PEEPS001
Process Safety Management Guideline
PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

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1. **Scope**

This Practice provides overall guidelines to project engineers on the application of Process Safety Management and how to incorporate these principles into a project.

2. **References**

Applicable parts of the following Practices and references should be considered an integral part of this Practice. The edition in effect on the date of contract award should be used, except as otherwise noted. Short titles are used herein where appropriate.

**Industry Codes and Standards**
- 29 CFR 1910.119 *OSHA Process Safety Management (United States)*
- 40 CFR 68 *EPA - Chemical Accident Prevention Provisions (United States)*
- 30 CFR Chapter II, *Department of the Interior, Subchapter B, Subpart S § 250.1900 ff (United States)*
- SEVESO II Directive 2012/18/EU - *Control of Major-accident Hazards Involving Dangerous Substances (European Union)*
- DEVP1316983A - *Prevention of Major accidents (France)*
- AQ/T 3034 - *Industrial Standard of the People’s Republic of China on Work Safety (China)*

3. **Nomenclature and Definitions**

*covered process:* Any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or combination of these activities. For purposes of this definition, any group of vessels which are interconnected and separate vessels that are located such that a highly hazardous chemical could be involved in a potential release are considered a single process.

*catastrophic release:* A major uncontrolled emission, fire, or explosion, involving one or more highly hazardous chemicals that presents serious danger to employees in the workplace.

*facility:* The buildings, containers, or equipment which contain a process.

*highly hazardous chemical:* A substance possessing toxic, reactive, flammable, or explosive properties.

*hot work:* Work involving electric or gas welding, cutting, brazing, or similar flame or spark-producing operations.

*OSHA:* United States Occupational Safety and Health Administration

*EPA:* United States Environmental Protection Agency

*Offshore:* Bureau of Safety and Environmental Enforcement, Department of the Interior

4. **General**

4.1 **Description**

Process Safety Management (PSM) throughout the world is focused on control and management of highly hazardous chemicals using a disciplined and systematic approach. In general, a PSM program is defined by multiple elements each requiring the
development and implementation of a robust management system. Following are summaries of each Process Safety element and a paragraph specifically aimed at the Project Engineer or Manager describing how the project may be affected by incorporate that element of PSM.

4.2 Applicability

Process Safety Management applies to those companies that deal with any of more than 130 specific toxic and reactive chemicals in listed quantities; it also includes flammable liquids and gases in quantities of 10,000 pounds (4536 kg) or more. The US EPA Risk Management Plan maintains a list of toxic and flammable chemicals as defined in 40 CFR 68.130. The SEVESO standard and subsequent European Union enabling legislations prescribe other toxic and flammable chemicals that are regulated. Process Safety requirements apply to all project participants including both the owner as well as any engineering services firm. Table 1 is an example of how PSM Standards compare across different countries.

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Companies that deal with any of these chemicals will be required to comply with these paragraphs. Companies that do not deal with these chemicals, or maintain maximum intended inventories below the threshold quantities, will not be required to comply with these paragraphs but may choose to do so as an industry Best Practice.
4.3 Employee Participation

Employers covered by a Process Safety Management regulation should develop a written plan of action to implement the employee participation required by PSM.

Project engineers and managers should assure that any design or construction reviews include a wide range of employees whose jobs are affected by the project.

4.4 Process Safety Information

Employers covered by a Process Safety Management regulation should complete a compilation of written process safety information before conducting any process hazard analysis. This information will help the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals. The information should include information on the hazards of the highly hazardous chemicals used or produced by the process, information on the technology of the process, and information on the equipment in the process. Often, process safety information takes the form of process flow diagrams, piping and instrument diagrams, equipment datasheets, cause and effect diagrams, and other documentation.

Project engineers and managers should understand that the project deliverable of drawings, manuals, calibration sheets, and other documentation provides the employer with the necessary information to comply with this element.

4.5 Process Hazard Analysis (PHA)

The process hazard analysis is a thorough, orderly, systematic approach for identifying, evaluating, and controlling the hazards of processes involving highly hazardous chemicals. The process hazard analysis is best performed by a team with expertise in engineering and process operations, and that the team should include at least one employee who has experience with and knowledge of the process being evaluated. The team should also be led by someone who has experience with process hazard analysis technique(s) that are appropriate to the complexity of the process in question.

Project engineers and managers should allocate time and resources at the beginning of a project to perform a PHA to evaluate the risks to the employer. As the design of the project nears completion, a re-evaluation of the project should be planned to assure that the safeguards identified earlier are being incorporated or that there are no design changes which have not previously been evaluated.

4.6 Operating Procedures (SOP)

The employer covered by a Process Safety Management regulation should develop and implement written operating procedures consistent with the process safety information that provide clear instructions for safely conducting activities involved in each covered process.

Project engineers and managers should allocate time and resources to the development and evaluation of operating procedures by people knowledgeable of the process.

4.7 Training

A robust PSM program will require that each employee presently involved in operating a process or a newly assigned process should be trained in an overview of the process and in its operating procedures. The training should include emphasis on the specific safety and health hazards of the process, emergency operations including shutdown, and other safe work practices that apply to the employee’s job tasks.
Project engineers and managers should allocate time and resources to assure that all employees who are assigned to the process have been verifiably trained.

### 4.8 Contractors

A robust PSM program will include special provisions for contractors and their employees to emphasize the importance of everyone taking care that they do nothing to endanger those working nearby who may work for another employer. PSM, therefore, applies to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process.

Project engineers and managers should assure that any contractors required to perform work on the project, even if the work is not within a PSM covered process, are qualified to perform the work, understand the hazards of their workplace, and are mindful and knowledgeable of any site safe work practices.

### 4.9 Pre-startup Safety Reviews (PSSR)

It is important that a safety review take place before any highly hazardous chemical is introduced into a new or modified process. Prior to the introduction of a highly hazardous chemical to a process, the pre-startup safety review should confirm that the following:

- a. Construction and equipment are in accordance with design specifications;
- b. Safety, operating, maintenance, and emergency procedures are in place and are adequate;
- c. A process hazard analysis has been performed for new facilities and recommendations have been resolved or implemented before startup, and modified facilities meet the management of change requirements; and
- d. Training of each employee involved in operating a process has been completed.

Project engineers and managers should allocate sufficient time and resources to allow for a robust PSSR to be conducted, being mindful that the PSSR may identify actions that may be required to be completed prior to startup.

### 4.10 Mechanical Integrity (MI)

In a PSM covered facility, there should be written procedures established and implemented to maintain the ongoing integrity of process equipment. Employees involved in maintaining the ongoing integrity of process equipment should be trained in an overview of that process and its hazards and trained in the procedures applicable to the employee’s job tasks.

Project engineers and managers should allocate sufficient time and resources to develop and implement written procedures that follow recognized and generally accepted good engineering practices to maintain the ongoing integrity of the process equipment.

### 4.11 Safe Work Permits

A PSM covered facility will have developed and implemented safe work practices to control the conduct of work that apply both to employees and to contractor employees.

Project engineers and managers should assure that all work performed during the course of a project complies with site safe work practices, specifically hot work conducted on or near a covered process; the control of hazards during work activities such as lockout/tagout; confined space entry; opening process equipment or piping; and control over entrance into a facility.
4.12 Management of Change (MoC)

Any contemplated changes to a process should be thoroughly evaluated to fully assess their impact on employee safety and health and to determine needed changes to operating procedures or process safety information. The complexity of the evaluations should be proportional or appropriate for the scope of the changes and may span from a simple discussion to a formal process hazard analysis with a team.

This requirement is different than project change controls. Project engineers and managers should assure that sufficient time and resources are allocated such that any modification to a covered process has been fully evaluated by the site.

4.13 Incident Investigation

A crucial part of any process safety management program is a thorough investigation of incidents to identify the chain of events and causes so that corrective measures can be developed and implemented. The aim of an investigation is for the discovery of the incident's root cause in order to prevent reoccurrences of the hazardous situation.

Project engineers and managers should allocate sufficient time and resources to assure that an investigation of any incident within the scope of the project that resulted in, or could reasonably have resulted in, a catastrophic release of a highly hazardous chemical in the workplace has been investigated. Any incidents that may occur in an adjacent process to the project may adversely affect the cost and schedule due to site downtime, evacuation of the process area, or other external factors.

4.14 Emergency Planning and Response

If, despite the best planning, an incident occurs, it is essential that emergency pre-planning and training make employees aware of, and able to execute, proper actions.

Project engineers and managers should allocate sufficient time and resources to assure that existing emergency response plans are not affected by the execution of the project. If there are no existing emergency response plans, plans should be made with the host site and the local emergency responders to assure that emergency response can occur.

4.15 Compliance Audits

PSM covered facility employers should certify that they have evaluated compliance with the provisions of PSM at least every three years. This will verify that the procedures and practices developed under the standard are adequate and are being followed.

Project engineers and managers should assure that the project documentation is sufficient to provide evidence of adherence to the requirements of jurisdictional process safety regulations and programs.

4.16 Trade Secrets

PSM covered facility employers should make available all information necessary to comply with jurisdictional process safety regulations without regard to the possible trade secret status of such information.

Project engineers and managers should assure that the project information and documentation is available to all persons responsible for compiling the process safety information, those developing the process hazard analysis, those responsible for developing the operating procedures, and those performing incident investigations, emergency planning and response, and compliance audits.