United States
Environmental Protection
Agency

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Risk Management Program Training Manual

Office of Environmental Cleanup, EPA Region 10

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

March 2010

U.S. EPA – Region 10
Risk Management Program Training
HAMMER Training Center
Richland, Washington

Welcome RMP Facilities:

We appreciate your investment of time and effort to attend this training. Our objective is to inform our facilities of changes in registration protocols and to familiarize you with the tools and requirements of the Risk Management Program.

In case you have further questions regarding the program please refer to the list of resources below.

Best Regards,

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Contacts for further information:

- Region 10 RMP website:
  http://yosemite.epa.gov/R10/airpage.nsf/Enforcement/rmp
- EPA Headquarters website:
  http://www.epa.gov/emergencies/content/rmp/index.htm
- Help line: (800) 424-9346

Risk Management Program Training Manual

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RMP Program Elements

Program 1	Program 2	Program 3
Worse-case release analysis	Worse-case release analysis	Worse-case release analysis
	Alternative release analysis	Alternative release analysis
5-year accident history	5-year accident history	5-year accident history
	Document management system	Document management system
Certify no additional prevention steps needed	Safety Information	Safety Information
	Hazard Review	Hazard Review
	Operating Procedures	Operating Procedures
	Training	Training
	Maintenance	Maintenance
	Incident Investigations	Incident Investigations
	Compliance Audit	Compliance Audit
		Management of Change
		Pre-Startup Review
		Contractors
		Employee Participation
		Hot Work Permits
Coordinate with local responders	Develop plan and program (if applicable) and coordinate with local responders	Develop plan and program (if applicable) and coordinate with local responders
Submit one Risk Management Plan for All Covered Processes		

Risk Management Program Training

March 9-11, 2010
HAMMER Facility
Richland, Washington

Training Objectives

Smoke billows from heavily damaged Formosa Plastics plant following April 23 explosion. Photo: Kevin German/The State Journal-Register. (CSB)

- Understand the mission of the Risk Management Program and your facility's safety culture
- Understand common deficiencies identified from inspections
- Understand the elements required under the Risk Management Program

EPA Region 10 2

Purpose of Risk Management Program

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

EPA Region 10 3

Importance of Safety Culture

March 2005, Texas City, Texas oil refinery explosion.

The UK Health & Safety Executive defines safety culture as "... the product of the individual and group values, attitudes, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety programs."

EPA Region 10 4

Program Eligibility

- Stationary Source in a Single Process
- Listed of Regulated Substance
- Threshold Quantities
  - 63 Flammables
  - 77 Toxic Substances

List of Lists at: **http://yosemite.epa.gov/oswer/lol.nsf/homepage**

EPA Region 10 5

Program Level

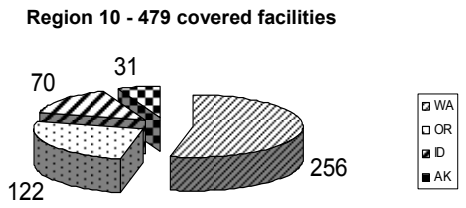
Program 1
- No history of offsite accidents
- No public receptors
- ER coordinated w/ local emergency organizations

Program 3
- Industries subject to OSHA Process Safety Management
- Complex processes –NH3 refrigeration, refineries, pulp & paper mills, fertilizer manufactures, industrial gas manufacturing, Water Treatment Plants/Wastewater Treatment Plants

Program 2
- Not eligible for Program 1 or 3
- Bulk storage and distribution of chemicals, fertilizer wholesalers, frozen and dehydrated food manufactures

EPA Region 10 6

Program Universe



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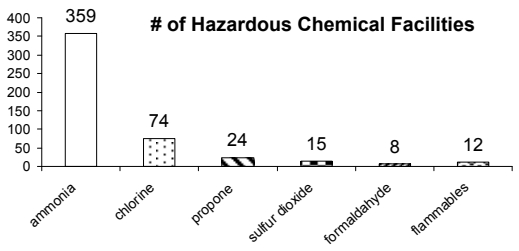
Program Universe



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Exemptions to Program

- Farmers using ammonia fertilizer
- Flammable substances used as fuel or held for sale as a fuel at a retail facility
- Chemicals in transportation, including storage incident to transportation
- Naturally occurring hydrocarbon mixtures prior to entering a processing plant
- Laboratory chemicals

EPA Region 10 9

General Duty Clause

Section 112(r)(1) –

"General duty to identify, prevent the release of extremely hazardous substances, and minimize consequences, if a release were to occur."

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Content of Program

Hazard Assessment - The potential worst-case and more probable accidental release scenario. 5 yr accident history.

Prevention Program – Safety information, hazard review/analysis, operating procedures, mechanical integrity/maintenance, employee training.

Emergency Response – Emergency response plan or program, employee training, procedures for informing the public and local responders.

EPA Region 10 11

Management System

Common Deficiencies:

- A company organizational chart that does not address the RMP elements
- Failure to document other persons responsible for implementing individual requirements of the risk management program and
- Failure to define the lines of authority through an organization chart or similar document

REQUIREMENTS

If you have a Program 2 or Program 3 process the management system provision requires you to:

- Develop a management system to oversee the implementation of the risk management program elements;
- Designate a qualified person or position with the overall responsibility for the development, implementation, and integration of the risk management program elements; and
- Document the names of people or positions and define the lines of authority through an organizational chart or other similar document, if you assign responsibility for implementing individual requirements of the risk management program to people or positions other than the person or position with overall responsibility for the risk management program.

HOW TO MEET THE MANAGEMENT SYSTEM REQUIREMENTS

Sources covered by this rule are diverse, so you are in the best position to decide how to appropriately implement the risk management program elements at your facility. Therefore, the rule provides considerable flexibility in complying with its program requirements.

WHAT DOES THIS MEAN FOR ME AS A SMALL FACILITY?

Identification of a qualified individual or position with overall responsibility may be all you need to do if the person or position named directly oversees the employees operating and maintaining the processes. You must define the lines of authority with an organizational chart or similar document only if you choose to assign responsibility for specific elements of the risk management program to persons or positions other than the person with overall responsibility. For a small facility, with few employees, it is likely that you will meet the requirements of this provision by identifying the one person or position with the overall responsibility of implementing the risk management program elements. If this is the case, you need not develop an organizational chart.

WHAT DOES THIS MEAN FOR ME AS A MEDIUM OR LARGE FACILITY?

As a medium or large facility you may have more personnel turnover than smaller sites. For this reason, it may make more sense at your facility to identify a position, rather than the name of the specific person, with overall responsibility for the risk management program elements.
As a relatively large or complex facility, you may choose to identify several people or positions to supervise the implementation of the various elements of the program; therefore, you must define the lines of authority through an organizational chart or similar document.

Defining the lines of authority and roles and responsibilities of staff that oversee the risk management program elements will help to:

- Ensure effective communication about process changes between divisions;
- Clarify the roles and responsibilities related to process safety issues at your facility;
- Avoid problems or conflicts among the various people responsible for implementing elements of the risk management program;
- Avoid confusion and allow those responsible for implementation to work together as a team; and
- Ensure that the program elements are integrated into an ongoing approach to identifying hazards and managing risks.

Remember that all of the positions you identify in your documentation will report their progress to the person with overall responsibility for the program. However, nothing in the risk management program rule prohibits you from satisfying the management provision by assigning process safety committees with management responsibility, provided that an organizational chart or similar document identifies the names or positions and lines of authority.

MANAGEMENT DOCUMENTATION SAMPLE

Risk Management Program Element	Responsible Employee(s) (Specific names or positions)
Overall responsibility – RMProgam Manager	
Hazard Review	
Safety Information	
Operating Procedures	
Training	
Maintenance	
Incident Investigation	
Emergency Planning and Response 24-Hour Emergency Contact	
Compliance Safety Audits	
RMP Plan Updates (5-year and changes)	

MANAGEMENT RESPONSIBILITIES FOR RMP/PSM - Program 3

Elements of RMP/PSM	**Responsible Parties**
1) Management System:	A) President/CEO/Operations Manager, etc – Overall Responsibility for the development, implementation and integration of the risk management program elements.
Each Section Below Reports to the above (President/CEO/Operations Manager, etc.)	
2) Employee Participation	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Safety Mgr. D) Training Coordinator
3) Process Safety Information:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Safety Mgr.
4) Process Hazard Analysis:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Refrigeration Engineers D) Safety Mgr.
5) Operating Procedures:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Safety Mgr.
6) Lockout/Tagout:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Maintenance Foreman D) Safety Mgr.
7) Site Security:	A) President/CEO B) Security Mgr. C) Maintenance and Refrigeration Mgr. D) Plant Managers
8) Line Opening/Process Equipment:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Safety Mgr.
9) Training:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Safety Mgr. D) Training Coordinator
10) Mechanical Integrity:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Safety Mgr.
11) Preventative Maintenance:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Safety Mgr.
12) Management of Change	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Safety Mgr.
13) Pre-Startup Safety Review	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman , C) Safety Mgr.
14) Compliance Audits:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Safety Mgr.
15) Incident Investigations	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Plant Managers D) Safety Mgr.
: 16) Hot Work, Permits	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Maintenance Foreman D) Safety Mgr
17) Contractors:	A) Maintenance and Refrigeration Mgr. B) Engineering Foreman C) Maintenance Foreman D) Purchasing Agent
18) Emergency Action Program	A) President/CEO B) Safety Mgr.
19) Trade Secrets	Not applicable

Date Last Revised: _____

SAMPLE

Management System

- Required for Program Level 2 & 3 facilities
- Must be documented
- Must describe who is ultimately in-charge and those authorized to make decisions and implement the plan

Overall responsibility

Assign a <u>qualified person or position</u> that has the overall responsibility for the development, implementation, and integration of the Risk Management Program elements

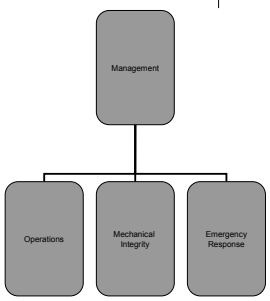
If you are a small facility

One individual may be adequate to oversee the:

- Development
- Implementation
- Integration of the RMP elements

If you are a large facility

. **Document all individuals responsible for implementing individual RMP requirements and defined the lines of authority through an organization chart or similar document**



Identify the lines of authority

Example: Training – shared responsibility

- Maintenance Manager
- Engineering Foreman
- Safety Mgr.
- Training Coordinator

Group Reports to Plant Manager

Management
Common Deficiencies

- A company organizational chart that does not address the RMP elements
- Failure to document other persons responsible for implementing individual requirements of the risk management program
- Failure to define the lines of authority through an organization chart or similar document

Five Year Updates and New Reporting Tools

Five-Year Updates

All facilities with a current Risk Management Plan (RMP) must completely update all nine sections of their RMP at least once every 5 years from the initial submission or most recent update (even if no changes occur). [40 CFR §68.190(b)(1) of the Clean Air Act].

Your five-year anniversary date is listed in the notification letter which was sent to you after you submitted your last RMP. You can also find your anniversary date in the Registration Section of the hard copy of your RMP and online in the Registration Section of RMP*WebRC (a web based tool for minor corrections/updates).

RMP*eSubmit: New web-based tool designed for complete RMP submissions

You will use RMP*eSubmit, an online reporting tool which simplifies the submission process. EPA uses industry-standard technology, including encryption used by most commercial banks, as well as stringent user ID and password protocols to protect your information.

You will be able to access your entire RMP online at anytime (Fig. 1). In addition to updating your facility's RMP at least every five years or when other specified update circumstances occur, RMP*eSubmit allows you to perform other recurring activities to ensure that your risk management program is current. These activities include, among other things, providing employee refresher training, performing compliance audits, and updating your safety information, hazard review (or process hazards analysis), operating procedures, and offsite consequence analysis.

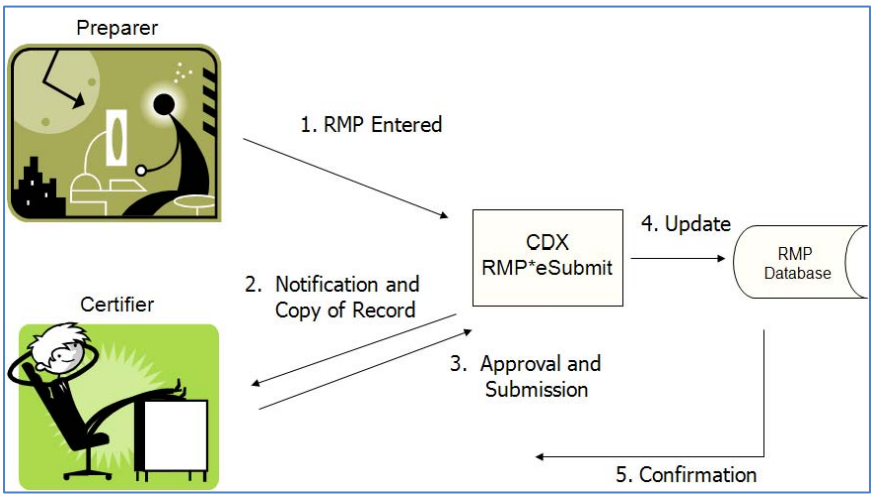


Figure 1: How the RMP Submission Process Will Work

Why has EPA developed RMP*eSubmit?

The web-based RMP*eSubmit tool offers many advantages (Fig.2), including, but not limited to:

- Online (24/7) access to your RMP,
- Ability to review, submit, correct, update and validate all sections of your RMP at a secure website (http://www.epa.gov/cdx/ , CDX),
- A one-time only, mailed in, Electronic Signature Agreement with all subsequent transactions online via the CDX website, and
- The ability of a facility's certifier to designate a "Preparer" who will be able to prepare, correct and/or update one or more RMPs and transmit them to the facility for review and approval. Note that only the facility's certifying official can submit the RMP(s) to EPA

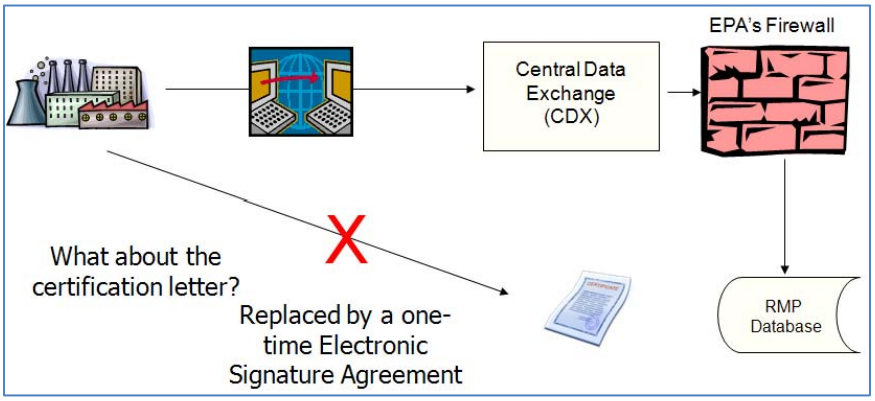


Figure 2: RMP*eSubmit - RMP Submission via the Internet

Updates & Required Corrections
Risk Management Plan

- Updates [§ 68.190]
  - Changes that typically require updating information in more than one section of the RMP

Change That Occurs	Date by Which You Must Update your RMP
No changes occur	At least **once every 5 years** from its initial submission or most recent update
A newly regulated substance is first listed by EPA	**Within 3 years** of the date EPA listed the newly regulated substance if your facility has more than a threshold quantity of that substance in a process
A regulated substance first becomes present above its threshold quantity in: --a process already covered; or --a new process	**On or before the date** the quantity of the regulated substance exceeds the threshold in the process
A change occurs at your facility that requires a revised PHA or hazard review	**Within 6 months** of the change
A change occurs at or near your facility that requires a revised offsite consequence analysis (e.g., you increase your inventory of a regulated substance such that it increases the distance to the endpoint by a factor of 2 or more, or a new public receptor is constructed near your facility)	**Within 6 months** of the change
A change occurs that alters the Program level that previously applied to any covered process	**Within 6 months** of the change

- De-registration is a special type of “Update”

Change That Occurs	Date by Which You Must De-register your RMP
A change occurs that makes the facility no longer subject to the requirement to submit an RMP	Submit a de-registration letter indicating that the RMP is no longer required to EPA within 6 months of the change

<u>To De-register:</u>
Submit a letter to the RMP Reporting Center within six months and include the effective date of the de-registration (the date on which you facility was no longer covered by Part 68). The letter should be signed by the owner or operator . Include your RMP ID number (the 12-digit EPA ID number).

Updates & Required Corrections
Risk Management Plan

- Required Corrections [§ 68.195]
    - Changes are usually limited to one section of the RMP

Change That Occurs	Date by Which You Must Correct your RMP
An accidental release meeting the reporting criteria of § 68.42 occurs at your facility	Add to and correct accident history information and incident investigation data elements **within 6 months** of the date of the accident Revising other RMP sections is not required unless facility changes resulting from an accident trigger a full update
Facility emergency contact information changes	Correct the emergency contact information in RMP **within one month** of the change Revising other RMP elements not required). This correction can be done via the Internet
Minor administrative change (i.e., correct a clerical error or supply additional information)	Correct the information **as soon as practicable** (revising other RMP elements is not required). This correction can be done via the Internet

RMP*eSubmit

EPA's initiative for Internet-based RMP Submissions
The First Year

1

Topics

- RMP*eSubmit Overview
- Schedule
- Publications
- Registration Process
- RMP Data Entry & Submission Process
  - Common Problems
- The First Year - Region 10's Experience

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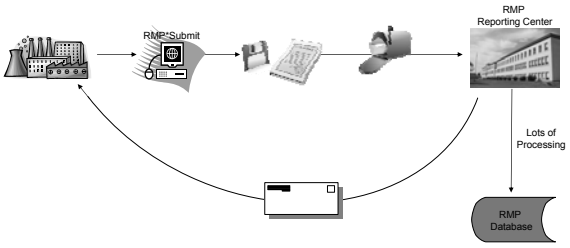
EPA's initiative for web-based RMP submissions

Old System: RMP*Submit



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EPA's initiative for web-based RMP submissions

Disadvantages of RMP*Submit

- Limited validation
- Facilities often lose their last submission
- Heavy processing load with manual steps
- Cumbersome mail back notification and resubmission cycle
- New Certification Letter required for each submission
- Security issue: mailing of sensitive data

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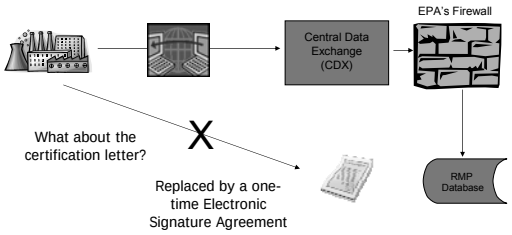
EPA's initiative for web-based RMP submissions

New system: RMP*eSubmit

RMP Submission via the Internet



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EPA's initiative for web-based RMP submissions

Central Data Exchange (CDX)

- EPA's secure portal for entering and retrieving information
- Many other data systems currently using CDX:
  - AQS, eBeaches, eIUR, LEAD, NEI, NESHAPS, PMN, RCRA, SDWIS, TRI-ME, TSCA, UCMR2, RMP*WebRC
- Facilities use CDX to gain access to RMP*eSubmit
- Facilities can use their existing CDX account if they have one

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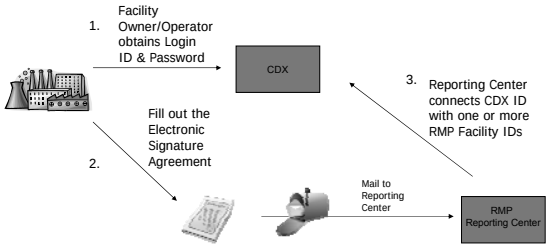
EPA's initiative for web-based RMP submissions

How the Electronic Signature Process Works



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Schedule

- RMP*eSubmit Activated
  - March 2009
- Removed RMP*Submit from website
  - June 2009
- No longer accept submissions from RMP*Submit
  - January 2010

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Publications

- See www.epa.gov/emergencies/rmp:
  - A Checklist for Submitting Your Risk Management Plan (RMP) for Chemical Accident Prevention
  - RMP*eSubmit User's Manual
  - RMP Fact Sheet
  - The General Duty Clause Fact Sheet
  - Chemical Emergency Preparedness and Prevention in Indian Country
  - Updated RMP technical guidance documents (General guidance, industry sector guidance, OCA guidance)

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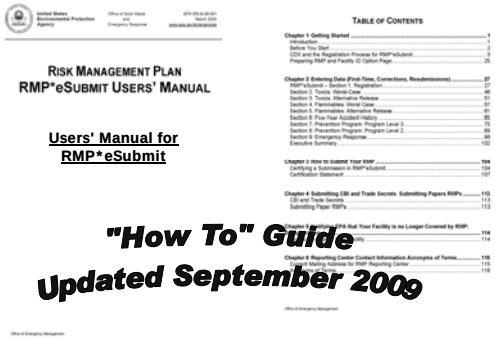
RMP*eSubmit User's Manual



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Basic Steps to set up RMP*eSubmit access for a facility

CDX Registration Process

Common Problems

RMP*eSubmit User's Manual

Chapter 1 Getting Started

1. Certifying official sets up CDX account & registers for RMP*eSubmit
   - Add Program: "Risk Management Plan (RMPESUBMIT)"
   - Add Role/Program ID: "certifying official"
2. Certifying official completes Electronic Signature Agreement (ESA) via online form
   - ESA includes list of facilities belonging to the certifier
   - Certifying official prints and signs the ESA
   - Certifying official mails ESA to the RMP Reporting Center
3. RC validates the ESA, sets up database access & emails certifying official an authorization code for a preparer
4. Preparer sets up their own CDX account
   - Add Role: "preparer" (using authorization code obtained from certifying official) "Preparer" doesn't receive the code.

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Basic Steps to set up RMP*eSubmit access for a facility

RMP Data Entry

RMP*eSubmit User's Manual

Chapter 2 Entering Data (First-Time, Corrections, Resubmissions)

5. Preparer enters RMP data for facility

RMP Submission Process

RMP*eSubmit User's Manual

Chapter 3 How to Submit Your RMP

6. Certifying official: Approval, Certification and Submittal of the RMP
   Certifying Official Doesn't Submit the RMP.

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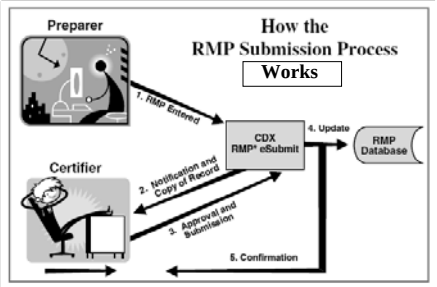
Common Problems

Step 3. Approval and Submission



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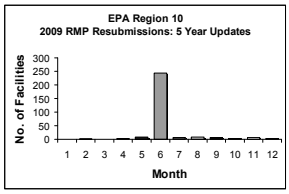
Region 10 – The First Year

Five-Year Updates in R-10

- All facilities must completely update all nine sections of their RMP at least once every 5 years, even if no changes occur.
- Current/Registered Facilities: 479
  - 289 Updates (2009)
  - Late re-submissions: 41



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Where Do I Go For More Information?

- EPA RMP Website:
  - http://www.epa.gov/emergencies/rmp
- EPA Listservs:
  - https://lists.epa.gov/read/all_forums/subscribe?name=callcenter_oswer
- EPA Region 10 RMP Website:
  - http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/rmp
- EPA Region 10 CEPP Newsletter
- EPA Region 10 RMP Coordinator:
  Javier Morales, 206-553-1255

Hazard Assessment

An analysis of the potential offsite consequences of accidental releases from RMP covered facilities

If you are RMP covered facility, you are required to conduct an offsite consequence analysis to provide information to the state, local, and federal governments and the public about the potential consequences of an accidental chemical release. The offsite consequence analysis consists of two elements:

- A worst-case release scenario, and
- Alternative release scenarios.

To simplify the analysis and ensure comparability, EPA has defined the worst-case scenario as the release of the largest quantity of a regulated substance from a single vessel or process line failure that results in the greatest distance to an endpoint. In broad terms, the distance to the endpoint is the distance a toxic vapor cloud, heat from a fire, or blast waves from an explosion will travel before dissipating to the point that serious injuries from short-term exposures will no longer occur.

Alternative release scenarios are scenarios that are more likely to occur than the worst-case scenario and that will reach an endpoint offsite, unless no such scenario exists.

You may use EPA's RMP Offsite Consequence Analysis Guidance (tables) to carry out your consequence analysis. EPA's guidance is optional, and you are free to use other air dispersion models, fire or explosion models, or computation methods provided that:

1. They are publicly or commercially available or are proprietary models that you are willing to share with the implementing agency;
2. They are recognized by industry as applicable to current practices;
3. They are appropriate for the chemicals and conditions being modeled;
4. You use the applicable definitions of worst-case scenarios; and
5. You use the applicable parameters specified in the rule.

In addition to EPA's RMP Offsite Consequence Analysis Guidance (tables), air dispersion/ fire or explosion models such as RMP*COMP, ALOHA and DEGADIS are commonly used.

RMP*Comp

RMP*Comp is a free program you can use to complete the offsite consequence analyses (both worst case scenarios and alternative scenarios) required under the Risk Management Program rule. When you use RMP*Comp, you don't need to make any calculations by hand and the program guides you through the process of making an analysis.

The RMP*Comp program steps users through a short list of questions about the CAA regulated chemical (such as the amount released) in the offsite consequence analysis--both worst-case and alternative scenarios can be run. Based on entered information, RMP*Comp estimates the distance to endpoint according to EPA's recommended procedures. The facilities can then enter the RMP*Comp values into their final RMP plan.

About RMP*Comp, Version 1.07:

The current version is RMP*Comp 1.07. This version was posted on October 29, 2001. It corrects bugs found in previous versions and modifies some functionality. If you have been using an earlier version, you should Download RMP*Comp, Version 1.07. Because the recommended RMP consequence analysis procedures may change in the future, please check this web page before you begin a consequence analysis to be sure that you are using the latest version of RMP*Comp.

- To download the RMP*Comp program, or to get more information about RMP*Comp, go to the EPA Emergency Management webpage at: http://www.epa.gov/emergencies/tools.htm

LandView® 6

- For Risk Management Plan reporters who need to obtain the latitude and longitude of their facilities.
- Download from the EPA Emergency Management webpage at: http://www.epa.gov/emergencies/tools.htm

The LandView 6 and MARPLOT® software were created by agencies of the U.S. Government and are in the public domain. They can be copied, used and distributed freely without the requirement for royalty payments or further permissions. However, the Census Bureau cannot provide technical support for products created by others using LandView.

The LandView database software:

- Uses the Population Estimator function to calculate Census 2000 demographic and housing characteristics for user defined radii.
- Creates simple thematic maps of Census 2000 data.
- Allows users to browse and query the Census, EPA or USGS databases and show the query results on the map.
- Provides the capability to locate a street address or intersection on a map based on TIGER/Line® 2000 road features and address ranges.
- Can automatically retrieve LandView database information for user selected map objects.

Released January 20, 2004. LandView 6 updates the Census 2000 statistical data as well as the Environmental Protection Agency (EPA) and U.S. Geological Survey (USGS) databases contained in LandView 5 that was released in November, 2002. If all you need to do is prepare EPA Risk Management Plans, then there is no need to upgrade from LandView 5 to LandView 6.

Source: U.S. Census Bureau Geography Division

MARPLOT

Mapping Applications for Response, Planning, and Local Operational Tasks

An updated version of the MARPLOT mapping program is now available. The updated program is part of the CAMEO software suite, created for hazmat responders and planners by OR&R in collaboration with EPA. The program is available at no cost.

MARPLOT may be used to fulfill the requirements of 40 CFR Part 68.30 "Defining offsite impacts—population." The application can:

- Estimate (in the RMP) the population within a circle with its center at the point of the release and a radius determined by the distance to the endpoint defined in 68.22(a).
- The population shall include residential population. The presence of institutions (schools, hospitals, prisons), parks and recreational areas, and major commercial, office, and industrial buildings shall be noted in the RMP. [68.22(b)]
- You can create and document maps of the worst case/alternative release scenarios. In addition, you can document the population estimates within the threat zones. [68.39(e)].

Working in MARPLOT's easy-to-use GIS interface, you can switch between three base maps: standard map files, high-resolution aerial photos, and topographical maps. You can get population estimates inside selected areas and can customize maps using drawing tools and an extensive symbol set.

MARPLOT 4.1.1 incorporates web-mapping services and supports the use of shapefiles and a variety of raster formats. You'll be able to click on a location of interest to get its elevation and an instant weather forecast, and you can work with Landview-like population functions. As you work with the new version, the latest U.S. Census county maps, and state and national map layers will automatically download.

For full details and to download the free application, go to MARPLOT web-page: http://www.epa.gov/emergencies/content/cameo/marplot.htm

ALOHA

Areal Locations of Hazardous Atmospheres

Part of the CAMEO suite, ALOHA® is an atmospheric dispersion model used for evaluating releases of hazardous chemical vapors. ALOHA allows the user to estimate the downwind dispersion of a chemical cloud based on the toxicological/physical characteristics of the released chemical, atmospheric conditions, and specific circumstances of the release. Graphical outputs include a "cloud footprint" that can be plotted on maps with MARPLOT to display the location of other facilities storing hazardous materials and vulnerable locations, such as hospitals and schools.

Specific information about these locations can be extracted from CAMEO information modules to help make decisions about the degree of hazard posed.
Key Program Features

- Generates a variety of scenario-specific output, including threat zone plots, threat at specific locations, and source strength graphs.
- Calculates the rate of release for chemicals escaping from tanks, puddles (on both land and water), and gas pipelines and predicts how that release rate changes over time.
- Models many release scenarios: toxic gas clouds, BLEVEs (Boiling Liquid Expanding Vapor Explosions), jet fires, vapor cloud explosions, and pool fires.
- Evaluates different types of hazard (depending on the release scenario): toxicity, flammability, thermal radiation, and overpressure.
- Displays threat zones on MARPLOT maps (and on ArcView and ArcMap with the Arc Tool extensions).
- Works seamlessly with companion programs CAMEO Chemicals and MARPLOT; it can also be used as a standalone program.

For more information, see Downloading, Installing, and Running ALOHA.
http://www.epa.gov/oem/content/cameo/aloha.htm

Hazard Assessment

Predicting Potential Impacts to the Community

Photo courtesy of West Virginia State Fire Marshal

March 2010 EPA Region 10 1

Offsite Consequences Analysis

Common Inspection Deficiencies Highlighted

- Agenda
  - Types of Scenarios
  - Definitions
  - Required Scenarios & Parameters
  - Release Mitigation
  - Modeling
  - Offsite Impacts Receptors
  - OCA Documentation

March 2010 EPA Region 10 2

Types of Scenarios

- Worst-case release scenarios
  - Based on conservative assumptions
  - Represent a very severe accident that is unlikely to occur
- Alternative release scenarios
  - Based on more realistic assumptions
  - More likely to occur

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Definitions

- **Offsite**: Areas beyond the property boundary of the stationary source, and ***areas within the property boundary to which the public has routine and unrestricted access during or outside of business hours***
- **Worst-case Release Scenario**: The release of the **largest quantity** of a regulated substance **from a vessel or process line failure** that results in the greatest distance to an endpoint
  - Does not depend on Program Level
- **Alternative Release Scenario**: Scenarios that are more likely to occur than the worst case scenario **and** that **will reach an endpoint offsite**, unless no such scenario exists
  - ***Should consider*** the 5-year release history and failure scenarios identified in ***the PHA or Hazard Review***
- **Public Receptors**: Public Receptors: Offsite areas such as residences, schools, office buildings, and parks where members of the public could be exposed

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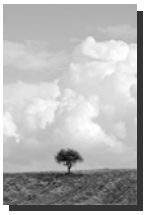
Required OCA Scenarios

Common Deficiencies

- For Each Program 1 Process
  - One worst-case scenario for each Program 1 process
    - ***No public receptors in worst-case scenario zone*** and
    - No accidents with OFF-Site consequences in last five years
  - No alternative scenarios are required



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Required OCA Scenarios (cont'd)

Common Deficiencies

- For All Program 2 and 3 Processes
  - One worst-case scenario for all toxics
  - One worst-case scenario for all flammables
  - ***Additional worst-case scenarios if different public receptors could be affected***
    - Public Receptors: Offsite areas such as residences, schools, office buildings, and parks where members of the public could be exposed
  - At least one alternative scenario for each toxic
  - At least one alternative scenario for all flammables

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Release Mitigation

Common Deficiencies

- Activities or equipment designed to contain released substances to minimize exposure
- Passive mitigation
  - Function without human, mechanical, or other energy input
  - Can use in worst-case and alternative release scenario analyses ***if capable of withstanding release event***
  - Examples include ***building enclosures***, dikes, and blast walls
- Active mitigation
  - Need human, mechanical, or other energy input to function
  - Can be considered only in alternative release scenario analyses, ***must be capable of withstanding release event***
  - Examples include interlocks, shutdown systems, pressure relieving devices, flares, emergency isolation systems, etc.

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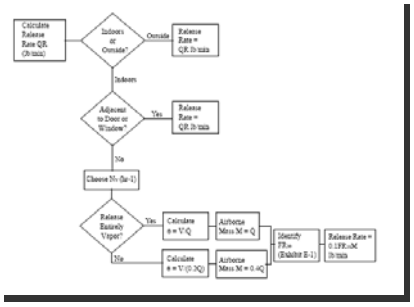
Effectiveness of Building Mitigation
for Alternative Release Scenarios



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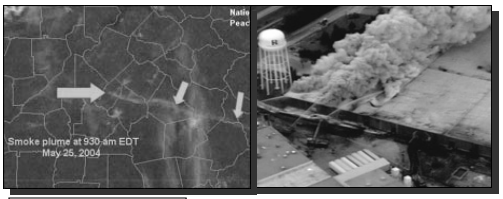
Modeling OCA Scenarios



- "Zones of concern"
  - Can be developed for a given facility based on specific hazardous substances
  - OCA can be used to aid in community planning

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Calculating Release Scenarios

- **Methods to calculate release scenarios**:
  - **EPA**
    - **RMP *Comp** – Computer software, easy to use, need basic data parameters (volume, size of container)
    - **EPA tables** – EPA guidance documents
  - **Industry specific** guidance
    - **TFI** [myRMP]
  - **Other Models** – Such as *Areal Locations of Hazardous Atmospheres* (ALOHA®), DEGADIS

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Offsite Consequence Parameters

Common Deficiencies

- **Offsite consequence analysis must include:**
  - Toxics
    - Toxic end points
  - Flammables
    - Overpressure, Radiant heat, Concentration – lower flammability limit
  - Must also consider:
    - Wind speed, stability class, ***ambient temperature***, height of release, and topography, Liquid or gas release

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OCA Release Calculations

Common Deficiencies

- Determine Distance to Endpoint (DTEP)
  - Air dispersion models
    - ***Based on*** Human Health Impacts within the ***area of a circle*** (of radius DTEP)
  - Common Models
    - RMP*COMP (EPA)
    - ***ALOHA***
    - DEGADIS (TFI)
- Define Off-Site Impacts
  - Public Receptors
    - Residential Population Estimate (Number)
    - Institutions, . . . major commercial, office . . . buildings (Presence)
    - Most recent Census data (LandView/Marplot) or "other updated information"
  - Environment
    - National/State Parks etc.
    - Local U.S.G.S maps and/or Landview

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HB1

Distance To End Points

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Common Deficiencies

- ***Wrong modeling input for endpoint calculations***
  - Incorrect use of Passive Mitigation
  - Incorrect use of "Rural" vs. "Urban" topography
  - Hazard review information not considered for the alternative release scenario
- ***Defining off site impacts on population***
  - Did not use or misused the "circle" map when defining the off-site impacts
- ***Did not use most recent census data or provide "other updated information"***
  - Did not identify environmental receptors within the circle
  - Did not use USGS data to identify environmental receptors
- ***Used old data for the update***
  - Incorrect quantities, physical locations etc.
- ***Did not maintain the documentation for all of the calculations, estimates, etc.***
  - Dated, detailed documentation

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The Most Common Deficiency

- ***Documentation Missing***
  - Worst-case scenario § 68.39(a)
    - Description of the vessel or pipeline and substance selected as worst case, assumptions and parameters used, and the rationale for selection; assumptions shall include use of any administrative controls and any passive mitigation that were assumed to limit the quantity that could be released. Documentation shall include the anticipated effect of the controls and mitigation on the release quantity and rate.
  - Alternative scenario § 68.39(b)

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Review and Documentation

Common Deficiencies

- **Offsite consequence analysis**
  - ***review and update*** the offsite consequence analyses ***at least once every 5 years***, or
  - Within 6 months of any process change that could increase or decrease the DTEP 2X

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Five-year accident history

Common Deficiencies

- An Accident is Reportable . . . if the release:
  - **Onsite** Deaths, injuries or property damage.
  - [Known] **Offsite** Deaths, injuries, property damage, or environmental damage, evacuations, or sheltering-in-place.
- ***Requires corrections to the RMP within 6 months***. {§ 68.195 *Required Corrections*}
  - Includes data required under §§ 68.168, 68.170(j) [Prgm 2], and 68.175(l) [Prgm 3]

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Prevention Program

Process Safety Information

Complete and accurate written information concerning process chemicals, process technology, and process equipment is essential to an effective process safety management program and to a process hazards analysis. The compiled information will be a necessary resource to a variety of users including the team that will perform the process hazards analysis; those developing the training programs and the operating procedures; contractors whose employees will be working with the process; those conducting the pre-startup reviews; local emergency preparedness planners; and insurance and enforcement officials.

The information to be compiled about the chemicals, including process intermediates, needs to be comprehensive enough for an accurate assessment of the fire and explosion characteristics, reactivity hazards, the safety and health hazards to workers, and the corrosion and erosion effects on the process equipment and monitoring tools. Current material safety data sheet (MSDS) information can be used to help meet this requirement, which must be supplemented with process chemistry information including runaway reaction and over pressure hazards if applicable.

Process technology information will be a part of the process safety information package and it is expected that it will include diagrams as well as employer established criteria for maximum inventory levels for process chemicals; limits beyond which would be considered upset conditions; and a qualitative estimate of the consequences or results of deviation that could occur if operating beyond the established process limits. Employers are encouraged to use diagrams which will help users understand the process.

A block flow diagram is used to show the major process equipment and interconnecting process flow lines and show flow rates, stream composition, temperatures, and pressures when necessary for clarity. The block flow diagram is a simplified diagram.

Process flow diagrams are more complex and will show all main flow streams including valves to enhance the understanding of the process, as well as pressures and temperatures on all feed and product lines within all major vessels, in and out of headers and heat exchangers, and points of pressure and temperature control. Also, materials of construction information, pump capacities and pressure heads, compressor horsepower and vessel design pressures and temperatures are shown when necessary for clarity. In addition, major components of control loops are usually shown along with key utilities on process flow diagrams.

Piping and instrument diagrams (P&IDS) may be the more appropriate type of diagrams to show some of the above details and to display the information for the piping designer and engineering staff. The P&IDS are to be used to describe the relationships between equipment and instrumentation as well as other relevant information that will enhance clarity. Computer software programs which do P&IDS or other diagrams useful to the information package, may be used to help meet this requirement.

The information pertaining to process equipment design must be documented. In other words, what were the codes and standards relied on to establish good engineering practice. These codes and standards are published by such organizations as the American Society of Mechanical Engineers, American Petroleum Institute, American National Standards Institute, National Fire Protection Association, American Society for Testing and Materials, National Board of Boiler and Pressure Vessel Inspectors, National Association of Corrosion Engineers, American Society of Exchange Manufacturers Association, and model building code groups. In addition, various engineering societies issue technical reports which impact process design. For example, the American Institute of Chemical Engineers has published technical reports on topics such as two phase flow for venting devices. This type of technically recognized report would constitute good engineering practice.

For existing equipment designed and constructed many years ago in accordance with the codes and standards available at that time and no longer in general use today, the employer must document which codes and standards were used and that the design and construction along with the testing, inspection and operation are still suitable for the intended use. Where the process technology requires a design which departs from the applicable codes and standards, the employer must document that the design and construction is suitable for the intended purpose.

Source: OSHA Guidance on PSM (1910.119)

RMP PROCESS SAFETY INFORMATION Requirements

Title 40: PART 68—CHEMICAL ACCIDENT PREVENTION PROVISIONS
Subpart C—Program 2 Prevention Program, § 68.48
Subpart D—Program 3 Prevention Program, § 68.65

- Common Deficiencies:
  - Missing or outdated MSDS
  - Missing Maximum Intended Inventory
  - Missing safer upper/lower limits
  - Missing documentation on changing obsolete equipment/design or still safe
  - Missing Block Flow Diagrams
  - Missing or unapproved PI&D
  - Missing ventilation system design
  - Missing "good engineering practices"

- Purpose of process safety information:
  - Understand the safety-related aspects of the equipment and processes, know what limits are placed on your operations and adopt accepted standards and codes that apply.
  - Foundation for an effective prevention program.

- Owner/Operator responsibility:
  - PROGRAM 2: Compile and maintain up-to-date safety information related to the regulated substances, processes, and equipment.
  - PROGRAM 3: Complete a compilation of written process safety information before conducting any process hazard analysis required by the rule. The compilation of written process safety information is to enable the owner or operator and the employees involved in operating the process to identify and understand the hazards posed by those processes involving regulated substances. This process safety information shall include information pertaining to the hazards of the regulated substances used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process.

PROGRAM 2: PROCESS SAFETY INFORMATION REQUIREMENTS

You must compile and maintain this safety information	You must ensure	You must update the safety information if
• Material Safety Data Sheets • Maximum intended inventory • Safe upper and lower parameters • Equipment specifications • Codes & standards used to design, build, and operate the process	That the process is designed in compliance with recognized codes and standards	There is a major change at your business that makes the safety information inaccurate

PROGRAM 3: PROCESS SAFETY INFORMATION REQUIREMENTS

For chemicals, you must complete information on	For process technology, you must provide	For equipment in the process, you must include information on
• Toxicity • Permissible exposure limits • Physical data • Reactivity • Corrosivity • Thermal & chemical stability • Hazardous effects of inadvertent mixing of materials that could foreseeably occur	• A block flow diagram or simplified process flow diagram • Information on process chemistry • Maximum intended inventory • Chemical Safe upper & lower limits: temperature, pressure, flows, or composition • An evaluation of the consequences of deviation	• Materials of construction • Piping & instrument diagrams (P&IDs) • Electrical classification • Relief system design & design basis • Ventilation system design • Design codes & standards employed • Safety systems • Material and energy balances for processes built after June 21, 1999

Process Safety Information

Risk Management Program

Focus

- Process Safety Information Requirements
- Program Level Differences
  - Program 2
  - Program 3
- Common Deficiencies

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General Requirements

- Hazard Information of the regulated substance used in the process
- Information on the technology in the process
- Information on the equipment in the process

View of explosion and fire that occurred at the Barton Solvents chemical distribution facility in Des Moines, Iowa, on October 29, 2007. (CSB)

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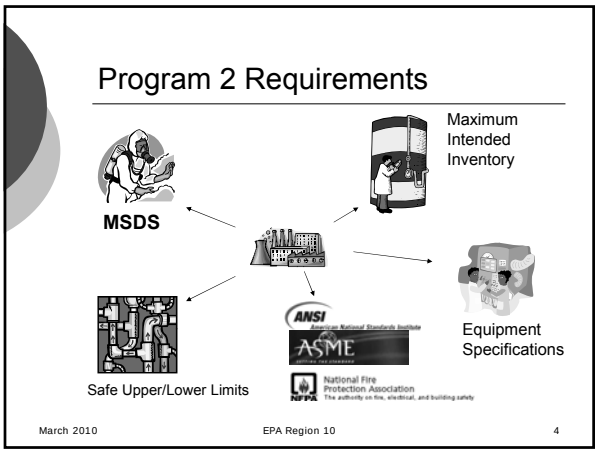
Program 2 Requirements
Maximum Intended Inventory
MSDS
Equipment Specifications
Safe Upper/Lower Limits
ANSI
American National Standards Institute
ASME
National Fire Protection Association
The authority on fire, electrical, and building safety
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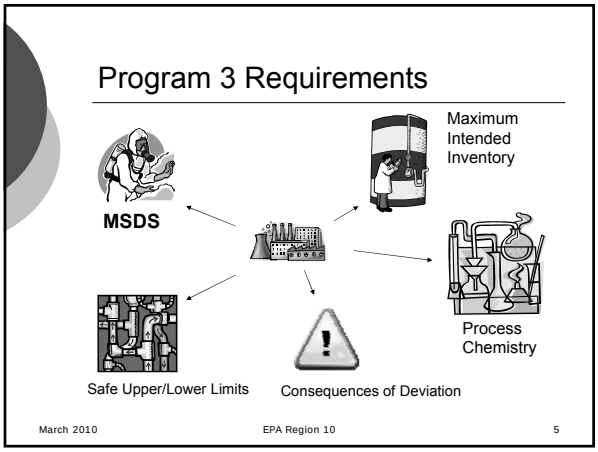
Program 3 Requirements
Maximum Intended Inventory
MSDS
Process Chemistry
Safe Upper/Lower Limits
Consequences of Deviation
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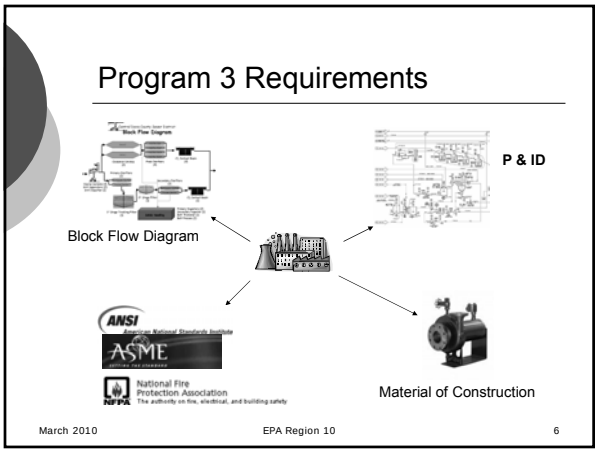
Program 3 Requirements
P & ID
Block Flow Diagram
ANSI
American National Standards Institute
ASME
National Fire Protection Association
The authority on fire, electrical, and building safety
Material of Construction
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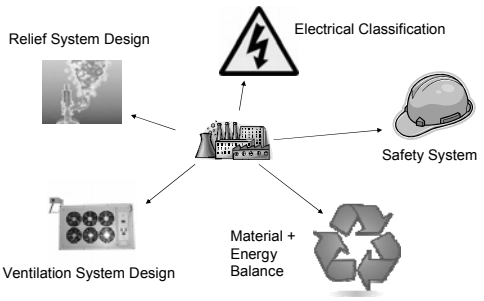
Program 3 Requirements



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Common Deficiencies

- Missing:
  - MSDS
  - Maximum Intended Inventory
  - Safer upper/lower limits
  - Documentation on existing equipment with codes, standards or practices no longer in general use.

March 4, 1998: Aerial view of petroleum tanks at the Sonat oil production facility, where a vessel overpressurization led to the deaths of four workers. (CSB)

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Common Deficiencies

April 21, 1995: Runaway chemical reaction kills five at Napp Technologies, Lodi, New Jersey. (CSB)

- Missing:
  - Block Flow Diagrams
  - PI&D or unapproved
  - Ventilation system design
  - "Good engineering practices"

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Process Hazard Analysis

The process hazard analysis is a thorough, orderly, systematic approach for identifying, evaluating, and controlling the hazards of processes involving highly hazardous chemicals. The employer must perform an initial process hazard analysis (hazard evaluation) on all processes covered by this standard. The process hazard analysis methodology selected must be appropriate to the complexity of the process and must identify, evaluate, and control the hazards involved in the process.

First, employers must determine and document the priority order for conducting process hazard analyses based on a rationale that includes such considerations as the extent of the process hazards, the number of potentially affected employees, the age of the process, and the operating history of the process. All initial process hazard analyses should be conducted as soon as possible, but at a minimum, the employer must complete no fewer than 25 percent by May 26, 1994; 50 percent by May 26, 1995; 75 percent by May 26, 1996; and all initial process hazard analyses by May 26, 1997. Where there is only one process in a workplace, the analysis must be completed by May 26, 1994.

Process hazard analyses completed after May 26, 1987 that meet the requirements of the PSM standard are acceptable as initial process hazard analyses. All process hazard analyses must be updated and revalidated, based on their completion date, at least every five years.

The employer must use one or more of the following methods, as appropriate, to determine and evaluate the hazards of the process being analyzed:

- What-if,
- Checklist,
- What-if/checklist,
- Hazard and operability study (HAZOP),
- Failure mode and effects analysis (FMEA),
- Fault tree analysis, or
- An appropriate equivalent methodology.

A discussion of these methods of analysis is contained in the companion publication, OSHA 3133, Process Safety Management Guidelines for Compliance. Whichever method(s) are used, the process hazard analysis must address the following:

- The hazards of the process;
- The identification of any previous incident that had a potential for catastrophic consequences in the workplace;
- Engineering and administrative controls applicable to the hazards and their interrelationships, such as appropriate application of detection methodologies to provide early warning of releases. Acceptable detection methods might include process monitoring and control instrumentation with alarms, and detection hardware such as hydrocarbon sensors;
- Consequences of failure of engineering and administrative controls;
- Facility siting;
- Human factors; and
- A qualitative evaluation of a range of the possible safety and health effects on employees in the workplace if there is a failure of controls.

OSHA believes that 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. Also, one member of the team must be knowledgeable in the specific analysis methods being used.

The employer must establish a system to address promptly the team's findings and recommendations; ensure that the recommendations are resolved in a timely manner and that the resolutions are documented; document what actions are to be taken; develop a written schedule of when these actions are to be completed; complete actions as soon as possible; and communicate the actions to operating, maintenance, and other employees whose work assignments are in the process and who may be affected by the recommendations or actions.

At least every five years after the completion of the initial process hazard analysis, the process hazard analysis must be updated and revalidated by a team meeting the standard's requirements to ensure that the hazard analysis is consistent with the current process.

Employers must keep on file and make available to OSHA, on request, process hazard analyses and updates or revalidation for each process covered by PSM, as well as the documented resolution of recommendations, for the life of the process.

Exhibit F-30
Checklist for Aqueous Ammonia Systems

Anhydrous Ammonia - Basic Rules	Yes/No/NA	Comments
Are storage tank(s) painted white or other light reflecting colors and maintained in good order?		
Is storage area free of readily ignitable materials?		
Are storage tank(s) kept away from wells or other sources of potable water supply?		
Are storage tank(s) located with ample working space all around?		
Are storage tank(s) properly vented and away from areas where operators are likely to be?		
Does receiving system include a vapor return?		
Is storage capacity adequate to receive full volume of delivery vehicle?		
Are storage tank(s) secured against overturn by wind, earthquake and/or floatation?		
Are tank bottom(s) protected from external corrosion?		
Is aqua ammonia system protected from possible damage from moving vehicles?		
Are storage tank(s) labeled as to content?		
Are all appurtenances suitable for aqua ammonia service?		
Are all storage tank(s) fitted with liquid level gauges?		
Are liquid level gauge(s) adequately protected from physical damage?		
If tubing is used, is it fitted with a fail closed valve?		
Are all storage tank(s) fitted with overfill fittings or high level alarms?		
Are tank(s) fitted with pressure/vacuum valves?		
Is an ammonia gas scrubber system used?		
Are piping and hose materials suitable for aqua ammonia service?		

General Guidance on Risk Management Programs for Chemical Accident Prevention (40 CFR Part 68). EPA-550-B-04-001 April 2004

What-If Checklist Log Sheet - Sample

Item	Equipment/ Activity	Questions	Causes	Consequence/Hazards	Safeguards	Safeguards Adequate?	Recommendations
4.1	Generic Pressure Vessel	What if the set pressure of the equipment SRV is more than the design pressure of the equipment?	Incorrectly set valve purchased or returned after mainten-ance at contractors shop	Potential for rupture and release of vessel contents	Manufacturer or repair shop's QA	Y	None
4.2	Generic Pressure Vessel	What if the SRV is incorrectly sized?	Design limits for SRV incorrectly chosen or SRV sized for vapor flow when two-phase or liquid flow is possible	SRV cannot relieve pressure, potential rupture	Valves purchased for specific service	Y	None
4.3	Generic Pressure Vessel	What if the SRV opens below its set pressure?	Vibration, incorrect design, weakened SRV spring, failure due to inadequate PM program	Release of vapor at relatively low pressure	PM Program	N	Develop PM Program for SRV's

Process Hazard Analysis or Hazard Review

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Program Levels:

There are three program levels.

A facility program level is determined by the result of the off site consequence analysis and whether or not it is subject to the OSHA PSM standard.

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Program 1

- The off site consequence analysis proves that a catastrophic release (worst case scenario) does not reach a public receptor or an environmental receptor.
- Also has not had an incident that caused a death, injury or a restoration response for an environmental receptor

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Program 3

- The process is subject to the OSHA process safety management standard, 29CFR 1910.119
- The process in the NAICS code 32211, 32411, 32511, 325181, 325188, 325192, 325199, 325211, 325311 or 32532.

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Program 2

- The off site consequence analysis proves that a catastrophic release (worst case) would reach a public or environment receptor but the facility does not meet the requirements of Program 3.

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Program 2 -- Hazard Review

Conduct a review of the hazards of the regulated process.

Identify opportunities for equipment malfunction or human error.

Identify safeguards used or needed to prevent such occurrences.

Identify the steps used or needed to detect or monitor releases

Document the results and ensure the problems identified are resolved in a timely manner.

Review and update at least every 5 years and or when major changes occur.

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Process Hazard Analysis -Program 3

- The owner or operator shall perform an initial process hazard analysis (PHA), and identify, evaluate, and control the hazards involved in the process,

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Why a Process Hazard Analysis?

- To identify activities or occurrences that are potential safety problems.
- To determine and develop corrective measures needed to reduce or eliminate the exposure.
- To establish a system to assure that all findings and recommendations are addressed.

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Types of Process Hazard Analysis Allowed

- What-if
- Checklist
- What-if/Checklist
- Hazard and Operability Study (HAZOP)
- Failure Mode and Effects Analysis
- Fault Tree Analysis
- An appropriate equivalent methodology

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Let's look at a "What if" concept

- Develop a PHA team to ask questions pertaining to actions, processes and procedures that occur within an operation.
- Each question addresses a potential failure in operating or maintenance procedures or an activity that could effect a process in an adverse way.

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The PHA Team

- The PHA must be performed by a team with expertise in engineering and process operations and the team must include appropriate personnel.
- The team must include one employee that is familiar with the process and one individual that is familiar with the PHA methodology being used.

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Example questions

- Do the operating procedures address the possibility of a release during power outage?
- Are the inspections of the power hoists adequate?
- Are the fork truck masts tall enough to impact the overhead piping or equipment?

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Examples: Responses

- Power outages are adequately addressed in the operating procedures and operator training.
- The hoists are being inspected monthly as per the manufacturers recommendations and OSHA requirements.
- The fork trucks could make contact with several evaporators in the cold storage warehouse.

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PHA : Fork truck operations

- Exposure was identified.
- Need to determine actions that will reduce and or eliminate the exposure.
- Need to prioritize and document the actions that are needed. (time line, responsibility, etc.)
- Need to establish a tracking system for completion.
- Do not overlook accountability

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Did the PHA address

The hazards of the process?

Identification of any incident that had a likely potential for catastrophic consequences?

Engineering and administrative controls applicable to hazards and interrelationships?

Consequences of failure of engineering and administrative controls?

Stationary source siting?

Human factors?

An evaluation of a range of the possible safety and health effects of failure of controls?

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System to address the team findings

- The owner or operator shall established a system to promptly address the team's findings and recommendations;
- Assure that the recommendations are resolved in a timely manner and documented; document what actions are to be taken;
- Complete actions as soon as possible;
- Develop a written schedule of when these actions are to be completed;
- Communicate the actions to operating, maintenance, and other employees whose work assignments are in the process and who may be affected by the recommendations.

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5 year up-dates

- The PHA must be updated and revalidated by a team every five years after the completion of the initial PHA to assure that the PHA is consistent with the current process,

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Document Retention

- The owner or operator must retain the PHA's and updates or revalidations for each process covered, as well as the resolution of recommendations, for the **life of the process**.

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Operating Procedures

Operating procedures describe tasks to be performed, data to be recorded, operating conditions to be maintained, samples to be collected, and safety and health precautions to be taken. The procedures need to be technically accurate, understandable to employees, and revised periodically to ensure that they reflect current operations. The process safety information package is to be used as a resource to better assure that the operating procedures and practices are consistent with the known hazards of the chemicals in the process and that the operating parameters are accurate. Operating procedures should be reviewed by engineering staff and operating personnel to ensure that they are accurate and provide practical instructions on how to actually carry out job duties safely.

Operating procedures will include specific instructions or details on what steps are to be taken or followed in carrying out the stated procedures. These operating instructions for each procedure should include the applicable safety precautions and should contain appropriate information on safety implications. For example, the operating procedures addressing operating parameters will contain operating instructions about pressure limits, temperature ranges, flow rates, what to do when an upset condition occurs, what alarms and instruments are pertinent if an upset condition occurs, and other subjects. Another example of using operating instructions to properly implement operating procedures is in starting up or shutting down the process. In these cases, different parameters will be required from those of normal operation. These operating instructions need to clearly indicate the distinctions between startup and normal operations such as the appropriate allowances for heating up a unit to reach the normal operating parameters. Also the operating instructions need to describe the proper method for increasing the temperature of the unit until the normal operating temperature parameters are achieved.

Computerized process control systems add complexity to operating instructions. These operating instructions need to describe the logic of the software as well as the relationship between the equipment and the control system; otherwise, it may not be apparent to the operator.

Operating procedures and instructions are important for training operating personnel. The operating procedures are often viewed as the standard operating practices (SOPs) for operations. Control room personnel and operating staff, in general, need to have a full understanding of operating procedures. If workers are not fluent in English then procedures and instructions need to be prepared in a second language understood by the workers. In addition, operating procedures need to be changed when there is a change in the process as a result of the management of change procedures. The consequences of operating procedure changes need to be fully evaluated and the information conveyed to the personnel.

Source: OSHA Guidance on PSM (1910.119), Appendix D: page D-5

For example, mechanical changes to the process made by the maintenance department (like changing a valve from steel to brass or other subtle changes) need to be evaluated to determine if operating procedures and practices also need to be changed. All management of change actions must be coordinated and integrated with current operating procedures and operating personnel must be oriented to the changes in procedures before the change is made. When the process is shutdown to make a change, then the operating procedures must be updated before startup of the process.

Training in how to handle upset conditions must be accomplished as well as what operating personnel are to do in emergencies such as when a pump seal fails or a pipeline ruptures. Communication between operating personnel and workers performing work within the process area, such as non-routine tasks, also must be maintained. The hazards of the tasks are to be conveyed to operating personnel in accordance with established procedures and to those performing the actual tasks. When the work is completed, operating personnel should be informed to provide closure on the job.

Source: OSHA Guidance on PSM (1910.119)

Operating Procedure Requirements Summary

Steps for Each Phase	Program 2	Program 3*
Initial startup	✓	✓
Normal operations	✓	✓
Temporary operations	✓	✓
Emergency shutdown	✓	✓
Emergency operations	✓	✓
Normal shutdown	✓	✓
Start-up following a normal or emergency shutdown or major change	✓	✓
Lockout/tagout*		✓
Confined space entry*		✓
Opening process equipment or piping*		✓
Entrance into the facility*		✓
Operating Limits	**Program 2**	**Program 3**
Consequences of deviations	✓	✓
Steps to avoid, correct deviations	✓	✓
Equipment Inspection	✓	
Safety & Health Considerations	**Program 2**	**Program 3**
Chemical properties & hazards		✓
Precautions for preventing chemical exposure		✓
Control measures for exposure		✓
QC for raw materials and chemical inventory		✓
Special or unique hazards		✓
Safety Systems & Their Functions	**Program 2**	**Program 3**
What systems are there and how do they work		✓
Annual Certification Requirement	**Program 2**	**Program 3**
Conduct annual certification		✓

*The owner or operator shall develop and implement safe work practices to provide for the control of hazards during operations that apply to employees and contract employees.
Reference 40 CFR 68.69(d).

Operating Procedures

- Must be:
  - Appropriate for the equipment and operations
  - Complete
  - Easily understood by facility's operators
  - Readily accessible to workers who operate or maintain the process
- Review/modify as often as necessary to reflect current practices and process changes

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Operating Procedure Requirements Summary

Steps for Each Phase	Program 2	Program 3*
Initial startup	✓	✓
Normal operations	✓	✓
Temporary operations	✓	✓
Emergency shutdown	✓	✓
Emergency operations	✓	✓
Normal shutdown	✓	✓
Start-up following a normal or emergency shutdown or major change	✓	✓
Lockout/tagout*		✓
Confined space entry*		✓
Opening process equipment or piping*		✓
Entrance into the facility*		✓

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Operating Procedure Requirements Summary

Operating Limits	Program 2	Program 3
Consequences of deviations	✓	✓
Steps to avoid, correct deviations	✓	✓
Equipment Inspection	✓	
Safety & Health Considerations	Program 2	Program 3
Chemical properties & hazards		✓
Precautions for preventing chemical exposure		✓
Control measures for exposure		✓
QC for raw materials and chemical inventory		✓
Special or unique hazards		✓
Safety Systems & Their Functions	Program 2	Program 3
What systems are there and how do they work		✓
Annual Certification Requirement	Program 2	Program 3
Conduct annual certification		✓

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Operating Procedures

- Must give **clear instructions** for safety conducting activities involving a covered process
- **Steps must include:**
  - Initial start-up
  - Normal operations
  - **Temporary operations**
  - **Emergency operations**
  - Normal shut down
  - Start-up following emergency or major change

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Operating Procedures

- **Must have:**
  - Consequences of deviations
  - Steps required to correct or avoid deviation
- **Know your operating limits!!**

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Operating Procedures

- **Safety and health considerations:**
  - Properties of, and physical hazards presented by, the chemicals used in the process
  - Precautions necessary to prevent exposure, including engineering controls, administrative controls, and personal protective equipment

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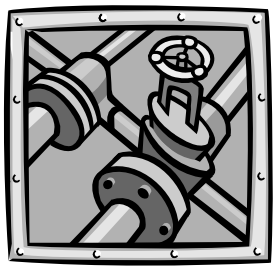
Operating Procedures



- Control measures to be taken if physical contact or airborne exposure occurs
- Quality control for raw materials and control of hazardous chemical inventory levels
- Any special or unique hazards

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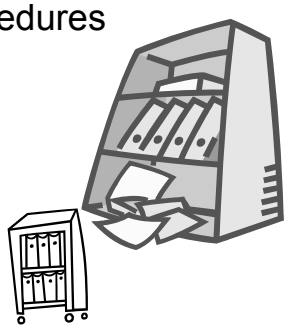
Operating Procedures

- Operating procedures must be **readily accessible** to employees who are involved in a process.



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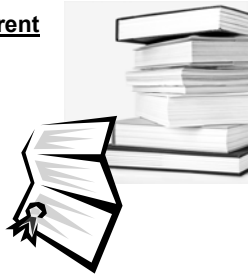
Operating Procedures

- Procedures must be **current and accurate** and that procedures have been reviewed as often as necessary.
- **Must certify annually**!!



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Training

Site-specific, up-to-date, and documented employee training programs are crucial to ensure that employees understand their job in relation to the chemical process, its hazards, and the precautions necessary to prevent process safety incidents. (CCPS)

Employee Training: All employees, including maintenance and contractor employees, involved with highly hazardous chemicals need to fully understand the safety and health hazards of the chemicals and processes they work with for the protection of themselves, their fellow employees and the citizens of nearby communities. Training conducted in compliance with OSHA 1910.1200, the Hazard Communication standard, will help employees to be more knowledgeable about the chemicals they work with as well as familiarize them with reading and understanding MSDS. However, additional training in subjects such as operating procedures and safe work practices, emergency evacuation and response, safety procedures, routine and nonroutine work authorization activities, and other areas pertinent to process safety and health will need to be covered by an employer's training program.

In establishing their training programs, employers must clearly define the employees to be trained and what subjects are to be covered in their training. Employers in setting up their training program will need to clearly establish the goals and objectives they wish to achieve with the training that they provide to their employees. The learning goals or objectives should be written in clear measurable terms before the training begins. These goals and objectives need to be tailored to each of the specific training modules or segments. Employers should describe the important actions and conditions under which the employee will demonstrate competence or knowledge as well as what is acceptable performance.

Hands-on-training where employees are able to use their senses beyond listening, will enhance learning. For example, operating personnel, who will work in a control room or at control panels, would benefit by being trained at a simulated control panel or panels. Upset conditions of various types could be displayed on the simulator, and then the employee could go through the proper operating procedures to bring the simulator panel back to the normal operating parameters. A training environment could be created to help the trainee feel the full reality of the situation but, of course, under controlled conditions. This realistic type of training can be very effective in teaching employees correct procedures while allowing them to also see the consequences of what might happens if they do not follow established operating procedures. Other training techniques using videos or on-the-job training can also be very effective for teaching other job tasks, duties, or other important information. An effective training program will allow the employee to fully participate in the training process and to practice their skill or knowledge.

Source: OSHA Guidance on PSM (1910.119)

RMP TRAINING REQUIREMENTS

Common Deficiencies

- No date or employee ID on Training Records
- No description of training or testing methods
- No documentation of initial or 3-year refresher training

Purpose of a training program

- Provides workers with the information they need to:
  - Understand how to operate safely, and
  - Why safe operations are necessary

Owner/Operator Responsibility

- Provide initial training to all workers in the covered process including safety and health hazards, operating procedures, emergency operations including shutdown and safe work practices
- Provide refresher training at least every three years
- Ascertain and document that each employee received and understood the training,
- O/O shall prepare a record which contains:
  Employee ID,
  Date of training, and
  The means used to verify that the employee understood the training

Training requirements for other Prevention Program (3) Elements

- Mechanical integrity - Training for process maintenance activities
- Management of change & Pre-startup review - Training of each employee involved in operating a process has been completed in any updated or new procedures prior to startup of a process after a major change
- Contractors
  The contract O/O shall assure that each contract employee is trained
  Has received and understood the training,
  Identity of the contract employee, the date of training, and the means used to verify that the employee understood is documented
- Emergency response program
  Training for all employees in relevant procedure

TRAINING DOCUMENTATION FORM - SAMPLE

Topics:

Accident Prevention Program, safety orientation
Personal Protective Equipment Type:
Chemical Hazard Communication
First Aid
Portable Fire Extinguishers

Date(s) of Training:

List of employees who completed this training:	**Testing Method and Results**

Trainer/Employer

Operator Certification Form

Name: _____ SSN: _____

Job Title/Position: _____ Process Area/Dept: _____

This document certifies that as of June 21, 1999, this employee has the required knowledge, skill and abilities to safety carry out duties and responsibilities as specified in the operating procedures for the following process(es):

(1) _____ (2) _____

(3) _____ (4) _____

(5) _____ (6) _____

(7) _____ (8) _____

(9) _____ (10) _____

(11) _____ (12) _____

Employee Signature: _____

Name: _____ Date: _____

Supervisor Signature: _____

Supervisor Name: _____ Date: _____

Training

- **A training program,**
  - **Provides workers with the information they need to:**
    - **Understand how to operate safely, and**
    - **Why safe operations are necessary**
  - **Ensures that the rest of the prevention program is effective**

Training Program Elements

- **Operating Procedures**
- **Maintenance or Mechanical Integrity**
- **Management of Change and Pre-Startup**
- **Contractor**
- **Emergency Response**

Program 2 & 3 Operating Procedure Training

- **Initial Training** -
  - Presently operating a process, and newly assigned to a covered process:
    - Have been trained or tested competent in the operating procedures and safe work practices
    - Employees operating a process on June 21, 1999; O/O certification

Program 2 & 3
Operator Training Requirements

- **Refresher training**
  - At least every three years

Maintenance - Program (2)
Mechanical Integrity - Program (3)

- **Hazards of the process**
- **How to avoid or correct an unsafe condition**
- **Procedures applicable to job tasks**

Management of Change and Pre-Startup Training

- Operators, maintenance and contract employees must be trained in any updated or new procedures prior to startup of a process after a major change
- Training must be complete prior to introduction of regulated substance to a new or changed process

Emergency Response Training

- Employees must be trained in relevant ER procedures –
- Document

Contractor Must Insure Contract Employees are Trained in:

- Safe work practices
- Known hazards and emergency response activities (Program 3)
- Maintenance procedures related to process hazard

Training Documentation Owner/Operator Requirements

- Ascertain that each employee:
  - Received and understood the training,
- Prepare a record which contains:
  - Employee ID,
  - Date of training, and
  - The means used to verify that the employee understood the training

Training Basics

- Site-specific
- Up-to date
- Documented

Training Deficiencies

- **No date or employee ID on Training Records**
- **No description of training or testing methods**
- **No documentation of initial or 3-year refresher training**

RMP Prevention Program

Training Requirements

Employee Participation

Common Deficiencies:

- Failure to develop a written plan of action regarding the implementation of the employee participation
- Failure to consult with employees and their representatives on the conduct and development of process hazards analyses
- Failure to provide employees and their representatives access to process hazards analyses and to all other information required to be developed under the chemical accident prevention rule

Because of their first-hand knowledge of problems and practical solutions, non-supervisory employees (operators, mechanics, etc.) should be included in the process. (CCPS)

The employee participation rule applies to Program 2 and 3 facilities. It requires you to consult with your employees and their representatives on the conduct and development of process hazards analyses and other required process safety management elements.

The Risk Management Program is a tool to be used by everyone in a facility, not just management. Parent company developed RMPs should have local input, review and relevance.

The table below briefly summarizes what you must do:

Program 3 Facilities: EMPLOYEE PARTICIPATION REQUIREMENTS

Write a plan	Develop a written plan of action regarding how you will implement employee participation.
Consult with employees	Consult your employees and their representatives regarding conducting and developing PHAs and other elements of process safety management in the risk management program rule. ▪ Review and certify operating procedures ▪ Determine frequency of training with employee input* (Program 2) ▪ Review maintenance procedures, use of equipment and need for upgrade or retrofit* (Program 2) ▪ Review incident investigations with all affected personnel* (Program 2)
Provide access to information	Ensure that your employees and their representatives have access to PHAs and all other information required to be developed under the rule.

Prevention Program

Employee Participation

Employee Participation

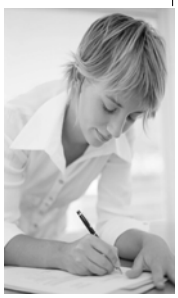
- *Because of their first-hand knowledge of problems and practical solutions, non-supervisory employees (operators, mechanics, etc.) should be included in the process. (CCPS)*

Employee Participation - Defined

- **Consult with employees and their representatives on the conduct and development of:**
  - **Process hazards analyses**
  - **Other process safety management elements in chemical accident prevention provisions.**

Employee Participation Requirements

Written plan of action regarding the implementation of the employee participation.



Plan Might Address

- Training - topic and frequency
- Mechanism for Operator Input
  - Contact
  - Scheduled review
- Availability of PHA documents

Mechanical Integrity

OSHA believes it is important to maintain the mechanical integrity of critical process equipment to ensure it is designed and installed correctly and operates properly. PSM mechanical integrity requirements apply to the following equipment:

- Pressure vessels and storage tanks;
- Piping systems (including piping components such as valves);
- Relief and vent systems and devices;
- Emergency shutdown systems;
- Controls (including monitoring devices and sensors, alarms, and interlocks); and
- Pumps.

The employer must establish and implement written procedures to maintain the ongoing integrity of process equipment. Employees involved in maintaining the ongoing integrity of process equipment must be trained in an overview of that process and its hazards and trained in the procedures applicable to the employees' job tasks.

Inspection and testing must be performed on process equipment, using procedures that follow recognized and generally accepted good engineering practices. The frequency of inspections and tests of process equipment must conform with manufacturers' recommendations and good engineering practices, or more frequently if determined to be necessary by prior operating experience. Each inspection and test on process equipment must be documented, identifying the date of the inspection or test, the name of the person who performed the inspection or test, the serial number or other identifier of the equipment on which the inspection or test was performed, a description of the inspection or test performed, and the results of the inspection or test.

Equipment deficiencies outside the acceptable limits defined by the process safety information must be corrected before further use. In some cases, it may not be necessary that deficiencies be corrected before further use, as long as deficiencies are corrected in a safe and timely manner, when other necessary steps are taken to ensure safe operation.

In constructing new plants and equipment, the employer must ensure that equipment as it is fabricated is suitable for the process application for which it will be used. Appropriate checks and inspections must be performed to ensure that equipment is installed properly and is consistent with design specifications and the manufacturer's instructions.

The employer also must ensure that maintenance materials, spare parts, and equipment are suitable for the process application for which they will be used.

Source: OSHA Guidance on PSM (1910.119)

Mechanical Integrity

- Written procedures
- Training
- Inspections and testing
- Corrective actions
- Fabrication/installation of new equipment
- Maintenance materials and parts

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Written Procedures

- Shut down & start up and/or isolation procedures for each specific task. (LOTO)
- Training requirements & methods to assure that training is adequate. (testing should be considered)
- Inspection/testing procedures addresses needed frequency & operational tolerances.
- Methods for assuring that new equipment or modifications to existing equipment are suitable for the process. (MOC covers this)

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Inspection Practices

- Follow recognized and generally good engineering practices for inspections and testing.
  - Manufactures recommendations
  - Industry standards (ASME, NFPA, IIAR, Etc.)
  - Prior operating experience

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Pressure Relief Devices

IIAR Bulletin 110, Section 6.6.3
(Excerpts)
Revision: May 24, 2007

Pressure relief devices shall be replaced or recertified in accordance with one of these three options:

1. Every five (5) years from the date of installation.
   IIAR originally recommended (in 1978) that pressure relief valves be replaced every five years from the date of installation. This recommendation represents good engineering practice considering the design and performance of pressure relief devices; or
2. An alternative to the prescriptive replacement interval, i.e., five years, can be developed based on documented in-service relief valve life for specific applications **using industry accepted good practices of relief valve evaluation**; or
3. The manufacturer's recommendations on replacement frequency of pressure relief devices shall be followed.

Exception: Relief devices discharging into another part of the closed-loop refrigeration system are not subject to the relief valve replacement practices.

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Inspection Frequency

- Ensure frequency of inspections and tests consistent with applicable manufacturers' recommendations, good engineering practices, and prior operating experience.
  - Hourly
  - Daily
  - Monthly
  - Annually
  - Manufactures recommendations

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Inspection Documentation

Document each inspection with

- Date
- Name of the person who performed inspection
- Serial number or other identifier of equipment
- Description
- Results

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Documentation Format

- Meets 29 CFR 1910 and 40 CFR 68
- Simple to maintain but captures all of the necessary information
- Accountability for both the inspection/test completion and the documentation of the results
- Corrective action (when needed) and documentation tied to the inspection report.

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Documentation Formats

Complexity

- Routine checklist
  - Hourly task
  - Simple items
  - Little training required to execute
- Complex checklist
  - Hourly or less
  - All items can be critical
  - Requires extensive training

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Inspection Identified Equipment Deficiencies

- The owner or operator shall <u>correct</u> deficiencies in equipment that are outside acceptable limits (defined by the process safety information in Sec. 68.65) before further use or in a safe and timely manner when necessary means are taken to assure safe operation.

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Design and Installation

Appropriate checks and inspections shall be performed to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions.

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Maintenance Materials

The owner or operator shall assure that maintenance materials, spare parts and equipment are suitable for the process application for which they will be used.

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Management of Change/ Pre-startup Safety Review

For existing processes that have been shutdown for turnaround, or modification, etc., the employer must assure that any changes other than "replacement in kind" made to the process during shutdown go through the management of change procedures. P&IDs will need to be updated as necessary, as well as operating procedures and instructions. If the changes made to the process during shutdown are significant and impact the training program, then operating personnel as well as employees engaged in routine and non-routine work in the process area may need some refresher or additional training in light of the changes. Any incident investigation recommendations, compliance audits or PHA recommendations need to be reviewed as well to see what impacts they may have on the process before beginning the startup.

Management of Change Requirements (Program Level 3)[i]

MOC procedures must address:	**Employees affected by the change must:**	**Update process safety information if:**	**Update operating procedures if:**
Technical basis for the change Impact on safety and health Modifications to operating procedures Necessary time period for the change Authorization requirements for proposed change	Be informed of the change before startup Trained in the change before startup	A change covered by MOC procedures results in a change in any PSI required under EPA's rule (see § 67.65)	A change covered by MOC procedures results in a change in any operating procedure required under EPA's rule (see § 67.69)

Pre-Startup Safety Review

For new processes, the employer will find a PHA helpful in improving the design and construction of the process from a reliability and quality point of view. The safe operation of the new process will be enhanced by making use of the PHA recommendations before final installations are completed. P&IDs are to be completed along with having the operating procedures in place and the operating staff trained to run the process before startup. The initial startup procedures and normal operating procedures need to be fully evaluated as part of the pre-startup review to assure a safe transfer into the normal operating mode for meeting the process parameters.

Interrelationship of [Process Safety Management] Elements

An essential part of verifying program implementation is to audit the flow of information and activities among the [Process Safety Management] elements. When information in one element is changed or when action takes place in one element that affects other elements, the Safety Compliance Officers or Health Compliance Officers (SCO/HCO) shall review a sample of the related elements to see if the appropriate changes and followup actions have taken place.

The following example demonstrates the interrelationship among the elements:
During a routine inspection of equipment **(Mechanical Integrity)**, the maintenance worker discovers a valve that no longer meets the applicable code and must be changed. Because the type of valve is no longer made, a different type of valve must be selected and installed **(Management of Change)**. The type of valve selected may mandate different steps for the operators **(Operating Procedures)** who will require training and verification in the new procedures **(Training)**. The rationale for selecting the type of valve must be made available for review by employees and their representatives **(Employee Participation)**.

When the new valve is installed by the supplier **(Contractors)**, it will involve shutting down part of the process **(Pre-startup Safety Review)** as well as brazing some of the lines **(Hot Work Permit)**. The employer must review the response plan **(Emergency Planning)** to ensure that procedures are adequate for the installation hazards.

Although **Management of Change** provisions cover interim changes, after the new valve is in place the **Process Safety Information** will have to be updated before the **Process Hazard Analysis** is updated or revalidated, to account for potential hazards associated with the new equipment. Also, inspection and maintenance procedures and training will need to be updated **(Mechanical Integrity)**.

In summary, 11 PSM elements can be affected by changing one valve. A SCO/HCO would check a representative number of these 11 elements to confirm that the required follow-up activities have been implemented for the new valve.

GENERAL GUIDANCE ON RISK MANAGEMENT PROGRAMS FOR CHEMICAL ACCIDENT PREVENTION (40 CFR PART 68). EPA-550-B-04-001 April 2004

Process Safety Management of Highly Hazardous Chemicals, OREGON OCCUPATIONAL SAFETY AND HEALTH DIVISION DEPARTMENT OF CONSUMER AND BUSINESS SERVICES, Program Directive A-177, Issued April 5, 1993, Revised August 15, 2000.

SCO/HCO: Safety Compliance Officers or Health Compliance Officers

Management of Change
Pre-startup Safety Review

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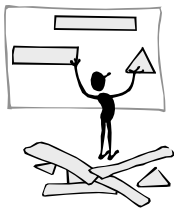
Management of Change § 68.75

- **Owner/Operator Shall**
  - Establish and Implement written procedures to manage changes
    - Except for "replacements in kind"



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Except for "replacements in kind"

"In Kind"

MOC NOT Req.

"NOT In Kind"

MOC Req.

Different Procedures
- Installation & Testing
- Operating
  - Training

Maintenance
  - Training

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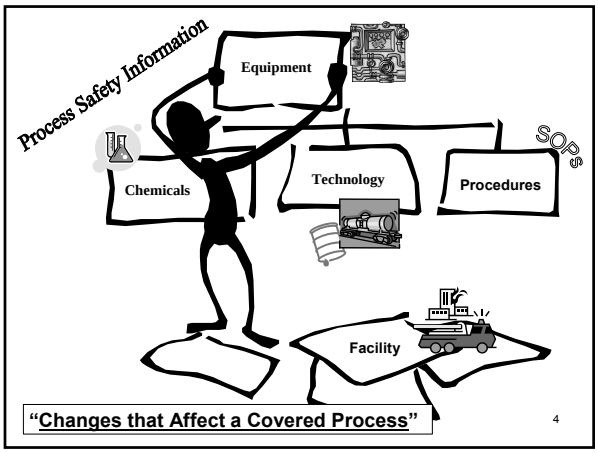

DESCRIPTION OF PROPOSED CHANGE AND POTENTIAL HAZARDS

- Technical basis
- Impact on safety and health
- Impact on operating procedures
- Time period for the change
- Authorization requirements
- Affected employees informed/trained *prior to start-up*
- Updated process safety information

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Deficiencies: Not Implementing MOC

- Have affected **personnel** (i.e., operations, maintenance, and contract) been **informed** of **and trained** in this change?
- Are **operating procedures or maintenance procedures** required to be **updated** as a result of this change?
  - **If yes**, have **affected personnel** been **trained** in the updated operating procedures?
- Is the **PHA**, **Offsite Consequence Analysis**, or RMP **applicability** affected by this change?
  - **If yes**, has a **hazard assessment update** been performed (if needed) and has the **revised RMPlan been submitted**?
- Is **process safety information** required to be **updated** as a result of this change?
  - **If yes**, has a **Prestartup Safety Review** been performed?

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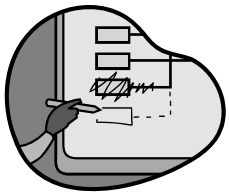
Pre-startup Safety Review

- For modified facilities where a change is needed to the *process safety information*
- For new facilities



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Pre-startup Safety Review

Evaluate beforehand

- Construction & equipment is in accordance w/ design specs
- Safety, operating, maintenance, & emergency procedures are in place & adequate
- PHA has been performed and recommendations resolved for new facilities
- Modified facilities meet the requirements contained in MOC
- Training has been completed for employees involved in operating the new process

Before you push

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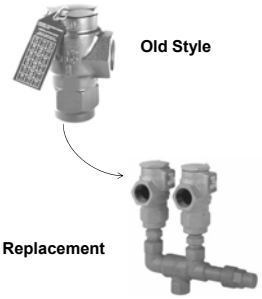
MOC & PSSR Example

- During a routine inspection, a maintenance worker discovers a valve that no longer meets the applicable code and must be changed.



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MOC & PSSR Example (cont'd)

Management of Change: Because the type of valve is no longer made, a different type of valve must be selected and installed.

Operating Procedures: The type of valve selected may mandate different steps for the operators.

Training: The operators will require training and verification in the new procedures.

Employee Participation: The rationale for selecting the type of valve must be made available for review by employees and their representatives.

Process Safety Information: Will have to be updated before the Process Hazard Analysis is updated or revalidated.

Process Hazard Analysis: Must be updated or revalidated in order to account for potential hazards associated with the new equipment.

Mechanical Integrity: Inspection and maintenance procedures and training will need to be updated.

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MOC & PSSR Example (cont'd)

Pre-startup Safety Review: Required for modified facilities where a change is needed to the process safety information.

- **Contractors:** When the new valve is installed by the supplier it will involve shutting down part of the process.
- **Hot Work Permit:** In addition to shutting down part of the process, some of the lines will need to be welded.
- **Emergency Planning:** The employer must review the emergency response plan to ensure that procedures are adequate for the installation hazards.

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Compliance Audits

Employers need to select a trained individual or assemble a trained team of people to audit the process safety management system and program. A small process or plant may need only one knowledgeable person to conduct an audit. The audit is to include an evaluation of the design and effectiveness of the process safety management system and a field inspection of the safety and health conditions and practices to verify that the employer's systems are effectively implemented. The audit should be conducted or led by a person knowledgeable in audit techniques and who is impartial towards the facility or area being audited. The essential elements of an audit program include planning, staffing, conducting the audit, evaluation and corrective action, follow-up and documentation.

Planning in advance is essential to the success of the auditing process. Each employer needs to establish the format, staffing, scheduling and verification methods prior to conducting the audit. The format should be designed to provide the lead auditor with a procedure or checklist which details the requirements of each section of the standard. The names of the audit team members should be listed as part of the format as well. The checklist, if properly designed, could serve as the verification sheet which provides the auditor with the necessary information to expedite the review and assure that no requirements of the standard are omitted. This verification sheet format could also identify those elements that will require evaluation or a response to correct deficiencies. This sheet could also be used for developing the follow-up and documentation requirements.

The selection of effective audit team members is critical to the success of the program. Team members should be chosen for their experience, knowledge, and training and should be familiar with the processes and with auditing techniques, practices and procedures. The size of the team will vary depending on the size and complexity of the process under consideration. For a large, complex, highly instrumented plant, it may be desirable to have team members with expertise in process engineering and design, process chemistry, instrumentation and computer controls, electrical hazards and classifications, safety and health disciplines, maintenance, emergency preparedness, warehousing or shipping, and process safety auditing. The team may use part-time members to provide for the depth of expertise required as well as for what is actually done or followed, compared to what is written.

An effective audit includes a review of the relevant documentation and process safety information, inspection of the physical facilities, and interviews with all levels of plant personnel. Using the audit procedure and checklist developed in the preplanning stage, the audit team can systematically analyze compliance with the provisions of the standard and any other corporate policies that are relevant. For example, the audit team will review all aspects of the training program as part of the overall audit. The team will review the written training program for adequacy of content, frequency of training, effectiveness of training in terms of its goals and objectives as well as to how it fits into meeting the standard's requirements, documentation, etc. Through interviews, the team can determine the employee's knowledge and awareness of the safety procedures, duties, rules, emergency response assignments, etc. During the inspection, the team

can observe actual practices such as safety and health policies, procedures, and work authorization practices. This approach enables the team to identify deficiencies and determine where corrective actions or improvements are necessary.

An audit is a technique used to gather sufficient facts and information, including statistical information, to verify compliance with standards. Auditors should select as part of their preplanning a sample size sufficient to give a degree of confidence that the audit reflects the level of compliance with the standard. The audit team, through this systematic analysis, should document areas which require corrective action as well as those areas where the process safety management system is effective and working in an effective manner. This provides a record of the audit procedures and findings, and serves as a baseline of operation data for future audits. It will assist future auditors in determining changes or trends from previous audits.

Corrective action is one of the most important parts of the audit. It includes not only addressing the identified deficiencies, but also planning, follow up, and documentation. The corrective action process normally begins with a management review of the audit findings. The purpose of this review is to determine what actions are appropriate, and to establish priorities, timetables, resource allocations and requirements and responsibilities. In some cases, corrective action may involve a simple change in procedure or minor maintenance effort to remedy the concern. Management of change procedures need to be used, as appropriate, even for what may seem to be a minor change. Many of the deficiencies can be acted on promptly, while some may require engineering studies or in-depth review of actual procedures and practices. There may be instances where no action is necessary and this is a valid response to an audit finding. All actions taken, including an explanation where no action is taken on a finding, needs to be documented as to what was done and why.

It is important to assure that each deficiency identified is addressed, the corrective action to be taken noted, and the audit person or team responsible be properly documented by the employer.

To control the corrective action process, the employer should consider the use of a tracking system. This tracking system might include periodic status reports shared with affected levels of management, specific reports such as completion of an engineering study, and a final implementation report to provide closure for audit findings that have been through management of change, if appropriate, and then shared with affected employees and management. This type of tracking system provides the employer with the status of the corrective action. It also provides the documentation required to verify that appropriate corrective actions were taken on deficiencies identified in the audit.

Source: OSHA Guidance on PSM (1910.119)

RMP Compliance Audit Requirements

Title 40: PART 68—CHEMICAL ACCIDENT PREVENTION PROVISIONS
Subpart C—Program 2, § 68.58, Subpart D—Program 3, § 68.79

- **Common Deficiencies:**
  - Not completed at least every three years
  - Do not identify and review all RMP elements
  - Checklist not site-specific
  - Do not identify who is responsible for addressing deficiencies
  - No date when deficiencies were corrected
  - How the deficiencies were addressed
  - Findings and recommendations not addressed
  - Resolutions/ corrections not documented
  - Failure to address previous PHA
  - Failure to ensure all written procedures are consistent
  - Failure to certify audit

- **Purpose of a compliance audit:**
  - Evaluate and measure the effectiveness of your risk management program (RMP):
    - Reviews each of the prevention program elements
      1. Ensure RMP is up-to-date and being implemented
      2. Identify problem areas and take corrective actions
  - Run a safer operation.

- **Owner/Operator responsibility:**
  - Certify that they have evaluated compliance at least every three years to verify that the procedures and practices developed under the rule are adequate and are being followed.
  - Have at least one person knowledgeable in the process.
  - Develop a report of the audit findings.
  - Promptly determine and document an appropriate response to each of the findings and document that deficiencies have been corrected.
  - Retain the two (2) most recent compliance audit reports. This requirement does not apply to any compliance audit report that is more than five years old.

- **Prevention Program Elements**
  - ✓ Safety Information
  - ✓ PHA/Hazard Review
  - ✓ Operating Procedures
  - ✓ Training
  - ✓ Maintenance/Mechanical Integrity
  - ✓ Compliance Audits
  - ✓ Incident Investigation
  - ✓ Management of Change (MOC)
  - ✓ Pre-startup Safety Review
  - ✓ Hotwork
  - ✓ Contractors - Employee Participation

Risk Management Program

Compliance Audits

CA Program Level Requirements

Program 2	Program 3
Safety Information	Process Safety Information
Hazard Review	Processes Hazard Analysis
Operating Procedures	Operating Procedures
Training	Training
Maintenance Mechanical Integrity	Maintenance Mechanical Integrity
	Management of Change
	Pre-Startup Review
Compliance Audits	Compliance Audits
Incident Investigation	Incident Investigation
	Employee Participation Hot Work Permit Contractors

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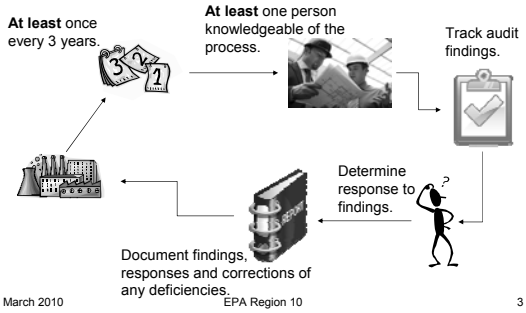
Compliance Audits Process



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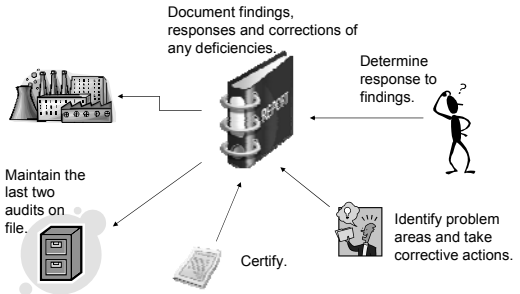
Compliance Audits Documentation



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Compliance Audits Common Deficiencies

- Not completed **at least** every three years
- Did not identify and review all RMP elements
- Checklist not site-specific
- Did not identify who is responsible for addressing deficiencies
- Failure to address previous PHA
- Failure to ensure all written procedures are consistent
- Failure to certify audit
- No date when deficiencies were corrected
- How were the deficiencies addressed
- Findings and recommendations not addressed
- Resolutions/ corrections not documented

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Hot Work Permit

Non-routine work which is conducted in process areas needs to be controlled by the employer in a consistent manner. The hazards identified involving the work that is to be accomplished must be communicated to those doing the work, but also to those operating personnel whose work could affect the safety of the process. A work authorization notice or permit must have a procedure that describes the steps the maintenance supervisor, contractor representative or other person needs to follow to obtain the necessary clearance to get the job started. The work authorization procedures need to reference and coordinate, as applicable, lockout/tagout procedures, line breaking procedures, confined space entry procedures and hot work authorizations. This procedure also needs to provide clear steps to follow once the job is completed to provide closure for those that need to know the job is now completed and equipment can be returned to normal.

Source: OSHA Guidance on PSM (1910.119)

UF HOT WORK PERMIT

This Hot Work Permit is required for any operation involving open flames or producing heat and/or sparks and must be completed by a Competent Hot Work Supervisor (CHWS) and posted at the site. Hot Work includes, but is not limited to: Brazing, Torch Cutting, Grinding, Soldering, and Welding. **If the required precautions cannot be met, Hot Work is not permitted.**

HOT WORK DONE BY ☐ CONTRACTOR	
DATE:	WO #
BUILDING NAME, BLDG #, ROOM #, LOCATION	
NATURE OF JOB	
NAME OF HOT WORK OPERATOR	
I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for work.	
NAME OF COMPETENT HOT WORK SUPERVISOR (CHWS) Contact # _____ Fax # _____	

PERMIT REQUEST	DATE	TIME ⦿AM ○PM
PERMIT EXPIRES	DATE	TIME ⦿AM ○PM

SIGNATURE OF CHWS To be signed during inspection
EH&S Approval

REQUIRED PRECAUTIONS CHECKLIST

Approved _____
Expiration Date _____
Notes:

☐ Available sprinklers, hose streams, and extinguishers are in service/operable.

☐ Hot work equipment in good repair.

Requirements within 35ft of work

☐ Flammable liquids, dust, lint and oil deposits removed.

☐ Explosive atmosphere in area eliminated.

☐ Floors swept clean of combustibles.

☐ Combustible floors wet down,

☐ Combustible floors wet down, covered with damp sand or fire-resistant sheets.

☐ Remove other combustibles where possible. Otherwise protect with fire-resistant tarpaulins, screens or shields.

☐ All wall and floor openings covered.

☐ Fire-resistant tarpaulins suspended beneath elevated hot work.

Work on walls or ceilings/enclosed equipment

☐ Construction is noncombustible and without combustible covering or insulation.

☐ Combustibles on other side of walls moved away.

☐ No danger exists by conduction of heat into another room or area

☐ Enclosed equipment cleaned of all combustibles.

☐ Containers purged of flammable liquids and vapors.

Fire watch/hot work area monitoring.

☐ Fire watch will be provided during and continuously for 30 minutes after work, including during any work breaks.

☐ Fire watch is supplied with suitable extinguishers.

☐ Fire watch is trained in use of this equipment and in sounding alarm.

☐ Fire watch may be required for adjoining areas, above and below.

☐ Hot work area inspected 30 minutes after job is completed.

Other precautions Taken

☐ Confined space entry permit required.

☐ Area is protected with smoke or heat detection.

☐ Ample ventilation to remove smoke/vapor from work area.

☐ Lockout/tagout required.

Comments:

FAX TO EH&S @352-392-6367 PRIOR TO 8:00AM OF PERMIT REQUEST DATE

This Permit was developed for compliance with:

EH&S HOT WORK SAFETY POLICY UFEHS-SAFE1-07/22/2003

Submit Form Reset Form

SAMPLE

Contractors

Employers who use contractors to perform work in and around processes that involve highly hazardous chemicals, will need to establish a screening process so that they hire and use contractors who accomplish the desired job tasks without compromising the safety and health of employees at a facility. For contractors, whose safety performance on the job is not known to the hiring employer, the employer will need to obtain information on injury and illness rates and experience and should obtain contractor references. Additionally, the employer must assure that the contractor has the appropriate job skills, knowledge and certifications (such as for pressure vessel welders). Contractor work methods and experiences should be evaluated. For example, does the contractor conducting demolition work swing loads over operating processes or does the contractor avoid such hazards?

Contract employees must perform their work safely. Considering that contractors often perform very specialized and potentially hazardous tasks such as confined space entry activities and non-routine repair activities it is quite important that their activities be controlled while they are working on or near a covered process. A permit system or work authorization system for these activities would also be helpful to all affected employers. The use of a work authorization system keeps an employer informed of contract employee activities, and as a benefit the employer will have better coordination and more management control over the work being performed in the process area. A well run and well maintained process where employee safety is fully recognized will benefit all of those who work in the facility whether they be contract employees or employees of the owner.

Source: OSHA Guidance on PSM (1910.119)

SAMPLE DOCUMENT

ZIP _____ RISK IDENTIFICATION NO. _____ EFFECTIVE DATE OF RATING _____

FEDERAL IDENTIFICATION NUMBER _____ STATE OF COVERAGE _____

Coverage Period							
(1) Effective Month/Day/ Year	(2) Expiration Month/Day/ Year	(3) Class Code	(4) Payroll	(5) Claim Identification Number Assigned	(6) Injury Type Code	(7) Open/Closed –Final (O/F)	(8) Incurred Losses (Paid plus Reserves)

PLEASE FOLLOW THE INSTRUCTIONS ON THE BACK PAGE FOR COMPLETING THIS WORKSHEET, AND RETURN IT TO NCCI PRIOR TO THE RATING EFFECTIVE DATE.

ERM-6 (Rev. 12/03)

Page 1 of 2

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Hot Work Permit

- Permit for each hot work operation conducted on or near a covered process.
- The permit shall document that the fire prevention and protection requirements in 29CFR 1910.252(a) have been implemented prior to beginning the hot work operations.
- The permit shall indicate the date(s) authorized for hot work and the object(s) upon which hot work is to be performed.
- The permits shall be kept on file until completion of the hot work operations.

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Contractors

- Requires that the owner or operator has obtained and evaluated contract owner or operator's safety performance and programs before selecting the contractor
  - How does your contracting or finance office fulfill this requirement?
  - Do you review the State OSHA website for injuries or accident/insurance claims?

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Facility Responsibilities

- Inform the contract owner or operator of the known potential fire, explosion, or toxic release hazards related to the contractor's work and the process.
- Explain to the contract owner or operator the applicable provisions of the emergency response or the emergency action program.
- Develop and implement safe work practices consistent with §68.69(d), to control the entrance, presence, and exit of the contract owner or operator and contract employees in the covered process areas.
- Periodically evaluate contractor in meeting their responsibilities

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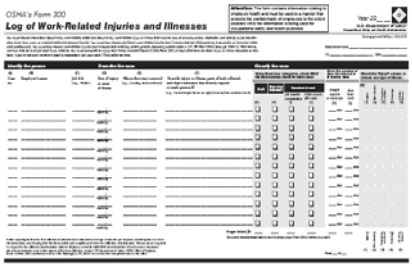
OSHA / WISHA Report Forms


OSHA's Form 300

Log of Work-Related Injuries and Illnesses

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Workers Compensation experience rating report

ZIP RISK IDENTIFICATION NO. EFFECTIVE DATE OF RATING

FEDERAL IDENTIFICATION NUMBER STATE OF COVERAGE

Coverage Period							
(1) Effective Month/Day/Year	(2) Expiration Month/Day/Year	(3) Class Code	(4) Payroll	(5) Claim Identification Number Assigned	(6) Injury Type Code	(7) Open/Closed -Final (O/F)	(8) Incurred Losses (Paid plus Reserves)

PLEASE FOLLOW THE INSTRUCTIONS ON THE BACK PAGE FOR COMPLETING THIS WORKSHEET, AND RETURN IT TO NCCI PRIOR TO THE RATING EFFECTIVE DATE.

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BP Texas City Explosion
15 fatalities

Incident Investigations

Incident investigation is the process of identifying the underlying causes of incidents and implementing steps to prevent similar events from occurring. The intent of an incident investigation is for employers to learn from past experiences and thus avoid repeating past mistakes. Some of the events are sometimes referred to as "near misses," meaning that a serious consequence did not occur, but could have.

Employers need to develop in-house capability to investigate incidents that occur in their facilities. A team needs to be assembled by the employer and trained in the techniques of investigation including how to conduct interviews of witnesses, needed documentation and report writing. A multi-disciplinary team is better able to gather the facts of the event and to analyze them and develop plausible scenarios as to what happened, and why. Team members should be selected on the basis of their training, knowledge and ability to contribute to a team effort to fully investigate the incident.

Employees in the process area where the incident occurred should be consulted, interviewed or made a member of the team. Their knowledge of the events form a significant set of facts about the incident which occurred. The report, its findings and recommendations are to be shared with those who can benefit from the information. The cooperation of employees is essential to an effective incident investigation. The focus of the investigation should be to obtain facts, and not to place blame. The team and the investigation process should clearly deal with all involved individuals in a fair, open and consistent manner.

Source: OSHA Guidance on PSM (1910.119), Appendix D: page D-11

Requirements	Program 2	Program 3
Initiate an investigation promptly, but within 48 hours.	X	X
Assemble an Investigation Team.		X
Summarize the investigation in a report.	X	X
Address findings/recommendations.	X	X
Review the report with your staff/contractors.	X	X
Retain Report for Five Years.	X	X

Important to Remember:

- Does this meet Five-Year Accident History criteria?
    - Required to submit RMP correction within 6 months.
- Does this incident impact other Prevention Program elements?

At a Minimum, **Key Elements should always** be routinely reviewed following an incident:

- Operating Procedures;
- Maintenance Procedures;
- Process Hazard Analysis; and
- Training

Incident Investigation

Risk Management Program

What's an Incident?

March 2010 EPA Region 10 2

Definitions

- Incident – Event **which resulted in**, or could reasonably have resulted in a **catastrophic release** *of a regulated substance. (**includes near misses**)*
- Incident Investigation – Written analysis of an accident/incident using various methods of causal determination.
- Catastrophic Release – One that presents an imminent and substantial endangerment to public health and the environment.

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Examples of Catastrophic Releases

- Process fires
- Explosions
- Reportable spills and releases
- Flammable, toxic, or reactive piping failures
- Line breaking accidents
- Equipment failures

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Requirements for an Investigation

- Begin within 48 hours of accident or incident.
- Establish knowledgeable investigation team.
- Summarize the investigation in a written report.

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Incident Investigation

Requirements	Program 2	Program 3
Initiate an investigation promptly, but within 48 hrs.	X	X
Assemble Investigation Team.		X
Summarize the investigation in a report.	X	X
Address findings/recommendations.	X	X
Review the report with your staff/contractors.	X	X
Retain Report for Five Years.	X	X

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Incident Investigation

- Important to Remember:
  - Does this meet Five-Year Accident History criteria?
    - Required to submit RMP correction within 6 months.
  - Does this incident impact other Prevention Program elements?

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Incident Investigation Prevention Program Elements

- At a Minimum**, Key Elements should always** be routinely reviewed following an incident:
  - **Operating Procedures**;
  - **Maintenance Procedures;**
  - **Process Hazard Analysis**; and
  - **Training**

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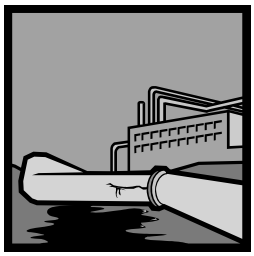
Incident Resolution

- Employer must either:
  - Adopt the incident investigation team's recommendation or
  - Justifiably decline to adopt the recommendations



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Declining Recommendations

- Owner/Operator must:
  - Inform team members;
  - Document the justification in writing:
    - Analysis and recommendations were based on factual errors
    - Recommendation not necessary to protect employees, contractors, or the public
    - Alternative measure would provide sufficient protection
    - Recommendation presented was not feasible for adoption

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Incident Investigations at Progressive Companies

- Not merely looking at only the specific findings, but look beyond "what broke"
- Determine root cause to ensure recurrence is eliminated, if possible
- Look at management systems and organizational structure that could be improved
- Use information from investigation to assess the program
- All incidents are investigated, including "near misses"

March 2010 EPA Region 10 11

Goals of the Investigation

- Use investigation as a program management tool
- Prevents injuries
- Prevent process shutdown
- Prevent recurrence

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Emergency Response

RISK MANAGEMENT PROGRAM REQUIREMENTS

40 CFR 68 Subpart E – Emergency Response

- Does not apply to facilities that exclusively have Risk Management Program Level 1 processes;
- All facilities with Program Level 2 or Program Level 3 processes are required to comply. If a facility has at least one Program 2 or Program 3 process, Part 68 requires the facility to implement an emergency response program if its employees will respond to some releases involving regulated substances.

Facilities have two options when developing programs to address accidental releases of regulated substances. The choices are:

1. Evacuate their employees and use coordinated response plans with local fire departments and/or community emergency response resources (non-responding facility) or
2. Have their employees respond to accidental releases of regulated substances (a responding facility)

The requirements of Subpart E are different based on a facility's choice of being a non-responding facility or a responding facility.

EPA recognizes that, in some cases (particularly for retailers and other small operators with few employees), it may not be appropriate for employees to conduct response operations for releases of regulated substances. For example, it would be inappropriate, and probably unsafe, for an ammonia retailer with only one full-time employee to expect that a tank fire could be handled without help of the local fire department or other emergency responders. EPA does not intend to force such facilities to develop emergency response capabilities. At the same time, the facility is responsible for ensuring effective emergency response to any release at the facility. If the local public responders are not capable of providing such responses, the facility must take steps to ensure that effective response resources are available (e.g., by hiring response contractors or obtaining agreements with regional hazmat teams).

40 CFR 68.90 – Non-Responding Facilities

- As required under OSHA, develop and implement an Emergency Action Plan;
- Coordinate with local response agencies:
    - Included in the Community Emergency Response Plan in response to a potential release of a toxic chemical and/or
    - Ensure that the local fire department is capable and aware of their responsibility to respond to a flammable gas fire.
- It is recommended that the facility document coordination efforts by keeping copies of correspondence, posting emergency response contact information and the procedures that will be used in the event of a response.

40 CFR 68.95 – Responding Facilities

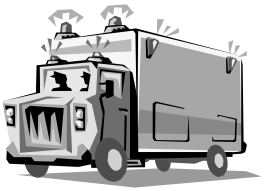
- Must have an Emergency Response Program that protects the public and the environment;
- Emergency Response Program elements must include:
    - Written response plan, which includes;
        - Procedures for informing the public and emergency response agencies about releases;
        - Documentation of proper first aid and emergency medical treatment necessary to treat human exposures;
        - Procedures and measures for emergency response.
    - Procedures for using, inspecting, testing, and maintaining emergency response equipment;
    - Training for employees;
    - Procedure for updating the response plan;

Although EPA's required elements for emergency response are essential to any emergency response program, they are not comprehensive guidelines for creating an adequate response capability. Rather than establish another set of federal requirements for an emergency response program, EPA has limited the provision of its rule to those in the CAA mandates. If a facility has a regulated substance on site, it already is subject to at least one emergency response rule; OSHA's emergency action plan requirements (29 CFR 1910.38). Under OSHA's HAZWOPER regulations, any facility that handles "hazardous substances" (a broad term that includes all of the CAA regulated substances and thus applies to all facilities with covered processes) must comply with either 29 CFR 1910.38(a) or 1910.120(q).

If a facility has a "hazmat" team, it is subject to the 29 CFR 1910.120(q) regulations. If a facility's emergency response program is developed to comply with the OSHA requirements and satisfy the elements listed for a "responding facility", generally, no other action need to be taken to comply with the EPA requirements. The goal is to create on comprehensive emergency response program that can respond quickly and effectively to any type of emergency at a particular facility.

General Guidance on Risk Management Programs for Chemical Accident Prevention (40 CFR PART 68). EPA-550-B-04-001 April 2004

Emergency Response



- Facilities have the option to respond to their own emergencies or rely on local HAZMAT responders
- For all Program 2 or 3 facilities, they must decide on how emergencies will be handled

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Non-Responding Facilities

- All Non-Responding Facilities:
  - Do not need an Emergency Response Program, if:
    - Coordination with local response agencies is arranged;
    - A formal notification procedure is in place to activate the response

March 2010 EPA Region 10 2

Non-Responding Facilities

- Must Coordinate:
  - Toxic substances - must be included in the Community Emergency Response Plan
  - Flammables - local fire department regarding response procedures

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Non-Responding Facilities

- Notification must:
  - Establish appropriate mechanism to notify emergency responders in an emergency
  - Identify an emergency contact that the responder will call for a toxic or flammable release

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Responding Facilities

- Emergency Response Program:
  - Written Emergency Response Plan
  - Procedures for using, inspecting, testing, and maintaining emergency response equipment
  - Training for employees
  - Have procedures to update the emergency response plan

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Emergency Response Program

- Emergency Response Plan:
  - Procedures for informing the public and emergency response agencies about releases
  - Documentation of proper first aid and emergency medical treatment necessary to treat human exposures
  - Procedures and measures for emergency response after an accidental release
  - Complies with other contingency plan regulations or the Integrated Contingency Plan Guidance
  - Coordinated with the Community Emergency Response Plan

March 2010 EPA Region 10 6

First Responder Training

- Facilities must:
  - Comply with OSHA regulations for HAZWOPER
  - If employees of the facility are members of the HAZMAT team, they are subject to additional HAZWOPER requirements

March 2010 EPA Region 10 7

Emergency Response Triggers

- An event or release that:
  - Affects ongoing operations
  - Requires evacuation of employees or the public from the area
  - Poses or has the potential to pose conditions that are immediately dangerous to life and health
  - Poses a serious threat of fire or explosion
  - May cause high levels of exposure to toxic substances
  - Creates uncertainty that the employees can handle the situation with their regular equipment and exposure limits have not been exceeded
  - Causes a situation to be unclear or information is lacking to make informed decisions

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EPA & OSHA Requirements

- EPA requires that facilities to have emergency response procedures to **inform** the public and responders and have **measures in place** to manage an offsite release of a hazardous substance.
- OSHA requires that facilities protect their employees by **evacuation**, **accounting for employees**, and **moving responders** into position to manage a release.

March 2010 EPA Region 10 9

OSHA Regulations

- Facilities who chose to rely on responders must have an **Emergency Action Plan** (29 CFR 1910.120 (q) (1) & 29 CFR 1910.38)
- Facilities who chose to manage their own response must have an **Emergency Response Plan** (29 CFR 1910.120 (q) (2)) and possibly 29 CFR 1910.156 (fire brigades)

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Communication

- Most important to protect employees and the community
- Must be able to communicate with emergency responders regarding safety and employees and community regarding evacuation or sheltering-in-place

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Alarm Systems

- Employers must have and maintain alarm systems
- Alarm system must use a distinctive signal for each purpose
- Capable of being perceived above all ambient noise or light levels
- Be distinctive and recognizable as a signal to evacuate the work area

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Appendix

- RMP Definitions
- Acronyms

68.3 Risk Management Program Definitions

For the purposes of this part: 40 CFR part 68, CAA 112(r) Risk Management Program

Accidental release means an unanticipated emission of a regulated substance or other extremely hazardous substance into the ambient air from a stationary source.

Act means the Clean Air Act as amended (42 U.S.C. 7401 *et seq* .)

Administrative controls mean written procedural mechanisms used for hazard control.

Administrator means the administrator of the U.S. Environmental Protection Agency.

AIChE/CCPS means the American Institute of Chemical Engineers/Center for Chemical Process Safety.

API means the American Petroleum Institute.

Article means a manufactured item, as defined under 29 CFR 1910.1200(b), that is formed to a specific shape or design during manufacture, that has end use functions dependent in whole or in part upon the shape or design during end use, and that does not release or otherwise result in exposure to a regulated substance under normal conditions of processing and use.

ASME means the American Society of Mechanical Engineers.

CAS means the Chemical Abstracts Service.

Catastrophic release means a major uncontrolled emission, fire, or explosion, involving one or more regulated substances that presents imminent and substantial endangerment to public health and the environment.

Classified information means “classified information” as defined in the Classified Information Procedures Act, 18 U.S.C. App. 3, section 1(a) as “any information or material that has been determined by the United States Government pursuant to an executive order, statute, or regulation, to require protection against unauthorized disclosure for reasons of national security.”

Condensate means hydrocarbon liquid separated from natural gas that condenses due to changes in temperature, pressure, or both, and remains liquid at standard conditions.

Covered process means a process that has a regulated substance present in more than a threshold quantity as determined under §68.115.

Crude oil means any naturally occurring, unrefined petroleum liquid.

Designated agency means the state, local, or Federal agency designated by the state under the provisions of §68.215(d) .

DOT means the United States Department of Transportation.

Environmental receptor means natural areas such as national or state parks, forests, or monuments; officially designated wildlife sanctuaries, preserves, refuges, or areas; and Federal wilderness areas, that could be exposed at any time to toxic concentrations, radiant heat, or overpressure greater than or equal to the endpoints provided in §68.22(a) , as a result of an accidental release and that can be identified on local U. S. Geological Survey maps.

Field gas means gas extracted from a production well before the gas enters a natural gas processing plant.

Hot work means work involving electric or gas welding, cutting, brazing, or similar flame or spark-producing operations.

Implementing agency means the state or local agency that obtains delegation for an accidental release prevention program under subpart E, 40 CFR part 63. The implementing agency may, but is not required to, be the state or local air permitting agency. If no state or local agency is granted delegation, EPA will be the implementing agency for that state.

Injury means any effect on a human that results either from direct exposure to toxic concentrations; radiant heat; or overpressures from accidental releases or from the direct consequences of a vapor cloud explosion (such as flying glass, debris, and other projectiles) from an accidental release and that requires medical treatment or hospitalization.

Major change means introduction of a new process, process equipment, or regulated substance, an alteration of process chemistry that results in any change to safe operating limits, or other alteration that introduces a new hazard.

Mechanical integrity means the process of ensuring that process equipment is fabricated from the proper materials of construction and is properly installed, maintained, and replaced to prevent failures and accidental releases.

Medical treatment means treatment, other than first aid, administered by a physician or registered professional personnel under standing orders from a physician.

Mitigation or mitigation system means specific activities, technologies, or equipment designed or deployed to capture or control substances upon loss of containment to minimize exposure of the public or the environment. Passive mitigation means equipment, devices, or technologies that function without human, mechanical, or other energy input. Active mitigation means equipment, devices, or technologies that need human, mechanical, or other energy input to function.

FPA means the National Fire Protection Association.

Natural gas processing plant (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both, classified as North American Industrial Classification System (NAICS) code 211112 (previously Standard Industrial Classification (SIC) code 1321).

Offsite means areas beyond the property boundary of the stationary source, and areas within the property boundary to which the public has routine and unrestricted access during or outside business hours.

OSHA means the U.S. Occupational Safety and Health Administration. Owner or operator means any person who owns, leases, operates, controls, or supervises a stationary source.

Petroleum refining process unit means a process unit used in an establishment primarily engaged in petroleum refining as defined in NAICS code 32411 for petroleum refining (formerly SIC code 2911) and used for the following: Producing transportation fuels (such as gasoline, diesel fuels, and jet fuels), heating fuels (such as kerosene, fuel gas distillate, and fuel oils), or lubricants; Separating petroleum; or Separating, cracking, reacting, or reforming intermediate petroleum streams.

Population means the public.

Process means any activity involving a regulated substance including any use, storage, manufacturing, handling, or on-site movement of such substances, or combination of these activities. For the purposes of this definition, any group of vessels that are interconnected, or separate vessels that are located such that a regulated substance could be involved in a potential release, shall be considered a single process.

Produced water means water extracted from the earth from an oil or natural gas production well, or that is separated from oil or natural gas after extraction.

Public means any person except employees or contractors at the stationary source.

Public receptor means offsite residences, institutions (e.g., schools, hospitals), industrial, commercial, and office buildings, parks, or recreational areas inhabited or occupied by the public at any time without restriction by the stationary source where members of the public could be exposed to toxic concentrations, radiant heat, or overpressure, as a result of an accidental release.

Regulated substance is any substance listed pursuant to section 112(r)(3) of the Clean Air Act as amended, in §68.130.

Replacement in kind means a replacement that satisfies the design specifications.

Retail facility means a stationary source at which more than one-half of the income is obtained from direct sales to end users or at which more than one-half of the fuel sold, by volume, is sold through a cylinder exchange program.

RMP means the risk management plan required under subpart G of this part.

Stationary source means any buildings, structures, equipment, installations, or substance emitting stationary activities which belong to the same industrial group, which are located on one or more contiguous properties, which are under the control of the same person (or persons under common control), and from which an accidental release may occur. The term stationary source does not apply to transportation, including storage incident to transportation, of any regulated substance or any other extremely hazardous substance under the provisions of this part. A stationary source includes transportation containers used for storage not incident to transportation and transportation containers connected to equipment at a stationary source for loading or unloading. Transportation includes, but is not limited to, transportation subject to oversight or regulation under 49 CFR parts 192, 193, or 195, or a state natural gas or hazardous liquid program for which the state has in effect a certification to DOT under 49 U.S.C. section 60105. A stationary source does not include naturally occurring hydrocarbon reservoirs. Properties shall not be considered contiguous solely because of a railroad or pipeline right-of-way.

Threshold quantity means the quantity specified for regulated substances pursuant to section 112(r)(5) of the Clean Air Act as amended, listed in §68.130 and determined to be present at a stationary source as specified in §68.115 of this part.

Typical meteorological conditions means the temperature, wind speed, cloud cover, and atmospheric stability class, prevailing at the site based on data gathered at or near the site or from a local meteorological station.

Vessel means any reactor, tank, drum, barrel, cylinder, vat, kettle, boiler, pipe, hose, or other container.

Worst-case release means the release of the largest quantity of a regulated substance from a vessel or process line failure that results in the greatest distance to an endpoint defined in §68.22(a).

[59 FR 4493, Jan. 31, 1994, as amended at 61 FR 31717, June 20, 1996; 63 FR 644, Jan. 6, 1998; 64 FR 979, Jan. 6, 1999; 65 FR 13250, Mar. 13, 2000]

Definitions of Acronyms

AIChE	**A**merican Institute of Chemical Engineers
ALOHA	Arial Locations of Hazardous Atmospheres
ANSI	American National Standards Institute
API	American Petroleum Institute
ASHRAE	**A**merican Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
BLEVE	Boiling Liquid, Expanding Vapor Explosion
CAA	Clean Air Act
CAS	Chemical Abstracts Service
CBI	Confidential Business Information
CCPS	Center for Chemical Process Safety
CEPPO	Chemical Preparedness and Prevention Office
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CSB	U.S. Chemical Safety and Hazard Information Board
DOT	U.S. Department of Transportation Environmental Protection Agency
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FMEA	Failure Mode and Effects Analysis
FTA	Fault Tree Analysis
HAZMAT	Hazardous Materials
HAZOP	Hazard and Operability Analysis
HAZWOPER	Hazardous Waste Operation and Emergency Response
IDLH	Immediately Dangerous to Life and Health
IIAR	International Institute of Ammonia Refrigeration
LEPC	Local Emergency Planning Committee
LFL	Lower Flammable Limit
MOC	Management of Change
MSDS	Material Safety Data Sheet
NAICS	North American Industrial Classification System
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NOAA	National Oceanographic and Atmospheric Administration
NRC	National Response Center
OSHA	Occupational Safety and Health Administration
P&ID	Process and Instrumentation Diagram
PFD	Process Flow Diagram
PHA	Process Hazard Analysis
PSI	Process Safety Information
PSM	Process Safety Management
PSSR	Pre-Startup Safety Review
RMP	Risk Management Program
SERC	State Emergency Response Commission
SIC	Standard Industrial Classification