

Process Safety Management Fact Sheet

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Every day, workplaces across the country handle chemicals that can fuel reactions, drive production, or keep systems running. But when those same materials are mishandled, the results can be disastrous, leading to explosions, fires, toxic releases, or worse.

That's where **Process Safety Management (PSM)** comes in. PSM is a program designed by the Occupational Safety and Health Administration (OSHA) to prevent large-scale chemical accidents. It gives employers a step-by-step system to control hazards, protect workers, and keep surrounding communities safe.

When does PSM apply?

PSM applies to any workplace process that involves **highly hazardous chemicals (HHCs)**. These include toxic, flammable, reactive, or explosive substances that could cause serious harm if released.

Under OSHA's PSM standard ([29 CFR 1910.119](#)), coverage applies when a process contains:

- Flammable liquids or gases at or above 10,000 pounds.
- Chemicals listed in [Appendix A](#), which specifies threshold quantities for certain toxic and reactive substances.

Employers must review both criteria to determine whether PSM applies. However, many of the PSM principles — like preventive maintenance, hazard analysis, and employee involvement — are valuable for **any** business that handles chemicals, even in smaller quantities.

Why PSM matters

Major chemical accidents rarely come from a single mistake. More often, they result from a



series of small failures — missing procedures, skipped inspections, outdated training, or unreported equipment issues.

PSM works because it addresses all of those weak spots **before** a disaster happens. A strong PSM program helps you:

- Identify and control chemical hazards.
- Maintain reliable equipment.
- Prepare for emergencies.
- Involve employees in safety decisions.
- Comply with OSHA and avoid costly penalties.

The cost of prevention is always lower than the cost of recovery — both in lives and in dollars.

Core building blocks of a PSM program

A complete PSM program includes 14 key elements, but they all share one goal: **to understand what could go wrong and make sure safeguards are in place.**

Here's a simplified breakdown of the main ideas behind those elements:

(continued)

PSM Elements



1. Gather all process safety information.

Collect all written information about your procedures and chemicals. Include:

- **Chemical data**, such as toxicity, exposure limits, reactivity, and stability.
- **Technology information**, such as flow diagrams, safe limits for pressure and temperature, and maximum intended inventory.
- **Equipment details**, such as design codes,

materials of construction, relief systems and safety devices.

2. Know and evaluate your chemical and equipment hazards.

Use a Process Hazard Analysis (PHA) to find and keep detailed records of every chemical's hazards. Include information about the process, materials, and equipment. Understanding how these pieces interact helps you predict and prevent problems. OSHA requires employers to use one or more of the following methods to determine and assess process hazards:

- **What-if:** The What-if method uses a brainstorming approach where a skilled team poses a series of “what-if” questions to explore possible failures.
- **Checklist analysis:** This relies on a prepared list of process safety questions created from regulations, operating experience, and design codes. The team reviews the process against the checklist to identify hazards or non-compliance.
- **What-if/checklist combination:** This hybrid method combines the format of a checklist with the creativity of the What-if brainstorming approach.
- **Hazard and Operability Study (HAZOP):** The HAZOP method is a detailed, step-by-step way to find problems in a process. A team made up of people from different departments looks at each part (or “node”) of the process. They use simple guidewords like *No*, *More*, *Less*, or *Reverse* to spot anything that could go wrong or work differently than planned. For every issue they find, the team discusses what could cause it, what might happen, what safety systems are in place, and what changes could fix or prevent it.
- **Failure Mode and Effects Analysis (FMEA):** The FMEA method looks at each part or system to find out how it could fail and what might happen if it does. The team studies how serious each failure could be and how it might affect the whole process. This method is especially useful for mechanical or instrument systems where each type of failure can be listed and reviewed. Teams can also give each issue a score, called a Risk Priority Number, to help decide which problems need to be fixed first.
- **Fault Tree Analysis (FTA):** The FTA method starts with something that could go wrong—like a chlorine gas release—

and then works backward to find out what equipment problems or human errors could cause it. It uses a logic diagram with “AND” and “OR” connections to show how different failures might combine to create the event. This method uses numbers and calculations to estimate how likely system failures are to happen.

- **Any other appropriate equivalent methodology:** OSHA allows other types of PHA methods if they meet the same goals — finding and studying process hazards and controlling the risks they create. Examples include [Layer of Protection Analysis](#), [Event Tree Analysis](#), and [Quantitative Risk Assessment](#). The method you choose depends on how complex your process is and what the regulations require.

3. Write down and maintain clear operating procedures.

Create clear, step-by-step operating procedures. Include normal operations, startup and shutdown steps, and what to do if something goes wrong. Keep procedures current and accessible to everyone who operates or maintains the system.

4. Involve employees in every step.

Involve your employees and their representative in the PSM program. Employees know the process better than anyone. Encourage them to speak up about concerns, share ideas, and help shape safe procedures. Their first-hand knowledge is vital.

5. Train for safe and informed operations.

Train all employees who work with or near covered processes. Ensure they understand hazards, operating limits, and emergency actions. Provide refresher training at least every three years — or sooner if needed. Hands-on exercises and real examples make training more effective.

6. Hold contractors to the same standards.

Contractors must meet your safety requirements and understand the hazards of the worksite. Before work begins, confirm contractors understand:

- Process hazards and emergency procedures.
- Site safety rules and reporting requirements.
- The importance of following permit systems.

7. Verify safety before startup.

When installing new equipment or making major changes, verify that everything meets design specs, employees are trained, and safety systems are in place before introducing chemicals. A careful pre-startup review prevents costly and dangerous mistakes.

8. Keep equipment in good shape.

A solid maintenance program ensures that tanks, pipes, valves, sensors, and alarms work as designed. Inspections, testing, and repair records are essential. Follow written maintenance schedules, and document inspections and repairs. Fix issues promptly to prevent system failures.

9. Control hot work with written permits.

Any work that generates heat, sparks, or flames near chemical processes requires a written permit and fire protection plan. The permit should:

- Identify the location and duration of the work.
- Verify the fire prevention steps.
- Remain on file until the job is complete.

10. Manage change carefully.

Before changing materials, equipment, or procedures, review how those changes could affect safety. Even small changes can have big consequences.

11. Investigate incidents promptly.

Investigate all incidents and near misses within 48 hours. Determine what happened, why it occurred, and how to prevent a repeat. Involve knowledgeable employees, document findings, and share lessons learned. Keep reports for at least five years to support accountability and improvement.

12. Plan and practice for emergencies.

Develop and regularly practice an emergency action plan. Train employees to respond to chemical releases, fires, and other emergencies. Coordinate with local emergency responders and update the plan as conditions change.

13. Review safety practices and make corrections.

At least every three years, conduct a full audit of your PSM program. Confirm that procedures are followed and improvements are made where needed. Document results, track corrections, and keep the two most recent audit reports. Regular audits help ensure your system stays strong and compliant.

14. Share critical information safely.

Provide all necessary information to employees, contractors, auditors, and emergency responders — even when trade secrets are involved. Employers may use confidentiality agreements but must never withhold data that affects safety.

Building a culture of safety

A PSM program only works when leadership supports it and employees believe in it. Supervisors set the tone by enforcing procedures, rewarding good practices, and following the same rules they expect others to follow.

Start here:

- Review your current chemical processes and identify which are covered by PSM.
- Assign clear roles for PSM responsibilities.
- Create or update written procedures.

- Schedule regular hazard reviews and training.

Over time, this structure becomes part of your workplace culture — one that values prevention over reaction.

The bottom line

PSM isn't just about meeting OSHA requirements. It's about protecting lives, jobs, and communities. By understanding your chemical processes, training your team, and maintaining equipment properly, you can prevent incidents that make headlines — and ensure everyone goes home safe at the end of the day.

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