

# PSM and RMP Facility Management

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## Agenda

1. Why does PSM or RMP exist?
2. What is PSM or RMP?
3. OSHA Process Safety Management
4. EPA Risk Management Program

Note: This presentation is only compliance. Process Safety Management is much more than compliance with the regulations.

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## Why does PSM or RMP exist?

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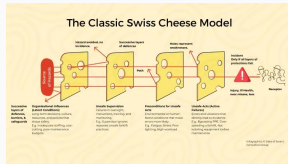
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## Purpose of PSM/RMP

Prevent or minimize the consequences of catastrophic releases of toxic, reactive, or flammable chemicals.

- Systematic Management
  - People
  - Plant
  - Process



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## Why PSM and RMP?

- Unexpected releases of toxic, reactive, or flammable liquids and gases in processes involving highly hazardous chemicals have been reported for many years.
- Incidents continue to occur in various industries
- Regardless of the industry.....there is a potential for an accidental release any time they are not properly controlled.

**All of this, creates the possibility of disaster.**

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## Process Safety Incidents



Bhopal, India 1984 – 1754 fatalities, 100,000's injured



Piper Alpha Oil Platform

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## Chemical Safety Board

Chemical Safety Board

<http://www.youtube.com/@USCSB>



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## What is PSM and RMP?

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## PSM & RMP

Both developed with the same intent: Prevent the accidental release of hazardous substances.

### Process Safety Management:

- Inside the property
- Protect human lives
- Includes everything that the hazards can reach in the process

OSHA aims to protect employees

### Risk Management Program:

- Outside the property
- Protect environment
- Protect the community

EPA aims to protect the environment.

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# PSM/RMP

Process Safety Management		Risk Management Plan			
		Level 1	Level 2	Level 3	
1. Process Safety Information	8. Compliance Audits*	Worst-Case Release Analysis	✓	✓	✓
2. Process Hazard Analysis	9. Incident Investigation	Alternative Release Analysis		✓	✓
3. Operating Procedure	10. Employee Participation	5-year Accident History	✓		✓
4. Employee Training	11. Hot Work Permit	Management System		✓	✓
5. Mechanical Integrity*	12. Contractors Management	Prevention Program		✓	✓
6. Management of Change	13. Emergency Planning & Response	Emergency Response Program - Coordinate	✓	✓	✓
7. Pre-Startup Safety Review	14. Trade Secrets	Emergency Response Program - Develop Plan & Program		✓	✓

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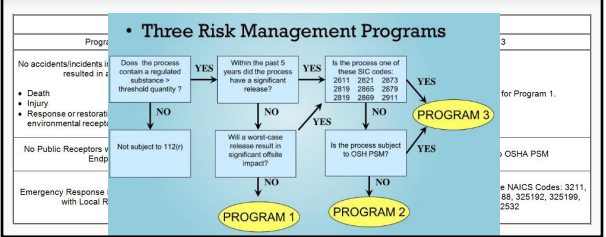
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# RMP Program Levels




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# Similarities & Differences

Requirements	OSHA PSM	EPA RMP
Management System	✓	✓
Employee Participation	✓	✓
Process Safety Information	✓	✓
Process Hazard Analysis	✓	✓
Operating Procedures	✓	✓
Training	✓	✓
Contractors	✓	✓
Pre-startup Safety Review	✓	✓
Mechanical Integrity	✓	✓
Hot Work Permit	✓	✓
Management of Change	✓	✓
Incident Investigation	✓	✓
Emergency Planning and Response	✓	✓
Compliance Audits	✓	✓
Trade Secrets	✓	✓
Includes Flammable Chemicals	✓	✓
Offsite Release Consequence Analysis		✓

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# OSHA Process Safety Management

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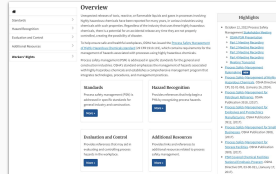
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## Basics of OSHA PSM

- 1910 Subpart H
- [1910.119](#)
- Process safety management of highly hazardous chemicals
- E-tool
  - [osha.gov/process-safety-management](https://www.osha.gov/process-safety-management)



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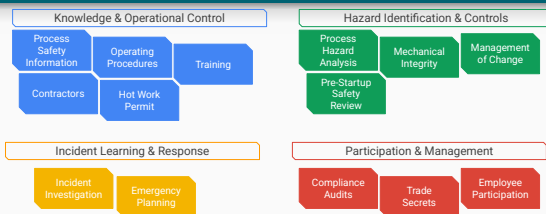
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## Elements of PSM



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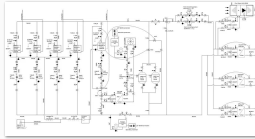
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## Knowledge & Operational Control

### Process Safety Information:

1. Safety Data Sheets
2. Block Flow Diagram
3. Facility Site Plan
4. Maximum Intended Inventory
5. Upper and Lower Control Limits
6. Materials of Construction
7. Piping and Instrumentation Diagram
8. Electrical Classification
9. Relief System Design
10. Ventilation System Design
11. Material & Energy Balances
12. Safety Systems
13. Design Codes
14. Good Engineering Practices

- Written process safety information must be compiled prior to performing any PHA.



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## Knowledge & Operational Control

### Operating Procedures

- Must develop operating procedures consistent with the process safety information
- Provide clear instructions for safely conducting activities involved in each covered process
- Must be readily accessible to employees who work in or maintain the process
- Must certify annually that the procedures are current and accurate

#### Steps for each operating phase:

- Initial startup
- Normal operations
- Temporary operations
- Emergency shutdown
- Normal shutdown
- Startup following shutdown

#### Operating Limits:

- Consequences of deviation
- Steps required to correct or avoid deviation

- #### Safety Considerations:
- Properties/hazards of chemical
  - Precautions to prevent exposure (ie controls)
  - Safety systems (ie interlocks, detection systems, etc)
  - Quality control for raw ingredients
  - Control measures for exposure

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## Knowledge & Operational Control

### Training

- Effective training program is one of the most important steps
- Initially: Each employee involved in the process must be trained in an overview of the process and its operating procedures
  - Specific safety and health hazards of the process, emergency operations including shutdown, and other safe work practices that apply to the job tasks
- Refresher training: provided at least every three years or more often if necessary
  - **Best Practice:** perform annual training with operators
- Records must be kept of the training and how the employer verified that the employee understood the training
  - **Best Practice:** perform task observations after training to document training retention

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## Knowledge & Operational Control

1. Prequalification

2. Pre-job task and risk assessment

3. Training & Orientation

4. Job Monitoring

5. Post Job Evaluation

### Contractors

- Seasonal labor, vendors (electricians, pipefitters, etc), or anybody else working on the system not employed by your company
  - Not janitorial services, food/beverage, laundry, delivery, or other supply services
- Obtain and evaluate information regarding contractor's safety performance and programs
  - Must train contractors similar to employees
  - Must include contractor injuries log
  - **Best Practice:** Develop site specific safety training for all contractors. Include a task observation for contractors similar to employee task observation. Task obs can be a bit more generic

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## Knowledge & Operational Control

### Hot Work Permit

- Permit must be issued for hot work operations conducted on or near a covered process
- Must document:
  - Fire prevention and protection requirements in 1910.252(a) have been implemented prior to beginning hot work
  - Date(s) authorized for hot work
  - Identify object on which hot work is to be performed
  - Must be kept on file until completion of the work
    - **Best Practice:** keep on file for one year
  - **Best Practice:** Develop Hazardous Work Permit or Safe Work Permit for all to utilize (not just in PSM)



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## Hazard Identification & Controls

### PHA Must Address:

- Hazards of the process
- Identification of any previous incidents that had the potential for catastrophic consequences
- Engineering/administrative controls
- Consequences of failure of controls
- Facility siting
- Human factors
- Qualitative evaluation of a range of the possible safety and health effects on employees if there is a failure

### Process Hazard Analysis (PHA)

- Key component of OSHA PSM requirements
- Thorough, orderly, systematic approach for identifying, evaluating, and controlling the hazards of processes involving highly hazardous chemicals
- Completed initially prior to startup of process
- At least every 5 years

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# Hazard Identification & Controls

## Process Hazard Analysis

### PHA Methodology You are responsible for choosing the appropriate methodology:

- What-if
- Checklist
- What-if/checklist
- Hazard and operability study (HAZOP)
- Failure modes and effects analysis (FMEA)
- Fault tree analysis
- Appropriate equivalent methodology

### Action Plans

- Timely resolution of findings is critical.
- Document action plans (ie log) and document completion (what was done)
- Communicate actions to employees

### PHA Team:

- Engineering
- Process Operations
- Employees (minimum 1)
- HSE

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# Hazard Identification & Controls

## Mechanical Integrity

- Critical process equipment is designed, installed, and operates correctly
- Establish and implement written procedures to maintain equipment
- Maintenance must be trained on these procedures
- Inspection and testing must be performed on process equipment using procedures that follow RAGAGEP (recognized and generally accepted good engineering practices)
  - Must conform with mfg recommendations
  - Must be documented
  - Must correct any deficiencies found prior to further use
  - **Best Practice:** Utilize EHS Software program to schedule "preventive maintenance" and document completion
- Critical Spare Parts
  - **Best Practice:** Develop a spare parts list. Order and maintain inventory of these parts.

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# Hazard Identification & Controls

## Pre-Startup Safety Review

- Required for new facilities and for modified facilities when there is a change to the process safety information
- Equipment/construction in accordance with design specs
- Operating procedures are accurate
- PHA has been performed and action plans implemented prior to startup
- Training has been completed

Item	Yes	No
<b>GENERAL INFORMATION</b>		
1. Name of the facility		
2. Date of review		
3. Reviewer's name		
4. Reviewer's title		
5. Reviewer's signature		
6. Reviewer's date		
7. Reviewer's phone number		
8. Reviewer's email address		
9. Reviewer's address		
10. Reviewer's city		
11. Reviewer's state		
12. Reviewer's zip		
13. Reviewer's fax number		
14. Reviewer's website		
15. Reviewer's other contact information		
<b>SAFETY INFORMATION</b>		
16. Is the process safety information (PSI) complete and accurate?		
17. Are the operating procedures (OP) complete and accurate?		
18. Are the emergency response procedures (ERP) complete and accurate?		
19. Are the safety data sheets (SDS) complete and accurate?		
20. Are the hazard and operability study (HAZOP) findings addressed?		
21. Are the process hazard analysis (PHA) findings addressed?		
22. Are the safety instrumented systems (SIS) complete and accurate?		
23. Are the safety instrumented functions (SIF) complete and accurate?		
24. Are the safety instrumented logic (SIL) complete and accurate?		
25. Are the safety instrumented system (SIS) test procedures complete and accurate?		
26. Are the safety instrumented system (SIS) test results complete and accurate?		
27. Are the safety instrumented system (SIS) test reports complete and accurate?		
28. Are the safety instrumented system (SIS) test procedures, results, and reports complete and accurate?		
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## Hazard Identification & Controls

1. Recognize a change

2. SME review (hazards/risks)

3. Is safe change feasible?

4. PSSR Conducted

5. Implement changes

6. Process Hazard Analysis

7. Train Workers

8. Monitor and adjust

### Management of Change

- Changes to a process must be thoroughly evaluated to fully assess their impact on employee safety and health
  - Determine changes needed to operating procedures
- Must establish a written procedure on changes to equipment, process chemicals, technology, procedures, and other changes that affect a covered process
  - Must cover training with employees after the change
  - Updates to other PSM information (ie Process Safety Information)

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## Incident Learning & Response

### Incident Investigation

- Each incident that resulted in or could reasonably result in catastrophic release of a highly hazardous chemical in the workplace
- No later than 48 hours after the incident
- Must be completed by a team
  - **Best Practice:** include PHA team
- Promptly address and resolve findings
- Must be kept for 5 years

### Emergency Planning

- Pre-planning and training to ensure proper actions in event of emergency
- Emergency Action Plan (1910.38(a))
- Include procedures for handling small releases of hazardous chemicals
- May also be subject to HAZWOPER (1910.120)
- **Best Practice:** Reach out to local fire dept to coordinate a response

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## Participation & Management

### Compliance Audits

- Every 3 years
- Evaluate compliance with the PSM provisions
- Conducted by at least one knowledgeable person in the process
  - **Best Practice:** Include PHA Team
- Two most recent audits must be kept on file

### Trade Secrets

- Must make all information necessary to employees without regard to possible trade secret status
- Can have employees enter into a confidentiality agreement to protect the trade secret(s)
- **Best Practice:** have employees document/sign that they have access to all relevant information on an annual basis. Train where information is stored.

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## Participation & Management

### Employee Participation

- Must consult with employees and their representatives on the conduct and development of PHA and other elements of PSM
  - Must provide access to PHA and all other information required to be developed by the standard
- **Best Practice:**
  - Document employees that participate in incident investigations, emergency planning, operating procedure review, PHA, compliance audits, etc

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## Question?

"Can a facility alter its highly hazardous chemical storage practices to avoid PSM?"

Yes. When OSHA enacted the PSM standard, it did so in an effort to eliminate or minimize catastrophic incidents involving highly hazardous chemicals. PSM programs are risk reduction strategies. When implemented correctly, reducing storage inventories of highly hazardous chemicals and isolating stored quantities in distinct facility areas are acceptable risk reduction strategies. Employers at storage facilities may therefore choose to safely alter their storage practices to reduce chemical risks—and fall below PSM applicability criteria—instead of complying with PSM.

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## EPA Risk Management Program

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## RMP Must Include

1. Hazard assessment that details the potential effects of an accidental release (See PSM)
2. Accident history of the last five years (See PSM)
3. Evaluation of worst-case and alternative accidental releases (NEW)
4. Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures (See PSM)
5. Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies should an accident occur (NEW)

Plans are revised and resubmitted every 5 years

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## Off Site Consequence Analysis

	Worst Case Release Scenario Analysis	Alternative Release Scenario Analysis
Program Level 1	<b>REQUIRED</b> <ul style="list-style-type: none"> <li>• 1 scenario for each process</li> </ul>	<i>Not Required</i>
Program Level 2	<b>REQUIRED</b> <ul style="list-style-type: none"> <li>• 1 for regulated toxic substances</li> <li>• 1 for regulated flammable substances</li> <li>• Additional scenarios for hazard classes that may affect public receptors differently</li> </ul>	<b>REQUIRED</b> <ul style="list-style-type: none"> <li>• 1 for regulated toxic substances</li> <li>• 1 for regulated flammable substances</li> </ul>
Program Level 3	<b>REQUIRED</b> <ul style="list-style-type: none"> <li>• 1 for regulated toxic substances</li> <li>• 1 for regulated flammable substances</li> <li>• Additional scenarios for hazard classes that may affect public receptors differently</li> </ul>	<b>REQUIRED</b>

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## Off Site Consequence Analysis

### RMP Comp: Results of Consequence Analysis Scenario Summary Jul 21, 2014

Chemical: Propane  
 CAS number: 74-98-6  
 Threat type: Flammable Gas  
 Scenario type: Worst-case  
 Quantity released: 119000 pounds  
 Release type: Vapor Cloud Explosion  
 Estimated distance to 1 psi overpressure: 0.4 miles (0.6 kilometers)  
 -----ASSUMPTIONS ABOUT THIS SCENARIO-----  
 Wind speed: 1.5 miles/hour (0.4 miles/hour)  
 Stability class: F  
 Air temperature: 77 degrees F (25 degrees C)




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## Emergency Response Coordination

- Program Level 2 or 3
- Open communications with LEPC (Local emergency planning committee)
  - Can typically find the information for your county online
  - If no LEPC, directly contact local agencies (ie police, fire, etc)
- Coordination
  - Provide your Emergency Response Plan
  - Performed annually
  - Meeting or drill with local responders and input from LEPC
- What do you do if nobody responds?

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## Best Practice

- [1910.119 - Appendix A & EPA List of Regulated Substances](#)
  - List of Highly Hazardous Chemicals, Toxics and Reactives
- Develop a list of all chemicals at your facility that are listed
  - Document that you are managing these chemicals either below or above the threshold level and how you are managing these
    - Ie separate processes, PSM implemented, etc

REST Site	Site State	Regulated Substance	Max LBS on hand	Lowest Threshold Quantity	Management Process
			21,802.64	10,000	PSM implemented & RMP Submitted
			2,667	10,000	n/a
			25,356.00	10,000	PSM implemented
			47,201.00	10,000	PSM implemented
			37,005	10,000	PSM implemented

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## Additional Resources

- [OSHA 3132](#)
- [OSHA 3133](#)
- [OSHA PSM E-Tool](#)
- [EPA RMP Site](#)

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Thanks!



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