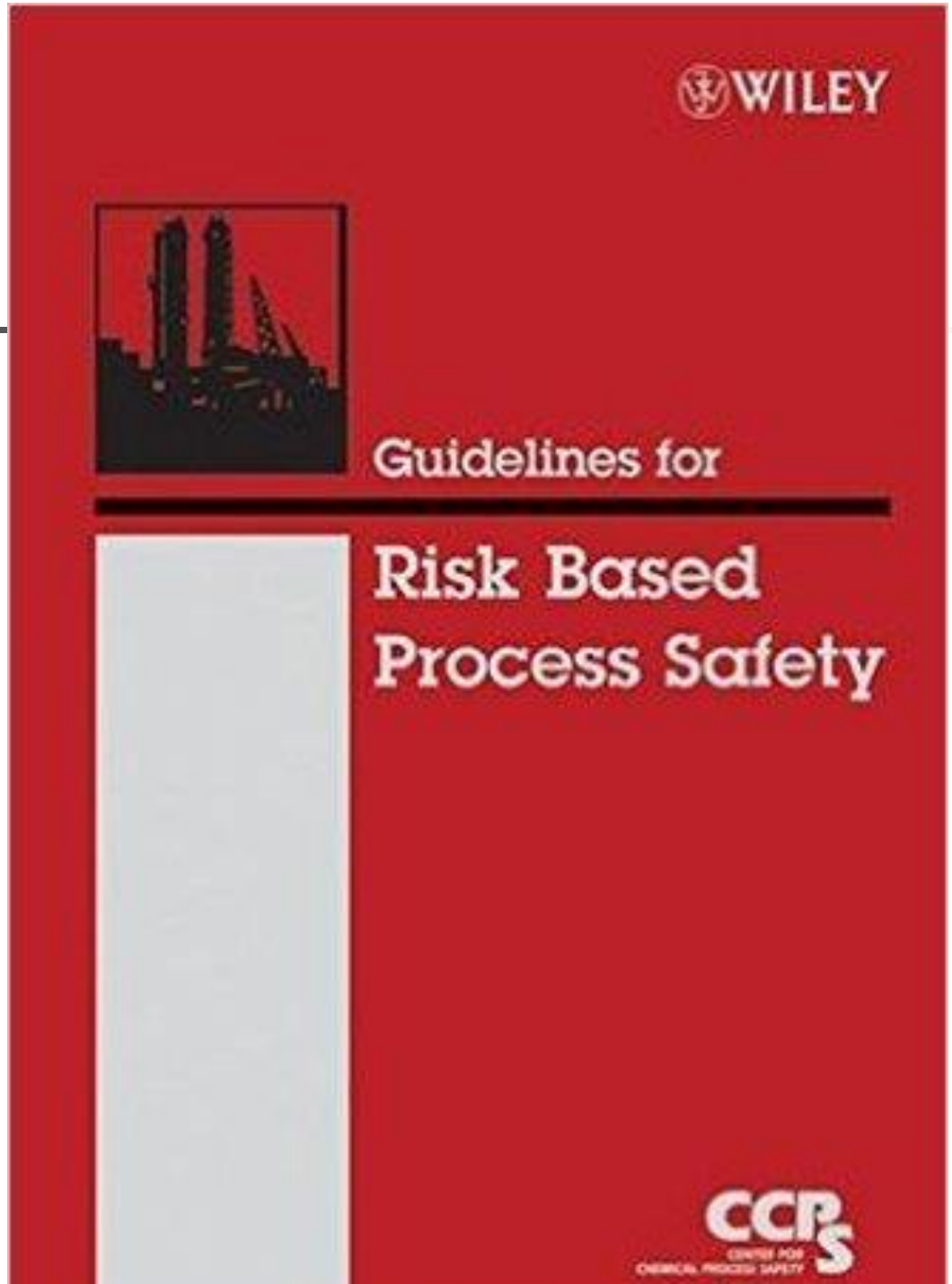
Cost–Benefit Analysis of Proposed California Oil and Gas Refinery Regulations

by Daniel Gonzales, Timothy Gulden, Aaron Strong, William Hoyle

Concluded that the proposed regulations are cost-effective; included examination of gasoline costs due to serious refinery incidents

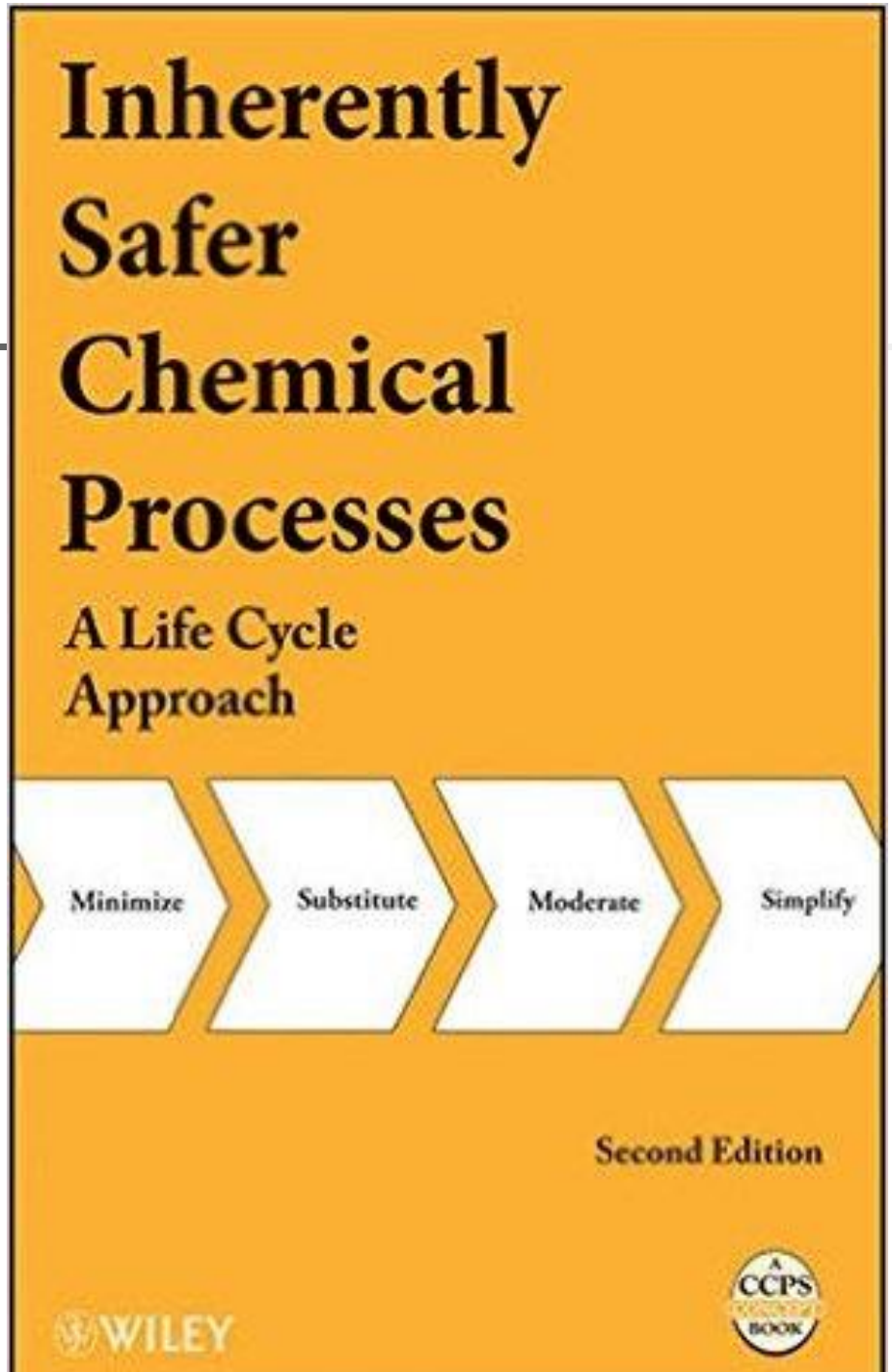
Proposed changes based on existing industry guidelines

- Primary sources for updating the regulation are CCPS publications
- What is CCPS?
- Most refiners are members of CCPS
- What are the key changes?

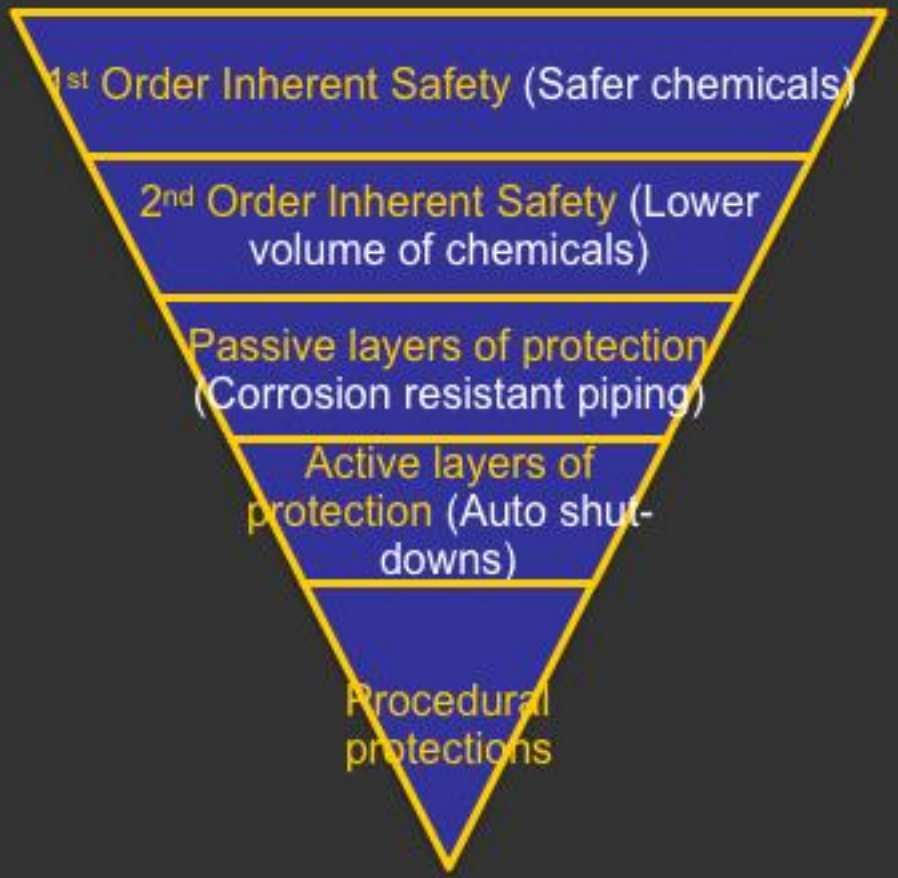

WILEY
Guidelines for
Risk Based
Process Safety
CCPS

CCPS additional process safety elements

- Process Safety Culture
- Stakeholder Outreach
- Process Knowledge Management
- Asset Integrity and Reliability
- Training and Performance Assurance
- Management of Change/Organizational Change
- Operational Readiness
- Conduct of Operations
- Measurement and Metrics
- Management Review and Continuous Improvement


Inherently
Safer
Chemical
Processes
A Life Cycle
Approach
Minimize
Substitute
Moderate
Simplify
Second Edition
WILEY
A CCPS BOOK

Industry-wide systemic problems of corrosion, aging infrastructure and management inattention require solutions based on inherent safety in the hierarchy of controls



Safeguard Protection Analysis

Perform a Safeguard Protection Analysis (SPA) to determine the effectiveness of individual and combined safeguards. Safeguards must be independent of each other. The SPA must examine the likelihood and severity of potential initiating events, including equipment failures, human errors, loss of flow, pressure, temperature or level control. It must also evaluate excess reaction and external events.

Human Factors

Establish a Human Factors program that includes analysis of human factors in the design phase of major changes and in incident investigations, PHAs, MOOCs and HCAs. Evaluate staffing levels, complexity and time needed to do tasks as well as the level of training, experience and expertise of employees. Evaluations must also include human-machine interface, physical challenges in the work environment, as well as the clarity of operating and maintenance procedures.

Hierarchy of Hazard Controls Analysis

Conduct a Hierarchy of Hazard Controls Analysis as a standalone analysis for all processes. Identify inherent safety measures from most preferred to least preferred. These include first and second order inherent safety measures as well as passive, active and procedural safeguards. Eliminate hazards to the greatest extent feasible using first order inherent safety measures.

Management of Organizational Change

Conduct a Management of Organizational Change (MOOC) assessment prior to reducing staffing or changing experience levels, alterations in shift duration, or increasing employee responsibilities. Perform a MOOC for changes affecting operations, engineering, maintenance, health and safety, and emergency response. Also included is an evaluation of the use of contractors in permanent positions. An analysis of Human Factors must be included in each MOOC.

Process Safety Culture Assessment

Implement a Process Safety Culture Assessment program that includes evaluation of the hazard reporting program and response to reports of hazards.

Also perform an evaluation to ensure that process safety is prioritized during upset or emergency conditions.

Process safety culture assessment-continued

PSCA shall evaluate process safety culture practices with regard to the following:
(A) Encouragement for reporting of process safety concerns;
(B) Ensuring that reward or incentive programs do not deter reporting by employees of process safety concerns, near misses, injuries and incidents;
(C) Ensuring that process safety is not compromised by production pressures; and,
(D) Promoting effective process safety leadership at all levels of the organization.

Damage Mechanism Review

Perform a Damage Mechanism Review (DMR) for at-risk processes. This includes examination of mechanical loading, erosion, corrosion, thermal-related failures, cracking, and embrittlement. DMRs must include an assessment of previous experience with the process, including the inspection history and a review of industry-wide experience and applicable standards, codes/practices.

Implementation of recommendations

The employer shall conduct a written interim assessment of the implementation and effectiveness of each PSCA recommendation within 3 years following the completion of a PSCA report.

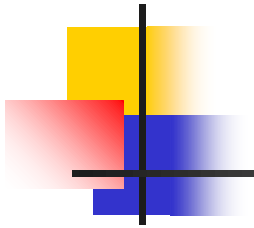
The refinery manager or designee shall serve as signatory to all process safety culture assessments, reports and corrective action plans.

Employee participation

Employee and union involvement in each element of the standard is required.
Union representatives must be chosen by the union. Procedures must address the authority to to shut down unsafe work or an unsafe process unit. A program to anonymously report hazards is required.

Conclusion

- The experience in California serves as a model for other states who seek to improve process safety.
- It is increasingly recognized that process safety must include a focus on organizational factors and safety culture.
- A company's safety reputation is largely dependent on not having a major process safety incident.



Questions?