

## FREQUENTLY ASKED QUESTIONS (FAQS)

### PROCESS SAFETY MANAGEMENT IMPLEMENTATION

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1. Companies without a formal PSM system may find it difficult to visualize what PSM looks like. Specific examples of how a PSM system works would be helpful. For instance, if a Company introduces a new plastic pipe resin that has different joining procedures, tapping equipment and fittings, how would the introduction of new products and procedures be touched by the PSM system? Please provide other examples of when PSM applies.

Introduction of a new plastic pipe resin or any other new product or new procedure represents a change. A change may be necessary but it may also introduce new risks. Management of Change (MOC) is one of the elements of Process Safety which provides practices to manage risk.

In brief, the steps in an MOC may include performing a risk based review of the proposed change to identify and eliminate any new risk, and a Pre Start Up Safety Review to assess readiness to deploy the change. The risk based review should be commensurate with the level of risk. The risk based review can range from a checklist type approach for minor changes and extend to performing a Process Hazard Analysis (PHA) for more major type changes.

There are numerous examples of PSM applicability throughout natural gas operations. Most incidents with the potential to result in a release of gas or energy may be prevented or mitigated by applying Process Safety principles. For example, PSM may be applied to circumvent the inadequate use of a gas line squeezing tool in the following ways:

- Promote PHA – consequences of using an inadequate tool are understood,
- Train – employees are qualified for the job and know to use the right tools,
- Procedures – followed by employees for consistent and safe execution of the work,
- Audits – internal audits, including peer to peer to ensure the work is being performed the right way,
- Process Safety Culture – leadership involvement and employee engagement to promote a safety culture.

2. How could PSM address material failure such as defective valve installation in a variety of locations throughout the operating territory?

Application of elements of PSM may prevent or mitigate a defective valve installation through the Management of Change (MOC) process, which may include a risk based review up to a Process Hazard Analysis (PHA) to identify potential failure modes of the valve and defect and Pre Start Up Safety Review (PSSR) to check/test the valve and ensure it is ready for operation.

A benefit of PSM is layered protection. That is, if the MOC process was not used effectively and the valve defect was not identified prior to installation, a robust PSM Asset Integrity and Reliability would identify the defect during operation. Once the defect is found, a rigorous PSM Incident Investigation process would uncover not only the direct cause of the defect but also the root cause, which is based on management system or organizational culture issues. A strong safety culture would allow the organization to learn from this incident and implement corrective actions to prevent similar incidents.

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#### 3. How many additional resources are required to implement PSM?

There are multiple safety management systems available. Which a company chooses to use is dependent upon the company. This AGA guidance materials focus on the Risk-Based Process Safety (RBPS) management system because of its rigor and comprehensiveness and recognizes that all hazards and risks are not equal. It focuses more resources on greater hazards and higher risks as defined by the risk tolerance of the company. Limited company resources can be optimally apportioned to improve both facility safety performance and overall business performance. The PSM framework is modular and scalable and can leverage and be integrated into existing EHS systems or other ongoing initiatives. The following Process Safety Management questions help the operator identify and select the highest hazards associated with the operation:

- a) What can go wrong (the hazards)?
- b) How bad can it be (the consequences)?
- c) How often might it happen (the frequency)?
- d) Are the proper safeguards in place (layers of protection)?
- e) How can we better manage risk (additional measures)?

Based on this assessment, the operator may:

- Select the process safety elements of immediate interest to the organization from the 20 process safety elements available from the RBPS Management System (slide 7 of the “Implementation of a Risk-Based Process Safety Management System” slidedeck),
- Identify the practices of interest for each element (practices may be accessed from the PSM maturity assessment tool provided in the “Implementation of a Risk-Based Process Safety Management System” slidedeck), and
- Allocate resources or leverage existing programs to implement selected practices.

If deploying a Process Safety Management system holistically, including many or all of the PSM elements, a common industry practice is to allocate a dedicated program owner or a team. There will likely be a need for dedicated resources. The number of resources will depend on the magnitude of scope selected. In any case, it would be beneficial to leverage existing staff resources across the organization to act as champions to promote use of the PSM practices.

#### 4. PSM was originally designed to target machinery and mechanized processes where mechanical things can fail and redundant systems or controls are engineered to prevent failure. How does PSM apply to natural gas operations?

Process Safety Management (PSM) provides a structured and systematic approach to build commitment to a strong Safety Culture, to understand hazards and risks, to manage risks and learn from experience to prevent unintentional release of energy such as natural gas. PSM includes engineering controls (inherently safer designs & instruments, clearance process, Lock-Out-Tag-Out to isolate hazardous energy, etc.), administrative controls (procedures, safety toolboards,

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management of change process, etc.) and behavioral controls (use of PPE, use of the right tools, use of stop work authority, etc.) to prevent incidents with the potential to injure employees and the public, damage the environment and damage property/assets. The risk-based PSM approach, which consists of 20 elements (shown on slide 7 of the “Implementation of a Risk-Based Process Safety Management System” slidedeck) applies to most activities in natural gas operations.

#### 5. Does PSM apply to day-to-day job tasks that we perform to reduce the injuries and incidents that we are experiencing?

PSM focuses on prevention or mitigation of unintentional release of energy such as natural gas with the potential to injure employees and the public, damage the environment and damage property/assets. It can also be very helpful when planning your higher risk, non-routine type work. Additionally, reduction of personal injuries resulting from slips, trips, falls and motor vehicle incidents can benefit from PSM because of the process safety mindset and principles. Consider asking the following PSM questions before any task:

- a) What can go wrong (the hazards)?
- b) How bad can it be (the consequences)?
- c) How often might it happen (the frequency)?
- d) Are the proper safeguards in place (layers of protection)?
- e) How can we better manage risk (additional measures)?

#### 6. How much time and effort are required to get enough people within an organization trained to implement PSM?

The RBPS management system recommends just enough resources to address the highest hazards determined by the operator. The level of effort required depends on the PSM implementation scope selected as described in the answer to question 3 above. CCPS (Center for Chemical Process Safety) offers a 4-day Process Safety boot camp to introduce intended practitioners to the fundamentals of Process Safety. CCPS and several other organizations also offer more granular training on any individual Process Safety element. In-house Process Safety experts or external consultants may develop custom training that ranges from:

- 30-minute light awareness
- 2-hour extensive awareness
- 1 or more days for practitioners

Because of the modular and scalable nature of PSM, application may begin immediately after training. In some cases, application simply means increasing the rigor of a practice that already exists.

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7. Process Safety provides solutions to mechanized processes such as engineering and redundant fail safes or controls. How does PSM take into account human actions and behaviors? Is PSM the best process to prevent the types of incidents and injuries we currently experience and can PSM lead to such a reduction in injury rates as shown on slide 10 of the Process Safety Business Case presentation?

One of the 20 elements of PSM is Process Hazard Analysis (PHA). PHA assesses deviations of process parameters from design intent, deviations from procedures, failure modes of components, siting factors (the location of assets in relation to vulnerabilities) and **human factors**. Human factors considered include: workload (fatigue, stress, etc.), work conditions (weather, lighting, etc.), shift work issues (time to respond to abnormal situations, etc.), accessibility (adequate access to operate or maintain equipment and instruments), labeling (Pipelines and electrical conduit are clearly labeled, etc.), hardware/software, communications, personal aspects, etc.

Furthermore, the Process Safety Culture element promotes doing the right thing, even when no one is watching. For example, reporting incidents and near misses so that corrective actions are implemented; asking the PSM questions before performing any task.

- a) What can go wrong (the hazards)?
- b) How bad can it be (the consequences)?
- c) How often might it happen (the frequency)?
- d) Are the proper safeguards in place (layers of protection)?
- e) How can we better manage risk (additional measures)