1. **PSM Preamble Review**

Review the Preamble to 29CFR 1910.119 Process Safety Management of Highly Hazardous Chemicals.

Create a word document and answer the following questions in discussion format:

1. Prior to the 1992 promulgation of 29 CFR 1910.119:
   1. What means did OSHA use to enforce safety standards in the chemical industry?

OSHA's general industry standards

* 1. What were the shortcomings of those standards in protecting workers from process safety disasters?

At the moment, neither the protection of employees from significant releases of hazardous chemicals nor particular coverage for process hazards in the chemical sector is provided by these standards.

1. What, if **any organizations** were created to **provide guidance** to the Chemical Industry on Process Safety Issues? Discuss their purpose and mission?

With the aid of a step-by-step tutorial or some instances of engineering methods, their purpose might be to emphasize and clarify the criteria for preventing or limiting the results of catastrophic releases of hazardous, reactive, flammable, or explosive compounds.

Their mission might be these listed as follows

* + 1. Being a source of information for the chemical industry's understanding of process safety
    2. Improving the management style, technical principles, and culture of process safety in the chemical industry
    3. Enhancing individual and organizational Chemical Process Safety competency
    4. Fostering collaboration within and across organizations, at all levels.
    5. Promoting process safety as a key societal value and foundation for responsible, sustainable operation.

1. Summarize comments made by at least one trade or business organization listed below who **made public comment on the proposed Process Safety Management Standard**.
   1. Labor Unions
   2. Individual Corporations
   3. Industry Associations
   4. Other Governmental Organizations

CBS (U.S. Chemical Safety and Hazard Investigation Board) claimed to OSHA’s RFI and PSM that

* Add more management system components, such as the use of leading and lagging indicators to drive process safety performance and grant employees the power to halt work, to the regulation, such as expanding its scope to include the Oil and Gas Sector and reactive chemicals, among other things.
* Requirements for Process Hazard Analysis should be updated to incorporate the documented usage of systems that are intrinsically safer, a hierarchy of controls, reviews of harm mechanisms, and adequate and sufficient protections.
* Create more detailed specifications for facility/process siting, human factors, and fatigue.
* Specify and assess revisions to RAGAGEP (Recognized and Generally Accepted Good Engineering Practice).
* Expand mechanical integrity criteria to include safety-critical equipment.

1. Discuss why OSHA chose to use Threshold Quantities of Highly Hazardous Chemicals instead of aggregate quantities.

Most participants who discussed this subject agreed that the threshold quantity should not be aggregated, despite a few individuals suggesting that the quantities of a highly hazardous chemical utilized at multiple places around the plant should all be counted toward the threshold level for coverage. They both agreed that highly dangerous substances scattered across multiple processes at levels below the threshold would not provide the same risk of disaster as the threshold quantity in a single operation.

1. Why didn’t OSHA simply use the EPA “Extremely Hazardous Substance List” from the SARA title III law instead of creating their own “Highly Hazardous Chemical List” for PSM?

Since most of the items on the "Extremely Hazardous Substance List" are included on many lists. The same compounds are not included on all lists in the same quantities. Based on an evaluation of these sources, OSHA has made an effort to include those dangerous and reactive compounds that it believes are most crucial in potentially evolving into a catastrophic occurrence. OSHA has also created a list of practical threshold numbers that, when used in a process, would result in coverage of the standard.

1. Identify and describe at least one change OSHA made to the Highly Hazardous Chemical List based on public comments.

* The threshold quantities for allylamine were reduced from 1500 pounds to 1000 pounds, peracetic acid (also known as peroxyacetic acid) was reduced from 5000 pounds to 1000 pounds, and tetramethyl lead was reduced from 7500 pounds to 1000 pounds in order to properly reflect their hazardous dangers.
* The amount of 3-bromopropyne, also known as propargyl bromide, was reduced from 7,500 pounds to 100 pounds to reflect its harmful rather than reactive properties.
* The incorrect statement that formaldehyde occurs in "concentrations greater than 90%" is removed, and formalin is added to the description to remove any remaining doubt that formalin is covered by the formaldehyde item.

1. Some commenters asked that OSHA use a “Technical Basis” for creating the “Highly Hazardous Chemical List.” What does this term mean?

A formula that could be used to add compounds later on that is comparable to the substance danger index that OSHA has suggested could serve as an alternative to the strategy that OSHA now employs.

1. Why did OSHA opt for a TQ of 10,000 lbs of Flammable Liquid over the recommendation from several industry groups to use 5 tons of gas/vapor as a threshold quantities for PSM compliance?

OSHA had given the following reasons:

* 1. Regulatory challenges in creating plausible emission scenarios
  2. b. Using "worst case release conditions," which are not defined.
  3. RP 750 does not specifically address the risks to workers from potential flames as opposed to explosions. For instance, the discussion on the likelihood of ignition and explosion of vapor clouds in Appendix A of RP 750 generally states that when a hydrocarbon vapor cloud forms, it may dissipate without any harm, and then be consumed by a flash without noticeably increasing blast pressures or explosion.
  4. While there are some explosions resulting from the vapor cloud explosions, with following releases as small as one ton, the majority of these explosions have happened following releases of more than five tons.
  5. In addition to explosion risks, OSHA's proposed process safety management standard also addressed fire risks

1. **CASE STUDY - BP Texas City Refinery Fire and Explosion**

“On March 23, 2005, at 1:20 p.m., the BP Texas City Refinery suffered one of the worst industrial disasters in recent U.S. history. Explosions and fires killed 15 people and injured another 180, alarmed the community, and resulted in financial losses exceeding $1.5 billion. The incident occurred during the startup of an isomerization1 (ISOM) unit when a raffinate splitter tower was overfilled; pressure relief devices opened, resulting in a flammable liquid geyser from a blowdown stack that was not equipped with a flare. The release of flammables led to an explosion and fire. All of the fatalities occurred in or near office trailers located close to the blowdown drum. A shelter-in-place order was issued that required 43,000 people to remain indoors. Houses were damaged as far away as three-quarters of a mile from the refinery.

The BP Texas City facility is the third-largest oil refinery in the United States.”[[1]](#footnote-1)

Watch the video “Anatomy of a Disaster”

<http://www.csb.gov/videos/anatomy-of-a-disaster/>

Review the BP Texas City incident and the **physical system errors** and **personnel/management errors** that caused or contributed to the incident and the severe consequences. Physical system errors are ones such as design errors, malfunctioning gauges, etc. Personnel/management errors would include lack of proper relief, violating procedures, etc.

Build **a table in Excel** that depicts the **system and personnel errors and their root causes**. Divide the table into the problems with the physical system and personnel/management errors. Be very **specific** in your descriptions of the problems (errors) and link the root causes to the appropriate system error.

In a separate tab in the same Excel file, create a **matrix of recommendations** from all of the stakeholders involved in the investigation and subsequent analysis of the incident. Link each Recommendation back to the root cause identified in the first tab.

The Lab 4 Word document and Excel should be uploaded into the Canvas Lab 4 Assignment by the end of the lab period.

1. U.S. Chemical Safety Board, Report No. 2005-04-I-TX, March 2007 , pg. 17, [↑](#footnote-ref-1)