

CE 400 / CE 500

Process Safety Management

Lecture 40

BP Texas City Review Applying Course Learnings

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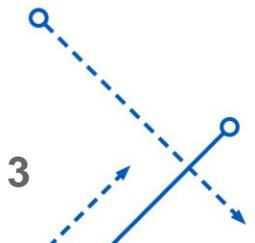
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Elements of PSM

1. Develop and maintain written safety information identifying workplace chemical and process hazards, equipment used in the processes, and technology used in the processes
2. Perform a workplace hazard assessment, including, as appropriate, identification of potential sources of accidental releases, identification of any previous release within the facility that had a potential for catastrophic consequences in the workplace, estimation of workplace effects of a range of releases, and estimation of the health and safety effects of such a range on employees
3. Consult with employees and their representatives on the development and conduct of hazard assessments and the development of chemical accident prevention plans and provide access to these and other records required under the standard
4. Establish a system to respond to the workplace hazard assessment findings, which shall address prevention, mitigation, and emergency responses
5. Review periodically the workplace hazard assessment and response system
6. Develop and implement written operating procedures for the chemical processes, including procedures for each operating phase, operating limitations, and safety and health considerations
7. Provide written safety and operating information for employees and employee training in operating procedures, by emphasizing hazards and safe practices that must be developed and made available

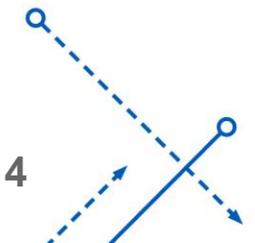
Elements of PSM

8. Ensure contractors and contract employees are provided with appropriate information and training
9. Train and educate employees and contractors in emergency response procedures in a manner as comprehensive and effective as that required by the regulation promulgated pursuant to section 126(d) of the Superfund Amendments and Reauthorization Act
10. Establish a quality assurance program to ensure that initial process-related equipment, maintenance materials, and spare parts are fabricated and installed consistent with design specifications
11. Establish maintenance systems for critical process-related equipment, including written procedures, employee training, appropriate inspections, and testing of such equipment to ensure ongoing mechanical integrity
12. Conduct pre-startup safety reviews of all newly installed or modified equipment
13. Establish and implement written procedures managing change to process chemicals, technology, equipment and facilities
14. Investigate every incident that results in or could have resulted in a major accident in the workplace, with any findings to be reviewed by operating personnel and modifications made, if appropriate



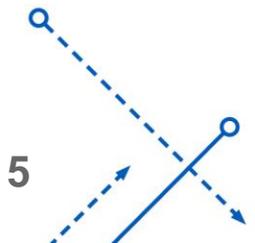
Background

- In March 2005 the British Petroleum Texas City Explosion occurred
- CSB Video: <https://www.csb.gov/bp-america-refinery-explosion/>
- As we watch the video, make notes of the various issues and we will connect them to the topics we have studied in this course



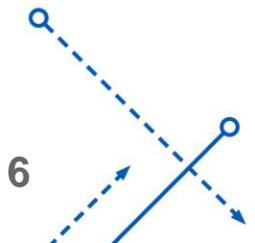
Observations

- Coming up off a shutdown
 - A lot of MOCs
 - Any start up is a higher risk period
- Facilities Siting – contractor trailers
 - Additionally: did not warn them of start up
- Level Indicator in tower
 - No redundancy
 - Inappropriate range of indication
- Deviation from written/design procedures
 - Ran level higher than was designed
 - Level outside of indicator range
 - There was no MOC for running outside of operating procedure range
- Second high level alarm failed
 - How often was it tested?
- Shift turnover communication was very brief
 - Operator left before his relief arrived
 - Supervisor arrived one hour late



Observations

- Operator working 30th day in a row of 12 hourshift
 - Human Factor - Fatigue
- Communication failure led to valve left in an incorrect position
 - Start up operating procedures inadequate?
- Supervisor left site with no one coming in to cover his shift
 - Violation of site procedures
- One control board operator running three units
 - Due to budget cuts
 - Human Factors – more work than one person could give proper attention
- Improperly calibrated level indicator said that level was at 8.4' and falling
 - Question – was it calibrated for the density of cooler liquid? (I do not know the answer.)
- Control panel configuration
 - Did not display flows into and out of tower all on one screen
 - Did not calculate total liquid in tower
 - Human Factor



Observations

- Relief system vented vapor directly to atmosphere
 - That might be okay, but you need to analyze the vapor cloud dispersion and see if it is a safe location
 - Because of the unusual chain of events it released a large plume of hot, highly volatile liquid
- There weren't appropriate emergency procedures
 - I'm not sure that anyone would have foreseen this chain of events as it involved
 - Valve in the wrong position AND high level probe failure AND the factor of the principal level detection being inadequate
- High level in blow down drum failed
- If the pickup truck had not been there, another ignition source would almost certainly have been found due to the size of the vapor cloud

