Tony Mazzocchi Center

Process Safety Representative Training

Edition 1.1, April 2014

E-27

TONY MAZZOCCHI CENTER

FOR HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION

A PROJECT OF THE UNITED STEELWORKERS, THE COMMUNICATIONS WORKERS OF AMERICA AND THE LABOR INSTITUTE

UNITED STEELWORKERS USW UNITY AND STRENGTH FOR WORKERS

Process Safety Representative Training

Edition 1.1
April 2014

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Written and produced by the Tony Mazzocchi Center for
Health, Safety and Environmental Education, a project of the
United Steelworkers - USW, the Communications Workers of America
and The Labor Institute

April 2014

Edition 1.1

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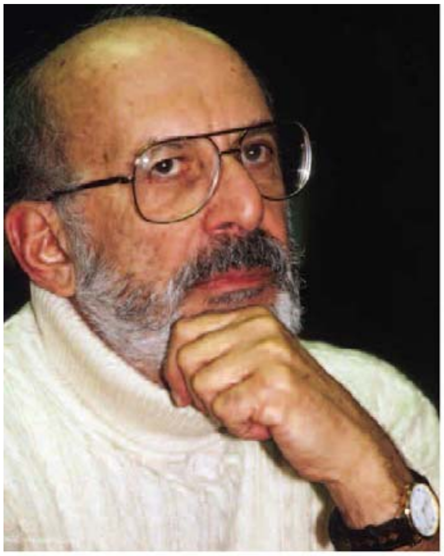
This book is written and produced in cooperation with the United Steelworkers - USW (Five Gateway Center, Pittsburgh, PA 15222), the Communications Workers of America (501 3rd Street NW, Washington, DC 20001) and The Labor Institute, a non-profit organization (817 Broadway, 6th Floor, New York, NY 10003). The project is supported by grant number EPA 2 U45 ES06175 from the National Institute of Environmental Health Sciences (NIEHS), NIH. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIEHS, NIH.

Tony Mazzocchi
(1926-2002)



Tony Mazzocchi is credited by many with founding the modern health and safety movement. As Vice-President and Secretary-Treasurer of the Oil, Chemical and Atomic Workers, he also helped to create OSHA and was the first to link worker safety and health to the environmental movement. The following passage from his biography, *The Man Who Hated Work and Loved Labor*, by Les Leopold, conveys some of his vision and passion for the labor movement:

"Tony Mazzocchi conjured up a labor movement that didn't really exist, but just might. This movement would be militant and green. It wouldn't just fight to protect the workforce from toxics — it would eliminate toxics. It would lead the struggle to prevent global warming. It would give workers real control over the quality and pace of work and over corporate investment decisions. It would champion the fight against militarism and for justice and equality. It would demand life-enhancing social programs like free higher education and free health care for all. In short, it would make good on its potential to transform American capitalism into something more humane."

Memorial

This book is dedicated to the memory of those USW workers and the members of the predecessor unions who lost their lives or were injured from 1984 to 1992. The Process Safety Management Standard, enacted in 1992, was written in part as a result of the 73 brothers and sisters who died and the 711 who were injured.

Further, this Process Safety Representative training is dedicated to the 63 United Steelworkers, contract workers and supervisors who have lost their lives at work since 1992.

It is the hope of the USW, Tony Mazzocchi Center and the National Oil Bargaining committee that through this training a properly educated Process Safety Representative will have an effect on how the facility is operated on a day-to-day basis to help make it safer for all employees as well as the community.

On October 23, 1989, a series of fires and explosions shook Houston Chemical Complex, killing 23 people. They are lost but not forgotten. We cannot and will not forget those whom tragedy hastened away — our loved ones, our fellow workers, our friends. They are gone, but the indelible imprint of their lives remains with us. We mourn their deaths. We celebrate their lives. But most of all, we remember. . .

Ruben Quilantan Alamillo
James Edward Allen
Albert Eloy Arce
James Henry Campbell, Jr.
Juan Manuel Garcia
Eloy Gonzalez
Jose Lara Gonzalez
Mark Lloyd Greeson
Jeffrey Lester Harrison
Delbert Lynn Haskell
Scotty Dale Hawkins
James Deowens Hubbard
Richard Leos
William Scott Martin
Juan Trejo Medrano
James Arthur Nichols
Jesse Thomas Northrup
Mary Kathryn O'Connor
Gerald Galen Pipher
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Jesse Oscar Trevino
Lino Ralph Trujillo
Nathan Gene Warner

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Example of the Factsheet Reading Method for a Task Containing Seven Factsheets

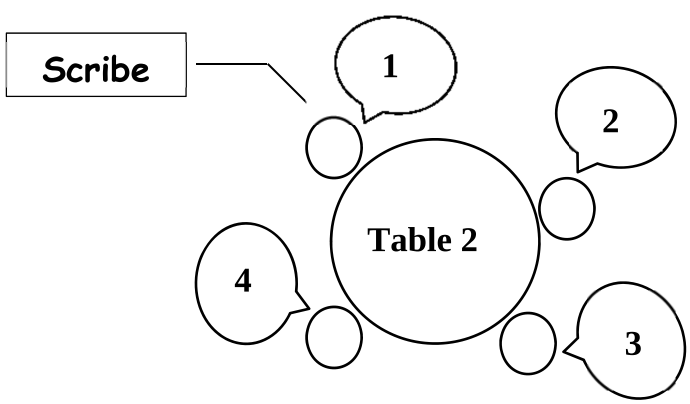
The Small Group Activity Method places workers at the center of the learning experience. It is designed to draw on two bodies of knowledge: The knowledge and experiences workers bring into the room and the factsheets contained in your workbooks.

Each of you will be assigned a small number of factsheets to read. You will then share this new information with your group. The idea is for each of you to describe your assigned factsheets to the others in your group.

Your trainer will assign your individual factsheets in the following way:

First, select a scribe for this task. Starting with the scribe and moving to his/her left, count out loud from 1 to 7. Keep going around the table until all numbers (factsheets) are distributed. For example, if there are four people at your table, the scribe will have self-assigned Factsheets 1 and 5; the person to their left will be responsible for Factsheets 2 and 6, etc. The numbers that you have assigned yourselves correspond to Factsheets 1 through 7 on the following pages.

Once everyone has read their assigned factsheets individually, your scribe will go around the table and ask each of you to explain to the rest of your group what you have learned. No notes need to be taken during this discussion. The factsheets should be explained in the order they were assigned (1 through 7), as many times factsheets build on previous factsheets. Once this process is complete, your trainer will read the scenario and the task. In this way we all start at the same place and with the same information.



The method described above is used several times in this book. A note appears each time the method is to be used.

Tony Mazzocchi Center Proficiency Assessment

Process Safety Representative Training

Complete this page BEFORE you begin your training.

Workbook Title: *Process Safety Representative Training*

Workbook Version: Edition 1.1, April 2014

Today's date: _ _ / _ _ / _ _ _ _
MM DD YYYY

As you complete the assessments at the end of each activity, please only mark one answer choice per question. Make your marks dark and clear when selecting your choice. See the following example:

O	●
No	Yes

Activity 1

Charting a Plan to Address Specific Hazards

Purposes

To recognize similarities and differences between labor and management perspectives in addressing workplace hazards and hazardous conditions.

To work within these perspectives to develop a plan for moving forward to address particular hazards.

This Activity has three tasks.

Introduction

The work of joint labor-management health, safety and environmental committees in identifying hazards and hazardous conditions and then working to get those problems addressed is critical to the health and safety of the workplace and the workforce. Despite ongoing health and safety efforts in workplaces across the country, each year approximately 5,000 workers are victims of acute, traumatic fatalities; another 50,000 to 60,000 die from occupational disease; and millions suffer disabling injuries and illnesses.

A document entitled "The Role of Labor-Management Committees in Safeguarding Worker Safety and Health" by the U.S. Department of Labor, Bureau of Labor-Management Relations and Cooperative Programs, states:

"It is easy to have a labor-management committee for occupational safety and health. It is extremely difficult to have one that can make major inroads into solving tough, long-standing dangers to worker health and safety."

This curriculum is designed to help participants work through some of the problems, obstacles and barriers that have proved to be challenges facing joint labor-management health, safety and environmental committees. In order to do this, there will be times when all participants in the training program (union and management representatives) will be working together in a large group; times participants will first work in union-only and management-only small groups; and times participants will work in small groups that include both union and management representatives. The use of these different groupings ensures that different viewpoints and perspectives are articulated and better understood by all parties. Participants will then be able to identify areas of agreement and set plans in motion to improve workplace health and safety and identify areas where more work will be needed in order to move forward.

We hope that this curriculum on establishing and strengthening joint labor-management health, safety and environmental committees will be useful, challenging and motivating, and will result in an effective mechanism in your workplace for identifying and addressing hazards and hazardous workplace conditions.

Task 1

For this Task, union and management in separate groups will discuss the questions below, develop responses and then share responses between/among the groups.

1. Read the five factsheets that begin on page 5. In your small groups, make a list of two key hazards and hazardous conditions in your facility that need to be eliminated, reduced or prevented.

   There are probably additional hazards and hazardous conditions in your workplace, but for now we'll be focusing on the two key health and safety problems you selected.

2. When all groups are done, put each of your hazards on a separate sheet of paper and post them on the wall. One side of the wall will be for the union responses; another side of the wall will be for management responses. The center of the wall will be used by the trainer to pull together those hazards that union groups and management groups have in common.

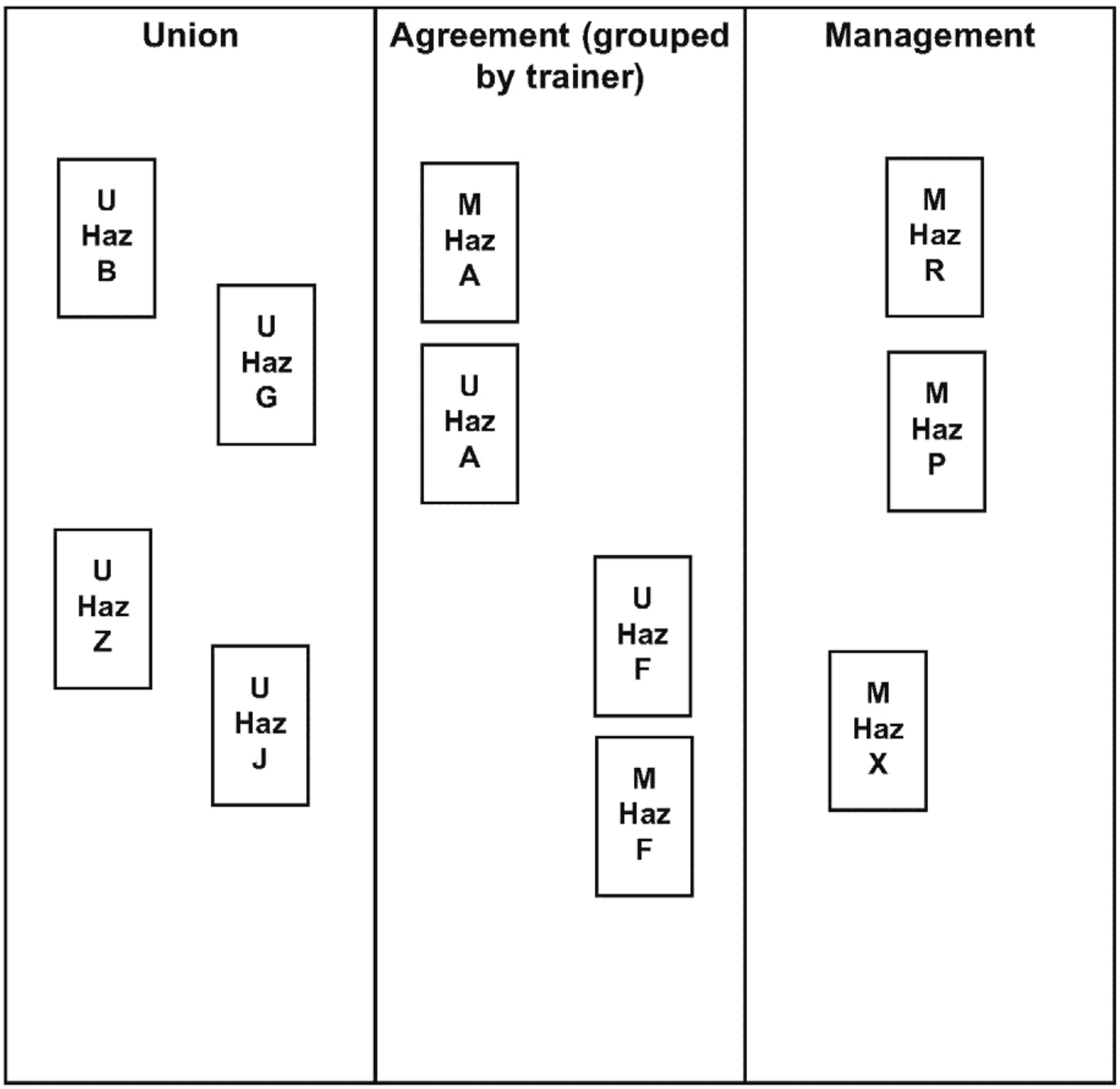
3. Once all papers are posted on the wall, your trainer will now group the like hazards in the middle.

4. If there are any other hazards that have been identified on which all can agree, your trainer will move them to the middle (hazards agreed on by both labor and management). Choose one priority item.

5. While there may be ongoing differences and discussions about addressing various hazards, work can commence and continue on correcting certain priority hazards, and the committee can continue to discuss, debate and work on hazards for which there may not be full agreement.

continued

Task 1 *(continued)*



Factsheet 1: The Goal of Joint Labor-Management Health, Safety and Environmental Committees

There is one overall goal for a joint labor-management health, safety and environmental committee:

Identify, prioritize and control hazards and hazardous workplace conditions using the Hierarchy of Controls and Systems of Safety approach that involves workers and their representatives.

Factsheet 2: Examples of Hazards and Hazardous Workplace Conditions

A hazard is a condition or set of circumstances that can cause harm. There are at least six major categories of occupational safety and health hazards:

Biological Hazards
Examples: Blood, mold, fungus, infectious diseases, viruses, vermin (and excrement of animals such as pigeons, rats, mice).

Ergonomic Hazards (hazards that result in back or repetitive strain injuries)
Example: Lifting, standing all day, vibration, awkward postures, repetitive motions.

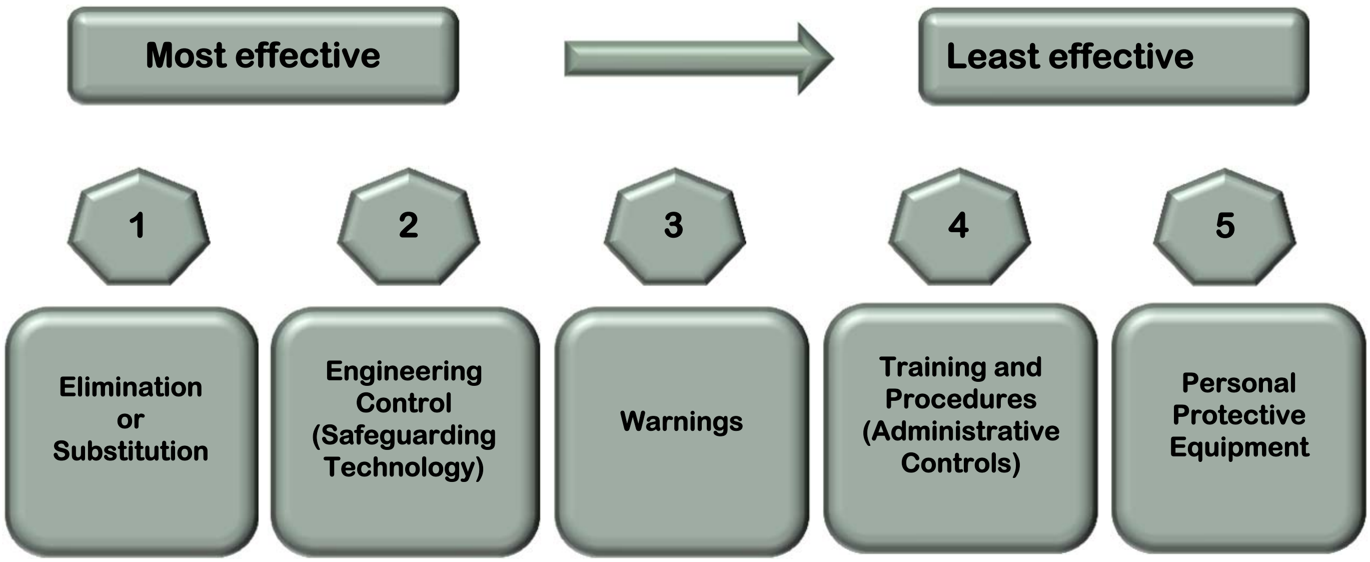
Stressors/Work Design Hazards
Examples: Understaffing, excessive work load, fast work pace, excessive working hours, shift work, job combinations, downsizing, contracting out, production quotas, multi-crafting, safety discipline etc.

Chemical Hazards
Examples: Solvents, lead, asbestos, silica, latex, formaldehyde, cleaning chemicals, metal dust, diesel fumes.

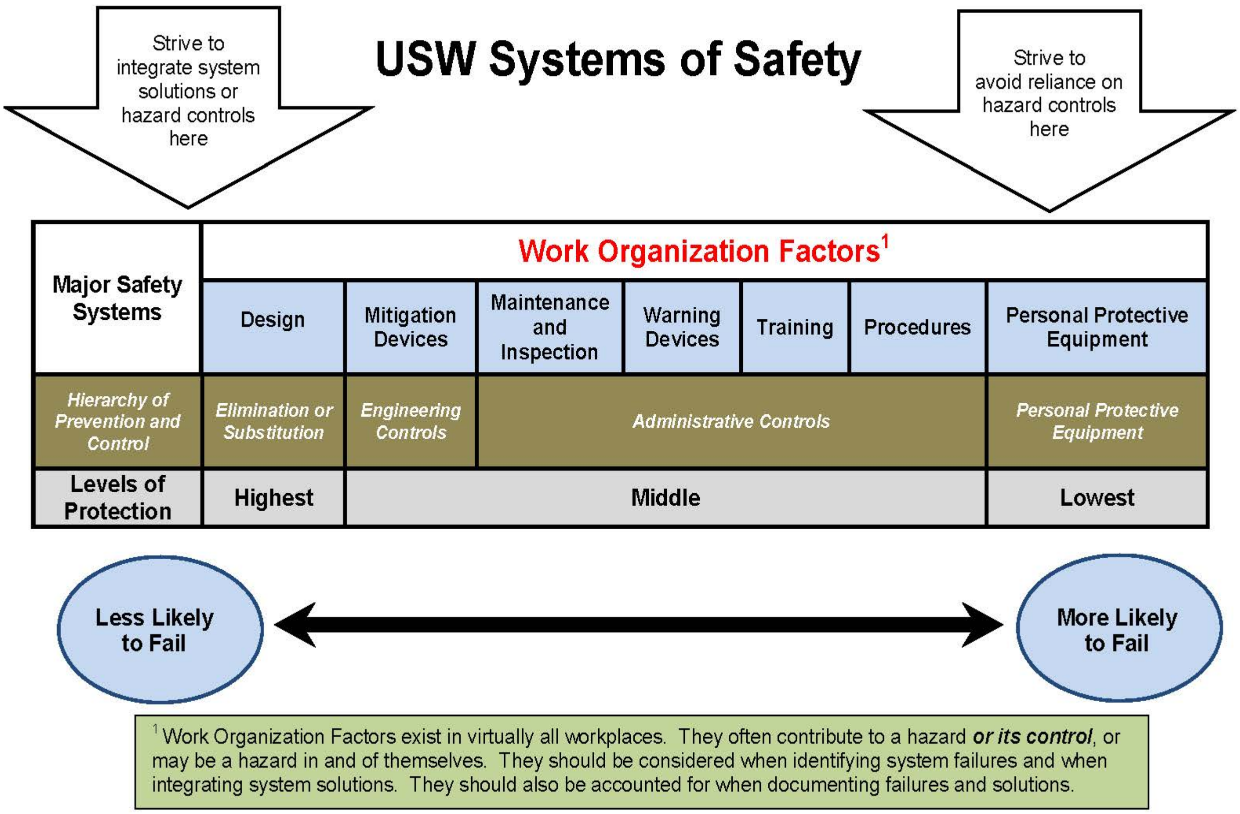
Physical Hazards
Examples: Noise, vibration, radiation, poor lighting, lack of ventilation, extreme temperatures.

Safety Hazards
Examples: Unsafe equipment, electrical hazards, slippery floors, unguarded machines, fall hazards, confined spaces, lack of training.

Factsheet 3: Hierarchy of Controls



Factsheet 4: Systems of Safety



Factsheet 5: Setting Priorities

There are a number of different ways to prioritize hazards for correction.

- Sometimes the biggest concern will be the hazards that are most serious; those that could cause the most serious injuries, illnesses, catastrophes or death.
- Sometimes the biggest concern will be the hazards that are affecting the most people in the workplace.
- Sometimes, in the beginning, it might make sense to tackle a hazard that is a concern for workers in the facility but is easily corrected. This may be useful if the workforce is discouraged and feeling that nothing will ever happen to improve health and safety conditions.

Task 2

For this Task, union and management in separate groups will discuss the questions below, develop responses and then share responses between/among the groups.

Based on your discussions in Task 1 and your understanding of the Hierarchy of Controls/Systems of Safety approach to hazard control, make a plan for moving forward to address some priority hazards.

1. Choose two or three hazards that you heard agreement on in Task 1.
2. Discuss appropriate control measures that will eliminate, reduce or prevent the hazard/hazardous conditions using the Hierarchy of Controls/Systems of Safety approach.
3. Use the example on the next page as a model to construct a chart on the flipchart paper(s) with your responses.
4. When you complete your chart, post it on the wall.

After all groups have completed their charts, each will explain their charts and can answer any clarifying questions regarding the information contained in the charts.

Issue	Short-term Fix (if necessary)	Long-term Fix	Short-term Completion Date	Long-term Completion Date

Task 3

Path Forward on Issues of Agreement that Need a Plan

As a large group, union and management, choose issues that are priority issues needing a longer-term fix. Each issue will require a chart like the one on the next two pages to capture a plan to get the issue addressed using the Hierarchy of Controls/Systems of Safety approach. Review Factsheets 6 and 7 on pages 15 and 16.

There is an example of a completed chart on pages 17 and 18.

Issue Chosen to Chart a Plan to Fix: ______________________________

Desired Outcome at the End of the Plan: ______________________________

Management Official Responsible: ______________________________

Short-term steps needed [to get started right away (first month)]	What will be needed to get this step done?	Who will work to help complete this step?	When will this step be completed?
1.			
2.			
3.			
Next step (after one month and up to the completion of the last step)			
4.			
5.			
6.			
7. Evaluation of Change (EOC)			

8. Barriers that will need to be overcome in reaching the desired outcome (the fix):

9. Supports that will be needed to overcome the above barriers:

Factsheet 6: Path to Complete Your Plan

Short-term steps needed:

These are those things you have to do to reach your long-term goal or fix.

Many times it could be research, a meeting of key people, a determination of equipment needed, getting an approval for time or funds or several other steps depending on the desired outcome. Who is going to complete these steps and when will they be done?

Next steps needed:

- How do we keep this thing moving until we adequately address the identified health or safety problem? Many times it could be an evaluation of where we are in the process; securing materials that weren't available earlier; getting designs from Engineering that take a few weeks; shutting down a process until certain parts are installed; or many other possible steps depending on the hazard or hazardous condition being addressed.
- Reaching the desired outcome and determining that the hazard/hazardous condition has been eliminated or addressed without creating or causing new hazards or other health or safety problems.
- Identifying barriers that may hinder progress in getting this health or safety problem addressed.
- Identifying supports that will be needed to overcome identified barriers and allow the health or safety problem to be adequately addressed.

Factsheet 7: Barriers and Supports to the Effectiveness of Joint Labor-Management Health, Safety and Environmental Committees

Barriers that hinder progress in addressing health and safety problems and supports that can help overcome those barriers can impact the effectiveness of joint labor-management health, safety and environmental committees.

Barriers may include:

- Differing priorities on how to address identified hazards;
- Differing perspectives on the nature and seriousness of particular hazards and hazardous conditions;
- Lack of attention to designing out hazards in the past; and
- Differing priorities, such as financial expenditures, can lead to short-term rather than long-term fixes. Many times the short-term or the inexpensive fix is not the most effective.

Always use the Hierarchy of Controls and Systems of Safety in determining the best way to address hazards.

All important: Major barriers do not mean this hazard or hazardous condition cannot be fixed.

Supports within the workplace to overcome these barriers can also exist:

- Education and materials from sources including NIOSH, OSHA, MSHA, the Chemical Safety Board, USW, TMC, etc.;
- Open communication that allows the voice of workers experiencing the hazards into the discussion about both problems and solutions; and
- A growing appreciation of "Prevention through Design" approaches that can be effective in designing out current hazards.

As we move forward with identifying, correcting and preventing hazards, it is important to both identify barriers that can hinder progress, as well as recognize the supports that can help overcome those barriers.

Issue Chosen to Chart a Plan to Fix: <u>Toxic chemical fumes in compressor room F</u>

Desired Outcome at the End of the Plan: <u>Substitution of a safe chemical for the one being used</u>

Management Official Responsible: <u>John Wilson</u>

Short-term steps needed [to get started right away (first month)]	What will be needed to get this step done?	Who will work to help complete this step?	When will this step be completed?
1. Measure concentration of fumes.	Industrial Hygiene and monitoring equipment	Ralph – IH Direction Sam – Maintenance	May 20
2. Begin installation of new ventilation fans.	Purchase new fans and put in W.O. to Sheetmetal and Electrical	Jim – Sheetmetal Joe – Electrical	June 1
3. Get data on successful use of a substitute chemical.	Contact the two plants using the new chemical	Jill – Development	May 16
Next step (after one month and up to the completion of the last step)			
4. Present data to division heads and plant manager.	Get time on agenda for July 1 Director's Meeting	John and Jill	July 1
5. Set up Compressor Room A as pilot to show result of using new, safe chemical.	Get redesign plan from Engineering to Mechanical Maint.	Henry – Engineering Sam – Maintenance	October 1
6. Set up Compressor Rooms B-F to use new chemical.	Publish Report	Sam – Maintenance	April 15, following year
7. Evaluation of Change (EOC): Before finalizing the change, make sure new chemical is safe and effective over long periods and does not create any new hazards.	Set up schedule for sampling and testing. Talk to workers involved in tasks using the new chemical.	John and Jill	June 1, following year

8. Barriers that will need to be overcome in reaching the desired outcome (the fix):

- Making sure there is safer substitute for the process.
- Convincing upper management that this substitute will work here.
- Having time to work on addressing this hazard with all the other work there is to do.
- Finding time to educate the workforce in these areas about this hazard, and the solution to address it, as well as keeping them apprised of the timeline for correcting the hazard.
- Making sure the solution of a safer substitute is put in place and that progress didn't stop with just new fans.

9. Supports that will be needed to overcome the above barriers:

- Time for research to identify the safer substitute.
- Identifying other workplaces that have implemented this solution.
- Having time allotted to health and safety committee members to regularly be able to work on health and safety issues — including time to talk with and educate the workforce.
- Educating all who work on health and safety about the importance of using the Hierarchy of Controls/Systems of Safety approach that favors elimination of hazards and use of engineering controls over other less effective fixes.

Notes

Summary: Charting a Plan to Address Specific Hazards

1. A chart or a plan to move forward is often necessary to properly address a hazard.
2. The chart can be developed and the progress can be checked in the joint committee meeting each month.
3. If the effort falls behind schedule, barriers can then be identified that are blocking the effort, and supports can be used to attempt to get back on track to properly address the hazard or hazardous workplace conditions.

Tony Mazzocchi Center Proficiency Assessment

Activity 1: Charting a Plan to Address Specific Hazards

Learning Objectives:

1. **To recognize similarities and differences between labor and management perspectives in addressing workplace hazards and hazardous conditions.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

2. **To work within these perspectives to develop a plan for moving forward to address particular hazards.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

3. **A chart or a plan to move forward is often necessary to properly address a hazard.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

4. **If the effort falls behind schedule, barriers can then be identified that are blocking the effort, and supports can be used to attempt to get back on track to properly address the hazard or hazardous workplace conditions.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 2

Process Safety Representative Introduction

Purposes

To review the requirements of the Process Safety Management (PSM) Standard.

To share resources to broaden the PS Rep's background.

This Activity has one task.

Remember, compliance with the PSM Standard is the *absolute minimum* required by law.

Background (NOTE: Trainer to Read to Group)

The PSM Standard has been in effect for nearly 20 years and some argue that it has not helped achieve the hoped for (by workers and unions) improvements in safety in the refining sector. This is not because it is a bad piece of legislation but more because its intent was not embraced by industry. This is nothing new. If you go back to the establishment of OSHA, you will see it has been this way since its beginning. The OSH Act was rather weak and industry has fought every attempt to improve or strengthen it. It has been the same with PSM.

The PSM Standard is a performance-based standard. That means it is goal-oriented and what you should judge is a program's effectiveness. The specifications are not spelled out, just the desired results. Originally, the idea of a **performance standard** seemed to make sense. The refining industry is different from most manufacturing settings; it is more than machine guarding or handrails. But there are some areas of this industry that could certainly be prescriptive (uniform for everyone) in the management of process safety. This may have enabled industry to enact and then follow best practices rather than every site seemingly doing their own thing. With everything being performance-based, it left too much discretion; there are areas that could have been made **prescriptive.**

The objective of the PSM Standard is to prevent unwanted releases of hazardous chemicals, especially into locations which could expose employees and others to serious hazards. To be effective, there must be a systematic approach to evaluating the entire process; in other words, all elements of the Standard need to work together. Elements also need to be reviewed and evaluated to assure their continued effectiveness. This is a proactive process and must involve all stakeholders in identifying, evaluating, mitigating and preventing any releases that could occur as a result of failures in process, procedures or equipment.

The PSM Standard is required by the Clean Air Act Amendments in the Environmental Protection Agency's (EPA) Risk Management Plan. Employers who merge the two sets of requirements into their process safety management program will better ensure full compliance with each, as well as enhance their relationship with the local community.

The PS Rep should also review the requirements of the EPA's Risk Management Plan (RMP) and evaluate the compliance of the employer's written plan with the RMP.

Factsheet 1: PSM Requirements

Written Plans

The PSM Standard requires the employer to develop written plans describing/ detailing how they will accomplish the PSM element requirement(s). **This includes documenting how the employer will involve the employees.**

One of the first steps for the PS Rep to follow is to request copies of the written plans from the employer.

- This will enable the PS Rep to compare the written requirements to the actual actions;
- If there are discrepancies between the written plan and actual performance, then the PS Rep must call these to the attention of the employer and work with them to get the written action plan items reconciled; or
- Change the written plan to reflect actual practice**, but only if that practice accomplishes the goal of the element.**

If there are references to standards [American Petroleum Institute Recommended Practices (API RPs), American Society of Safety Engineers (ASSE), Center for Chemical Process Safety (CCPS)] in the written plans:

- Ask your employer for copies of these standards.
- In the case of API references:
    - Ask if they are using the entire RP or just certain sections; and
    - If they are just using certain sections, have them identified.

Factsheet 2: OSHA/EPA Website

The PS Rep must know how to navigate the OSHA website (www.osha.gov) to find items such as relevant regulations and standard interpretations. Reviewing the appendices for a particular standard is very useful and can often provide guidance as to the intent of the regulation.

The EPA website (www.epa.gov), in particular the Risk Management Plan (RMP) details, is also important. A review of the employer's current Risk Management Plan (40 CFR Part 68) would be a good starting place.

Like OSHA, there are elements to be followed under EPA. The employees have the same walk around rights when an EPA compliance officer shows up on site* as when an OSHA compliance officer shows up.** Union or employee representatives have the right to accompany each agency representative.

Contact your closest regional or area office and inform the agency that your workplace is represented by a union and give them the name of the designated union contact for site visits. It would be beneficial to make an appointment and pay a visit to the office and introduce yourself to the agency representatives.

Federal or State OSHA Plan

Your workplace may be covered by either a Federal or state OSHA plan. Be sure you know which it is and reference the corresponding state codes if you are covered under a state plan.

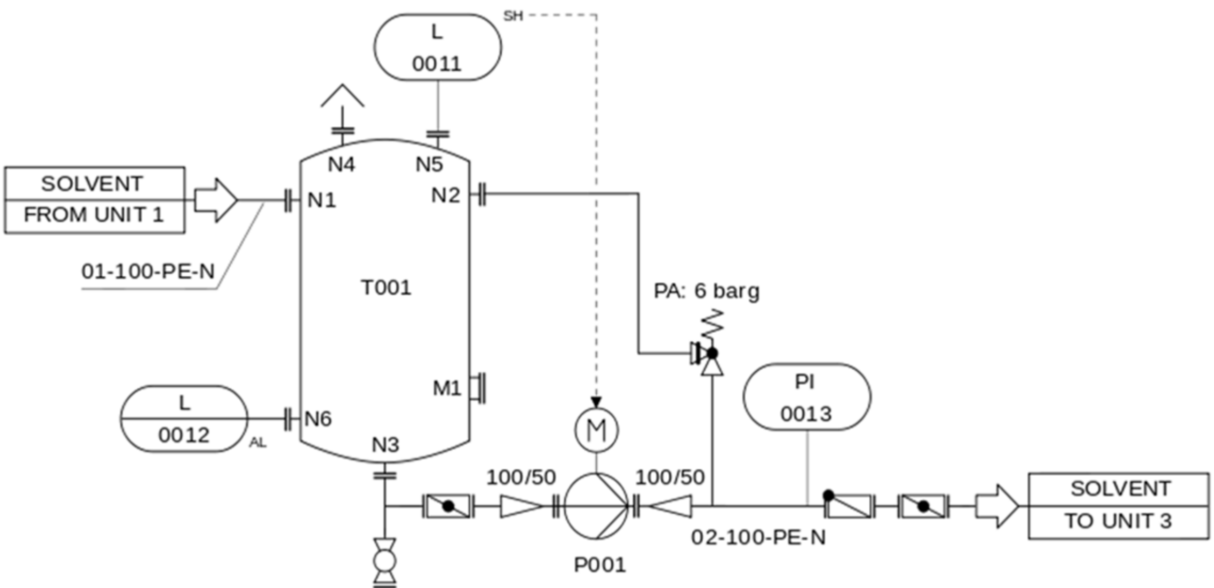
* http://www.epa.gov/emergencies/docs/ chem/clean_air_guidance.pdf.

** http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=OSHACT&p_id=3362.

Factsheet 3: Sample P&ID

It is important to be able to read a P&ID (piping and instrumentation diagram/ drawing). This includes understanding the legends and reading to the next page. If there are sections or symbols you don't understand, get an explanation from the Engineering Department.

	T001	P001
SERVICE	STORAGE TANK	FEED PUMP
DATA	DIAMETER: 1000 mm HEIGHT: 3000 mm CAPACITY: 2.4 m3	FLOW RATE: 5 m3/h DIFF. PRESSURE: 2.5 bar
DESIGN PRESSURE	10 barg	10 barg
DESIGN TEMP.	50 °C	50 °C



Factsheet 4: Communicate with the Local Union

- Attend monthly union meetings and give reports on PSM issues.
- Highlight some efforts or fixes to show the importance of this union position.
- Work with the Joint Health and Safety Committee members and the full time H&S Rep.
- Be sure to direct any bargaining questions to the local leadership.

Remember, you are a resource to the union for H&S bargaining issues. You do not bargain issues for the union.

Factsheet 5: Reference Material

The Process Safety Rep's job should be one of continuous learning. There are many process safety practices in place in other areas of the world:

- Some of these practices may be new and innovative.
- We can only learn from others if we know what they are doing.
- It is important to develop communication with others who are fighting the same battles, no matter where the battlefield.

We need to be leaders and innovators, not followers. It is our lives, the lives of our brothers and sisters and the communities where we live that depend on us to make this workplace as safe as it can possibly be. We deserve to go home like we came to work; and it is our job to fight like hell to see that it happens.

Pages A-2 through A-33 of the Appendix contain references to help you not only find answers to questions, but also to broaden your background in process safety.

Factsheet 6: Employee Participation

What is consult?

OSHA says consult refers to a two-way dialogue between the employer and the employees and their representatives in which the employer elicits and **responds** to employees' concerns and suggestions. It is a process of seeking advice, criticisms and suggestions from employees and their representatives.

Consult is **not** a way to inform employees about aspects of process safety.

It should also be noted that workers do not consider a verbal response of much importance until they see the employer actions that must follow for this process to work.

Task

Using the Factsheet Reading Method for Factsheets 1 through 6, your past experience and looking ahead to the duties of the PS Rep, how would you respond to the following situations?

Situation 1: (It is 6:00 p.m. on a Saturday.)

- Pipe is leaking.
- The company wants to put a clamp on to keep running, but need to get a clamp in the facility first.
- In the meantime, the company wants an operator to stand-by at the leak and monitor it to see if it gets bigger so he can either block in the line or notify the board operator to block in the line.

1. **What questions would you ask?**

2. **What resources would you use?**

3. **For discussion purposes, and given only the limited facts above, what actions would you take?**

continued

Task *(continued)*

Situation 2: (It is 9:00 p.m. on a Tuesday.)

- Operator notices a leaking seal on a pump that is running product close to its auto ignition temperature.
- He calls the board operator to begin depressuring the unit as the charge/feed pump is leaking and the backup/spare has a work order tag hanging on it.
- Shift supervisor says to keep the unit running.
- The supervisor will find out what the problem is with the backup/spare pump to see if it can be run. If it can't, the unit is to be kept running until the supervisor can get maintenance in to fix the backup/spare so it can be used.

1. What questions would you ask?

2. What resources would you use?

3. For discussion purposes, and given only the limited facts above, what actions would you take?

Situation 3: (It is 11:00 p.m. on a Sunday.)

- The depropanizer tower has an operating limit of 195 psi with a PRV relief pressure of 210 psi.
- Pressure in the tower increases rapidly when the tower operates at the upper limit of 195 psi.
- The bottom-feed heat controller operates at 90 percent open to keep the heat up even with the reflux operated at a minimum of 20 percent valve.
- The bottom-feed heat controller swings to 100 percent regularly, causing the tower to over pressure and exercise the relief valve. This has been happening at least once or twice a shift (three or four times a day) for over a month.

1. What questions would you ask?

2. What resources would you use?

3. For discussion purposes, and given only the limited facts above, what actions would you take?

Summary: Process Safety Representative Introduction

1. The PSM Standard requires the employer to develop written plans describing how they will accomplish the PSM elements, including employee participation. Be sure to get a written copy of your site's plan.

2. The OSHA and EPA websites are great resources. Knowing how to navigate each of those websites will make the PS Rep position easier.

3. It is important to know how to read a P&ID (piping and instrumentation diagram/ drawing).

4. Communication with your local union on PSM issues is a must. Remember you are a resource on Health and Safety issues, you do not bargain issues for the union.

Tony Mazzocchi Center Proficiency Assessment

Activity 2: Process Safety Management Representative Introduction

Learning Objectives:

5. **To review the requirements of the Process Safety Management (PSM) Standard.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

6. **To share resources to broaden the PS Rep's background.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

7. **The OSHA and EPA websites are great resources. Knowing how to navigate each of those websites will make the PS Rep position easier.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

8. **Communication with your local union on PSM issues is a must. Remember, you are a resource on Health and Safety issues; you do not bargain issues for the union.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 3

Knowledge of the Process Safety Management (PSM) Standard

Purpose

To examine why the PSM Standard was needed and what it was expected to do.

This Activity has three tasks.

This material was developed by the United Steelworkers Tony Mazzocchi Center for Health, Safety and Environmental Education and produced by the Steelworkers Charitable and Educational Organization, funded in whole or in part with federal funds from the Occupational Safety and Health Administration, U.S. Department of Labor, under grant number SH-16632-07-60-F-42. These materials do not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial products or organizations imply endorsement by the U.S. Government.

Task 1

1. **At your tables, each individual should describe your current understanding of the PSM Standard.**

2. **What are your duties (or what do you foresee as your duties) as a Process Safety Representative?**

Task 2

Scenario:

It is 1980. Shortly after takeoff, the crew of Saudi Flight 163 noticed smoke coming from the plane's cargo compartment. The pilot declared an emergency and quickly returned to the airport. The plane landed safely but was on fire. There was a disconnect between where emergency crews were stationed and where the plane actually stopped.   As a result, all 287 passengers and 14 crew members perished. After the event, the airline revised its training and emergency procedures.

continued

Task 2 *(continued)*

Let’s look at the airline industry to define issues that fall into the scope of process safety.

If you, as a passenger, want to know about an airline’s safety record, would you call and ask them the number of slips, trips and falls the staff had during the last 10 years? No!

1. What sort of issues would you, as the PS Rep, be concerned with?

A. Questions on Procedures/Pre-startup Safety Review?

B. Questions on Mechanical Integrity/Training?

2. What are some other questions a potential passenger might have?

Though there were many contributing factors, what are some of the PSM Standard elements (listed on the chart below) that may have been at work during this incident or would need to be applied because of the incident? State your reason(s) why.

PSM Element	OSHA Standard	Your Reason(s)
Employee Involvement	**1910.119(c)**	
Process Safety Information	**1910.119(d)**	
Process Hazard Analysis	**1910.119(e)**	
Operating Procedures	**1910.119 (f)**	
Training	**1910.119(g)**	
Contractors	**1910.119(h)**	
Pre-startup Safety Review	**1910.119(i)**	
Mechanical Integrity	**1910.119(j)**	
Hot Work Permit	**1910.119(k)**	
Management of Change	**1910.119(l)**	
Incident Investigation	**1910.119(m)**	
Emergency Planning and Response	**1910.119(n)**	
Compliance Audits	**1910.119(o)**	
Trade Secret	**1910.119(p)**	

Task 3

Using the Factsheet Reading Method, read Factsheets 1 through 10 on the following pages. You are the PS Rep for your workplace. Use the information in the factsheets to explain to your new hires why the PSM Standard was established and why it was a good change.

1. **Find and list a problem or major fact from each of the ten factsheets and how the PSM Standard could help.**

FS No.	Problem or Fact to Address	How PSM Standard Would Help
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Trainer Option: Have half of the class do Factsheets 1 through 5 and the remaining half do Factsheets 6 through 10.

Factsheet 1: The OSHA PSM Standard and the USW Process Safety (PS) Rep

The USW PS Rep must be very familiar with the OSHA PSM Standard for two reasons:

1. To ensure the employer is complying with its written plan and to help identify problems and facilitate corrections where compliance is not occurring.

   If there are discrepancies between the written plan and actual performance, then the PS Rep must call these to the attention of the employer and work with them to get the written action plan items reconciled or change the written plan to reflect actual practice, if that practice accomplishes the goal of the element.

2. The Rep needs a good working knowledge of PSM in order to educate the membership so they too know what to look for in their individual units.

Factsheet 2: Why Was the Process Safety Standard Needed?

Explosions and Fires in Oil Refineries and Petrochemical Plants Impacting USW Members

Explosions and Fires Impacting USW* Members, 1984-1991		
July 23, 1984 17 Dead 30 Injured	Union Oil Co.	Oil refinery. Propane escaped from a crack in an amine; absorbed; and formed a gas cloud which ignited. This led to an explosion and fire in the alkylation unit and a fire in the Unfiring area. Damaged 59 homes. OSHA cited and fined Union Oil $21,000 for willful and serious violations including inadequate preventive maintenance and lack of personal protective equipment. It was later determined that the crack in the process tower was due to improper contractor welding procedures.
August 21, 1984 3 Dead	Ashland Oil, Inc. Freedom, PA PACE Local 8-621	Oil refinery. Explosion and fire in tank farm.
September 14, 1985 1 Dead	Koch Refining Co. Pine Bend, MN PACE Local 6-662	Oil refinery. Furnace explosion and fire.
December 5, 1986 5 Dead 44 Injured	Arco Petroleum Co. Carson, CA PACE Local 1-128	Oil refinery. Failure of eight-inch line spewing hydrogen naphtha mix caused vapor cloud which ignited and exploded. OSHA cited Arco for inadequate preventive maintenance on the pipe.
December 15, 1986 1 Dead	Sohio Oil Co. Lima, OH PACE Local 7-624	Oil refinery. Fire caused by ruptured natural gas line.
December 15, 1987 1 Dead	Koch Refining Co.	Oil refinery. Truck exploded due to fire during the transfer of light hydrocarbons from the truck to underground storage.
April 21, 1988 2 Dead	Derby Refining Co. Wichita, KS PACE Local 5-446	Oil refinery. Truck exploded due to fire during the transfer of light hydrocarbons from the truck to underground storage.

Explosions and Fires Impacting USW* Members, 1984-1991		
May 4, 1988 2 Dead 350 workers and residents injured; 17,000 evacuated	Henderson, NV USWA Local 4856	Rocket oxidizer plant. Runaway fire reached a large open area where drums of oxidizer were stored causing a massive explosion.
May 5, 1988 7 Dead 42 Injured including 23 in community	Norco, LA PACE Local 4-750	Oil refinery. Explosion and fire in catalytic cracking unit causing structural damage to homes up to a mile away, caused by a failed eight-inch elbow in pipe. Shell was cited by OSHA for inadequate preventive maintenance.
May 24, 1988 1 Dead 1 Injured	Amoco Oil Co. Yorktown, VA PACE Local 3-1	Oil refinery. Fire resulted when product overflowed and was sparked by compressor. Three months prior, the victim had authorized memo to company with details on necessary redesign of process that later killed him.
October 30, 1988 3 Dead 1 Injured	Amoco Oil Co. Whiting, IN PACE Local 7-1	Oil refinery. Explosion and fire in oxidizer unit coated workers with 500-degree asphalt. The oxidizer, a 70-foot-high, 32-foot diameter, vessel went up like a rocket 40 to 50 feet when it blew. OSHA cited and fined Amoco more than $300,000 for a wide variety of violations. Unit began to malfunction several days earlier but company kept it running in order to maintain production. (This explosion followed two others earlier in 1988 that injured 18.)
December 14, 1988 1 Dead	Cenex, Inc. Laurel, MT PACE Local 2-443	Oil refinery. Explosion and flash fire in a compressor.
March 25, 1989 1 Dead 1 Injured	Tosco Oil Corp. Avon, CA PACE Local 1-5	Oil refinery. Explosion and flash fire in a compressor.
August 24, 1989 2 Dead 3 Injured	Phillips Chemical Co. Pasadena, TX PACE Local 4-227	Petrochemical Plant. Flash fire resulted when contact workers mistakenly opened a live line. The gas traveled into an adjoining area, igniting and burning a PACE member to death. OSHA fined Phillips $750; Phillips contested.

continued

Factsheet 2: Why Was the Process Safety Management Standard Needed? *(continued)*

Explosions and Fires Impacting USW* Members, 1984-1991		
October 23, 1989 23 Dead 232 Injured	Phillips Chemical Co. Pasadena, TX PACE Local 4-227	Petrochemical Plant. Explosion and fire in polyethylene reactor threw debris six miles into community. Subsequent explosions resulted; fires burned for several days. Some loss estimates exceed $1 billion. Evidence suggests contractor crew removed blocking device from valve and actuated valve by hooking up actuating hoses in reverse order. 220,000 pounds of hydrocarbons were released.
December 23, 1989 1 Dead 1 Injured	Amoco Oil Co. Casper, WY	Oil refinery. Explosion and fire after butane gas escaped past an improperly maintained block valve.
June 18, 1990 1 Dead	Petrolite Corp. Barnsdall, OK PACE Local 5-391	Lubricants refinery. Loose particulate rust matter caused ignition of flammable at high velocity in reactor vent line, flashback to reactor, blown gaskets, directional release and secondary flash fire and explosion. Inadequate preventive maintenance cited.
January 19, 1991 1 Dead 6 Injured	BP Corp. Fernadale, WA PACE Local 1-590	Oil refinery. Difficulty getting crude unit up after turnaround and seals were leaking. Unit was brought part-way down and quickly fired in order to get put back up as soon as possible. Blinded line near heater not purged. Flashback killed one contractor, injured three others and injured three BP employees. Inadequate maintenance practices were blamed.

* On January 4, 1999, the Oil, Chemical and Atomic Workers International Union (OCAW) merged with the United Paperworkers International Union (UPIU) to become the Paper, Allied-Industrial, Chemical and Energy Workers International Union (PACE). In April of 2005, PACE formally merged with the United Steelworkers of America (USWA) to form the USW-United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union.

Sources: Robert E. Wages, Testimony on OSHA's Proposed Safety Standard for Highly Hazardous Chemicals, Houston, Texas, 1991, *New Solutions*, Fall 1991, pp. 98-100; and "Chemical Safety Board to Issue Report, Hold Public Hearing on Reactive Chemical Incidents," *The PACEsetter*, March/April 2002.

Factsheet 3: Disasters Were on the Rise

A 2003 report by an industry consulting firm gives us an idea of the magnitude of the largest petroleum industry accidents and their causes. The 100 largest on-shore losses, in terms of damage to property over the period 1972 through 2001 total $10.8 billion. The first table below gives a five-year snapshot (1987-1991) of the number of accidents which resulted in losses over $10 million. The second chart shows the total dollar amount of damages, adjusted for inflation, for accidents over $10 million for the period 1987 through 1991.

Large Property Losses in the Petroleum Industry 1987–1992	
Refinery	
U.S.	98
Non-U.S.	141
Petrochemical Plants	
U.S.	58
Non-U.S.	140
Terminals/Distribution	
U.S.	83
Non-U.S.	182

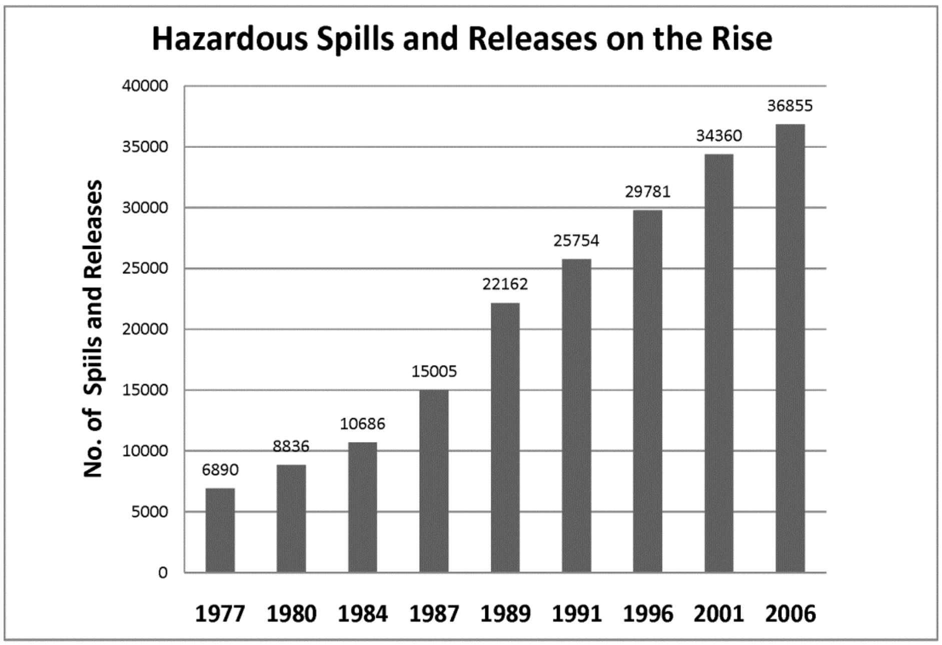
Property Value Losses from 1987–1991 (Adjusted for Inflation January 2002 $)	
Refineries	$775,000,000
Petrochemical Plants	$1,417,000,000
Terminals/Distributions	$40,000,000
Off-shore Incidents	$512,000,000

Sources: Marsh's Risk Consulting Practice, "The 100 Largest Losses 1972-2001: Large property damage losses in the hydrocarbon-chemical industries," Marsh, available at: www.scrib.com/doc./57459266, accessed January 2014.

Factsheet 4: Toxic Chemical Incidents Were on the Rise

Both workers and community residents do have reason to worry about accidents at USW-represented facilities, including oil refineries.

The following chart shows the number of accidents that were reported to the National Response Center. The actual number of incidents is estimated to be two-and-a-half to three times higher.



Source: Data derived from the Emergency Response Notification System (ERNS), a national computer database, from reports filed with the National Response Center, a Federal authority, http://www.nrc.uscg.mil/.

Factsheet 5: The Body Count Was on the Rise

In the past, some industry experts have downplayed the seriousness of catastrophic accidents in oil refineries and petrochemical facilities. But the tragic October 1989 fire and explosion at Phillips Chemical followed as it was by a string of similar catastrophes at Amoco (Wyoming), Amoco (Indiana), Exxon, ARCO, BASF, BP and elsewhere, proved that such calamities are not isolated events or simple coincidences.

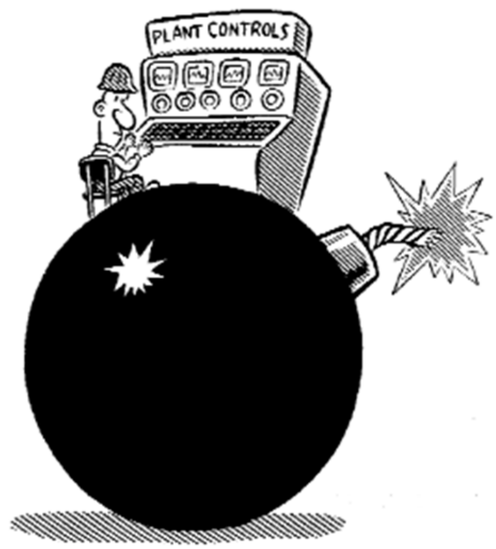
USW (formerly OCAW and PACE) has been outspoken on this problem since 1984 when an explosion and fire at Union Oil in Illinois killed 17. That accident, as well as 16 subsequent fatal explosions and fires at USW-represented petroleum industry facilities, are listed on pages 44 through 46.

These accidents are linked as much by cause as they are by effect.

Factsheet 6: New Technology Can Give Rise to New Hazards

Some experts believe that petrochemical plants are increasingly likely to have catastrophic accidents because:

- Petrochemical plants are tied together and have many complex interactive components.
- The plants are getting bigger, more complex and closer to communities.
- New chemicals are being created and used as throughput.
- The computerization of processes has resulted in many point-of-production problems being controlled by microprocessors in the field, with only high-level functions being fed back to the central control room. This centralization of control room functions makes it more difficult for operators to understand the process as a whole system and may make it harder to intervene when unexpected things happen.



Source: Perrow, *Normal Accidents: Living with High Risk Technologies*, Basic Books, New York: 1984, pp. 101-102 and 121-122.

Factsheet 7: The Problem

All these facts led OSHA to state:

> **The Problem**: "Unexpected releases of toxic, reactive or flammable liquids and gases in processes involving highly hazardous chemicals have been reported for many years. Incidents continue to occur in various industries that use highly hazardous chemicals which may be toxic, reactive, flammable or explosive or may exhibit a combination of these properties. Regardless of the industry that uses these highly hazardous chemicals, there is a potential for an accidental release any time they are not properly controlled. This, in turn, creates the possibility of disaster."

Major disasters included the 1984 Bhopal, India, incident which resulted in more than 4,000 deaths; the October 1989 Phillips Petroleum Company, Pasadena, TX, incident which resulted in 23 deaths and 132 injuries; the July 1990 BASF, Cincinnati, OH, incident which resulted in 2 deaths, and the May 1991 IMC, Sterlington, LA, incident which resulted in 8 deaths and 128 injuries.

Although these major disasters involving highly hazardous chemicals drew national attention to the potential for major catastrophes, the public record is replete with information concerning many other less notable releases of highly hazardous chemicals. Hazardous chemical releases continue to pose a significant threat to employees and provide impetus, internationally and nationally, for authorities to develop, or consider developing, legislation and regulations to eliminate or minimize the potential for such events.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 8: A History of the OSHA Process Safety Standard

Despite a growing number of major accidents, OSHA delayed work on a process safety standard. Unions and environmental organizations successfully lobbied Congress to require action by both OSHA and EPA, as part of the 1990 Clean Air Act Amendments. The legislation also established the U.S. Chemical Safety and Hazard Identification Board.

1984	Toxic chemical release in Bhopal, India, kills over 4,000 people. • The AFL-CIO and USWA joined in an international team of experts investigating this accident. They note that, had the release occurred in the U.S., none of the root causes would have violated any OSHA or EPA regulation. • U.S. unions begin to lobby for a Process Safety Standard.
1985	Release from a chemical plant in Institute, West Virginia, injures 135. American Institute of Chemical Engineers forms the Center for Chemical Process Safety and publishes Guidelines for Hazard Evaluation Procedures.
1989	Phillips Chemical Plant explosion kills 23, injures 232.
1990	American Petroleum Institute (API) publishes Management of Process Hazards voluntary guidelines. Arco Chemical plant disaster kills 17 workers. OSHA releases a Proposed Safety Standard based on the API Guidelines and Recommendations. Congress passes the Clean Air Act Amendments, which mandate that OSHA enact process safety rules covering 14 specific areas.
1991	OSHA releases study of the effects of using contract workers in the U.S. petrochemical industry.
1992	The final OSHA PSM Standard is issued. One year later, EPA released its Risk Management Program Regulation.
1997	May 26, 1997, was the deadline for 100 percent completion of all Process Hazard Analysis.

Source: "Learning from Hamlet: The Case for a National Safety and Health Board," *New Solutions*, Vol. 3, No. 2, Winter 1993.

Factsheet 9: The PSM Standard Is a Performance-based Standard

Prescriptive-based Standards
Some OSHA standards are specification-based standards. That means they give exact rules for compliance such as height of a guard rail, lengths of pipe, exact limits of exposure, etc.

Performance-based Standards
The PSM Standard is a performance-based standard. That means it is goal-oriented and what you should judge is a program's effectiveness. The specifications are not spelled out, just the desired results. In a sense, it is a race with no finish line. There is no checkered flag at the end signifying who has won.

The PSM Standard gives each facility the flexibility to design its own program to match its needs, as long as the outcome prevents or minimizes spills, fires and explosions.

A very important component is the review of the company's written plan. What worked ten years ago may not work today. Review and Compliance Audits are a key part to an effective PSM program and an important part of the PS Rep's duties.

We can see from the Saudi Flight 163 example that, even though there were procedures in place, training and procedures were updated (as is so often the case) **after** people have lost their lives.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 10: The Expected Results of the PSM Standard

After extensive hearings and much resistance from some employers, the PSM Standard became effective in 1992 with OSHA making these remarks:

> "OSHA anticipates that full compliance with the PSM Standard will lead to fewer catastrophic fires, explosions, releases of hazardous substances and other types of serious accidents. It is expected that many minor incidents will be prevented as well.
>
> In addition to the health and safety benefits from preventing catastrophic incidents, reductions in injuries and illnesses related to minor process disruptions are anticipated, as well as reductions in the long-run risks posed by occasional releases of toxic vapors and gases and by the physical hazards of poor process design."

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Summary: Knowledge of the Process Safety Management (PSM) Standard

1. The USW Process Safety Representative position is the Employee Participation piece of the Standard at its next level.
2. Many, many lives have been taken, and are still being taken, since OSHA enacted its Process Safety Management Standard. Additional billions of dollars in property damage has occurred.
3. Disaster and toxic chemical incidents were on the rise when the Standard was enacted and continue to be huge problems in the industry.
4. As new technology and larger plants and outputs continue, so do new hazards to our workers.
5. The expected results of the PSM Standard may have been somewhat over-estimated.
6. The PSM Standard is performance-based. In other words, the results are what matters. If disasters and lost lives are our measuring stick, **then how are we doing**?

Checklist Activity 3

1. Obtain your employer's written plan on employee involvement and review it for compliance with PSM.

2. Obtain the written plan for the rest of the elements and review.

3. Remember, these standards benefit everyone at a site. Catastrophic failures kill people, damage equipment and leave the surrounding community questioning the company's privilege to operate.

4. Your fellow PS Reps are a valuable resource. Making and staying in contact will help you if they have had, or are currently having, the same kind of issues. Using others' experiences in handling issues can be of great benefit.

Tony Mazzocchi Center Proficiency Assessment

Activity 3: Knowledge of the Process Safety Management Standard

Learning Objectives:

9. To examine why the PSM Standard was needed and what it was expected to do. How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

10. The USW Process Safety Representative position is the Employee Participation piece of the Standard at its next level. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

11. Many, many lives have been taken, and are still being taken, since OSHA enacted the Process Safety Management Standard. Additional billions of dollars in property damage has occurred. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

12. Disaster and toxic chemical incidents were on the rise when the Standard was enacted and continue to be huge problems in the industry. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 4

How Can We Apply the PSM Standard?

Purposes

To review how the PSM Standard was intended to be applied.

To examine needed definitions.

To practice applying elements of the Standard to problems and incidents in the industry.

This Activity has three tasks.

This material was developed by the United Steelworkers Tony Mazzocchi Center for Health, Safety and Environmental Education and produced by the Steelworkers Charitable and Educational Organization, funded in whole or in part with federal funds from the Occupational Safety and Health Administration, U.S. Department of Labor, under grant number SH-16632-07-60-F-42.

Factsheet 1: Features of PSM

PSM is not a management program that is handed down to workers and contractors. **PSM** is a process that involves and includes everyone.

> **Management**: Must organize and lead the initial effort.
>
> **Workers:** Must be fully involved in its implementation and improvement because they are the people who know the most about how a process really operates.

The concept of process safety management can further be understood by its component words:

> **Process**: PSM is concerned with process issues and the properties of chemicals as distinct from occupational issues such as trips and falls.
>
> **Safety:** Although an effective PSM program improves all aspects of a facility's operation, the initial driving force for most PSM programs was the need to meet safety regulations and to reduce safety incidents related to process upsets.
>
> **Management:** In this context, a manager is anyone who has some degree of control over the process, including operators, engineers and maintenance workers.

There must always be ways of improving safety and operability. Process safety management cannot be viewed as being a one-time fix.

Source: "Process Safety Management (PSM), Managing Risk in Process Facilities," available at: http=//knol.google.com/k/ian-sutton/process-safety_Management-psm/zvu500dgllb4m/1#.

Factsheet 2: Application — Paragraph (a)

(a) Application

What is covered:

- A process that involves a chemical which is present at or above certain levels (see Appendix A of the Standard); and
- A process that involves flammable liquid or gas in excess of 10,000 pounds.

Except:

- Hydrocarbons used for comfort heating (if not used elsewhere as part of a process);
- Flammable liquids stored in atmospheric tanks below their boiling point, which don't need cooling (unless interconnected or involved in a process); and
- Any flammable liquid or gas, provided it is consumed as a fuel and is not part of a process containing another highly hazardous chemical.

The OSHA Process Safety Management Standard, 29 CFR 1910.119, enacted in 1992, is composed of 16 sections: Applications, Definitions and the 14 elements (c through p). These elements are listed below and are described in detail on Factsheets 4 through 16.

continued

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 2: Application — Paragraph (a) *(continued)*

		Sections
	(a)	Application
	(b)	Definitions
		14 Required Elements
1	(c)	Employee Participation
2	(d)	Process Safety Information
3	(e)	Process Hazard Analysis
4	(f)	Safe Operating Procedures
5	(g)	Training
6	(h)	Contractors
7	(i)	Pre-Startup Safety Review
8	(j)	Mechanical Integrity
9	(k)	Hot-work Permit
10	(l)	Management of Change
11	(m)	Incident Investigation
12	(n)	Emergency Planning and Response
13	(o)	Compliance Audits
14	(p)	Trade Secrets

Factsheet 3: Definitions — Paragraph (b)

(b) Definitions:

1. **Atmospheric Tank** means a storage tank which has been designed to operate at pressures from atmospheric through 0.5 p.s.i.g. (pounds per square inch gauge, 3.45 Kpa).

2. **Boiling Point.** The boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (p.s.i.a.) (7650 mm). For the purposes of this section, where an accurate boiling point is unavailable for the material in question or for mixtures which do not have a constant boiling point, the 10 percent point of a distillation performed in accordance with the Standard Method of Test for Distillation of Petroleum Products, ASTM D-86-62, which is incorporated by reference as specified in Sec. 1910.6, may be used as the boiling point of the liquid.

3. **Catastrophic Release** means a major uncontrolled emission, fire or explosion involving one or more highly hazardous chemicals, that presents serious danger to employees in the workplace.

4. **Facility** means the buildings, containers or equipment which contain a process.

5. **Highly Hazardous Chemical** means a substance possessing toxic, reactive, flammable or explosive properties and specified by paragraph (a)(1) of this section.

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

7. **Normally Unoccupied Remote Facility** means a facility which is operated, maintained or serviced by employees who visit the facility only periodically to check its operation and to perform necessary operating or maintenance tasks. No employees are permanently stationed at the facility. Facilities meeting this definition are not contiguous with, and must be geographically remote from, all other buildings, processes or persons.

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

continued

Factsheet 3: Definitions — Paragraph (b) *(continued)*

9. **Replacement in Kind** means a replacement which satisfies the design specification.

10. **Trade Secret** means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Task 1

Do you think the worker involvement feature (mentioned in Factsheet 1) is adequate at your worksite as it applies to the PSM elements and definitions in Factsheets 2 and 3?

Task 2

1. **Use the Factsheet Reading Method for Factsheets 4 through 10. These factsheets describe the first seven PSM Elements.**

2. **Use the information in the factsheets to review the accidents listed on the next two pages. These accidents occurred *before* the PSM Standard was implemented. The PSM elements you just reviewed will be listed under the accident description. Place an "x" by each element which might have prevented the accident and list your reasons on the lines provided.**

3. **Using the facts presented in the accident description, discuss with your group whether having the PSM Standard in place at the time of the event would/ could have had an effect on the described incident.**

January 19, 1991 — British Petroleum (BP) Corp.
Oil Refinery

Workers had difficulty getting a crude unit up after turnaround. Seals were leaking. The unit was brought part-way down and quickly fired in order to get put back up as soon as possible. A blinded line near the heater was not purged. The flashback killed one contractor, injured three others and injured three BP employees. Inadequate maintenance practices were blamed.

☐ (c) Employee Participation

___

☐ (d) Process Safety Information

___

☐ (e) Process Hazard Analysis (PHA)

___

☐ (f) Safe Operating Procedures

___

☐ (g) Training

___

☐ (h) Contractors

___

☐ (i) Pre-startup Safety Review

___

July 23, 1984 — Union Oil Co.
Oil refinery

Propane escaped from a crack in an amine absorber and formed a gas cloud which ignited. This led to an explosion and fire in the alkylation unit and a fire in the unifiring area. The explosion damaged 59 homes.

OSHA cited and fined Union Oil $21,000 for willful and serious violations, including inadequate preventive maintenance and lack of personal protective equipment. It was later determined that the crack in the process tower was due to improper contractor welding procedures.

☐ (c) Employee Participation

___

☐ (d) Process Safety Information

___

☐ (e) Process Hazard Analysis (PHA)

___

☐ (f) Safe Operating Procedures

___

☐ (g) Training

___

☐ (h) Contractors

___

☐ (i) Pre-startup Safety Review

___

Factsheet 4: Employee Participation — Paragraph (c)

(c) Employee Participation

Requirements:

- Develop a written plan explaining how employers shall consult with employees and union representatives on the Standard.
- Consult with employees and union representatives on all of the elements of the Standard.
- Give workers and Union representatives access to all information required to be developed in this Standard.

Appendix C to 1910.119 -- Compliance Guidelines

- Employers are to consult with their employees and their representatives regarding the employer's efforts in the development and implementation of the process safety management program elements and hazard assessments.
- Requires employers to train and educate their employees and to inform affected employees of the findings from incident investigations.
- Employers may wish to form a safety and health committee of employees and management representatives.

  These committees can become a significant ally in helping the employer implement and maintain an effective process safety management program for all employees.

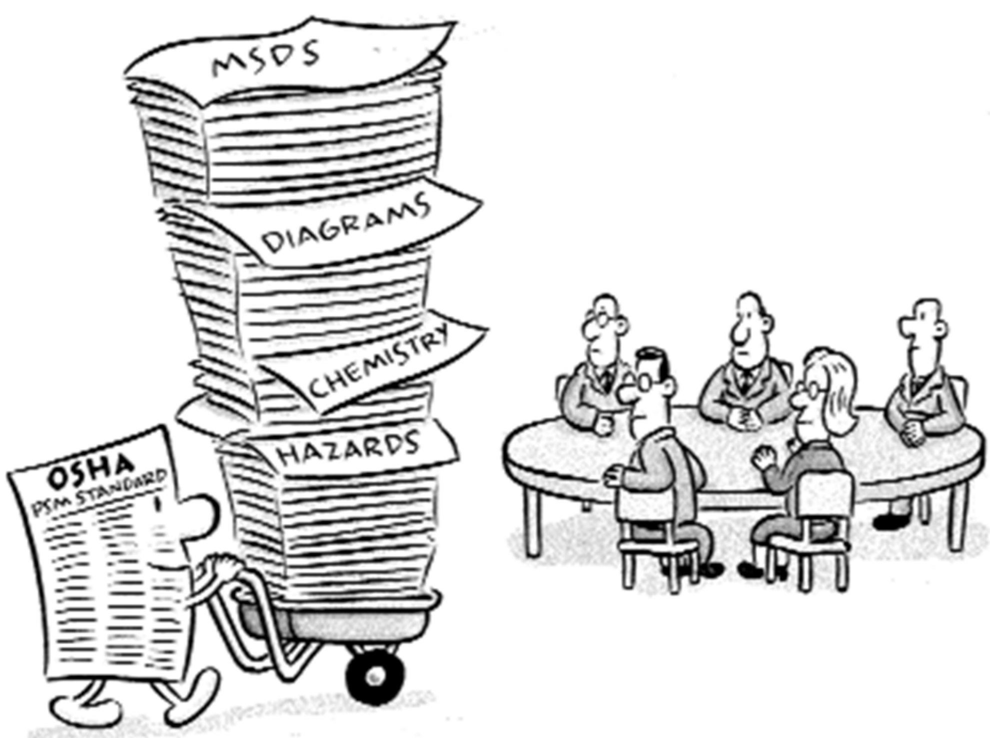
Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992, Appendix C.

Factsheet 5: Process Safety Information — Paragraph (d)

(d) Process Safety Information

Requirements:

- Compile specific information before starting a process hazard analysis that covers:
    1. The hazards of highly hazardous chemicals in the process (MSDSs are okay if they contain all required information);
    2. The technology of the process (block flow diagrams, chemistry of process); and
    3. Information pertaining to the equipment in the process.



Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 6: Process Hazard Analysis (PHA) — Paragraph (e)

(e) Process Hazard Analysis (PHA)

Process Hazard Analyses (PHAs), also called process hazard evaluations, use various methods to identify, evaluate and control the hazards involved in a process.

Requirements:

- Develop a priority order for conducting PHAs and do the most important ones first.
- Set a timetable for requirements.
- Use one of the six listed methods or equivalent methodology:
  1. What-if;
  2. Checklist;
  3. What-if/Checklist;
  4. Hazard and Operability Study (HAZOP);
  5. Failure Mode and Effects Analysis (FMEA); or
  6. Fault Tree Analysis.
- Outline what must be covered in a PHA.
- Establish a team to do the PHA.
- Set up a tracking system to assure that the team's findings and recommendations are addressed and resolved in a timely manner.
- Update the PHAs every five years and keep the records throughout the life of the process.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 7: Safe Operating Procedures — Paragraph (f)

(f) Safe Operating Procedures

Requirements:

Develop and implement written procedures covering:

1. Each operating phase:
    - Startup;
    - Normal operations; and
    - Emergency shutdown.
2. Conditions which require emergency shutdown;
3. Operating limits;
4. Safety and health considerations; and
5. Safety systems.

Keep these procedures current, updated once a year.

Develop safe work practices for employees and contractors covering:

1. Lockout/tagout;
2. Confined space entry; and
3. Opening of process equipment or piping.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 8: Training — Paragraph (g)

(g) Training

The Process Safety Standard has different training requirements for operators, maintenance workers and contractors. This element addresses operators.

Requirements:

- Initial training:
  1. Process overview;
  2. Safe operating procedures;
  3. Specific process health and safety hazards;
  4. Emergency shutdown operations; and
  5. Safe work practices.
- Refresher training to operating personnel at least every three years; and
- Provide written documentation that employees have been trained and understand the training. (Testing is not required.)

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 9: Contractors — Paragraph (h)

(h) Contractors

Plant Employer Requirements:

- When selecting a contractor, the employer must evaluate the contractor's safety performance and programs.
- Maintain a log on contractor injuries and illnesses.
- Inform the contract employers of potential fire, explosion or toxic release hazards related to the contractor's work.
- Develop and implement safe work practices to control the entrance, presence and exit of contract employees.
- Periodically evaluate the onsite performance of the contractor to ensure compliance with the PSM Standard; and
- Explain the company's emergency action plan to the contractor.

Contract Employer Requirements:

- Train its employees to perform work safely.
- Inform all of its employees of potential fire, explosion or toxic release hazards and what to do if they occur.
- Document that workers have been trained and understand the training.
- Assure that employees follow plant safety rules; and
- Inform plant employer of any hazards introduced by contractor's work or of any hazards discovered by the contractor.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 10: Pre-Startup Safety Review — Paragraph (i)

(i) Pre-startup Safety Review

A pre-startup safety review applies to all new facilities and to existing facilities when modification is significant enough to require change in the process equipment.

Requirements:

Before a highly hazardous chemical is introduced into a process it will be confirmed that:

- Construction and equipment meets specifications;
- All procedures are in place, such as:
  1. Safety;
  2. Operating;
  3. Maintenance; and
  4. Emergency.
- New facilities: Process hazard analyses have been performed and recommendations have been resolved or implemented;
- Modified facilities: Comply with management of change requirements [see paragraph (l) of the Standard (Factsheet 13)]; and
- Operating employees have been trained.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Task 3

1. **Use the Factsheet Reading Method for Factsheets 11 through 16. These factsheets describe the next seven PSM Elements.**
2. **Use the information in the factsheets to review the accidents listed on the next two pages. These accidents occurred *before* the PSM Standard was implemented. The PSM elements you just reviewed will be listed under the accident description. Place an "x" by each element which might have prevented the accident and list your reasons on the lines provided.**
3. **Using the facts presented in the accident description, discuss with your group whether having the PSM Standard in place at the time of the event would/ could have had an effect on the described incident.**

October 30, 1988 — Amoco Oil Co.
Oil Refinery

An explosion and fire in an oxidizer unit coated workers with 500°F asphalt. The oxidizer, a 70-foot-high, 32-foot diameter vessel, went up 40 to 50 feet like a rocket when it blew.

OSHA cited and fined Amoco more than $300,000 for a wide variety of violations. The unit had begun to malfunction several days earlier but the company had kept it running in order to maintain production. (This explosion followed two others earlier in 1988 that injured 18.)

☐ (j) Mechanical Integrity

___

☐ (k) Hot Work Permits

___

☐ (l) Management of Change

___

☐ (m) Incident Investigation

___

☐ (n) Emergency Planning and Response

___

☐ (o) Compliance Audits

___

☐ (p) Trade Secrets

___

October 23, 1989 — Phillips Chemical Co.
Petrochemical Plant

An explosion and fire in a polyethylene reactor threw debris six miles into a community. Subsequent explosions resulted; fires burned for several days. Some loss estimates exceed $1 billion. Evidence suggests the contractor crew removed a blocking device from a valve and actuated the valve by hooking up actuating hoses in reverse order. Two hundred and twenty thousand pounds of hydrocarbons were released.

☐ (j) Mechanical Integrity

___

☐ (k) Hot Work Permits

___

☐ (l) Management of Change

___

☐ (m) Incident Investigation

___

☐ (n) Emergency Planning and Response

___

☐ (o) Compliance Audits

___

☐ (p) Trade Secrets

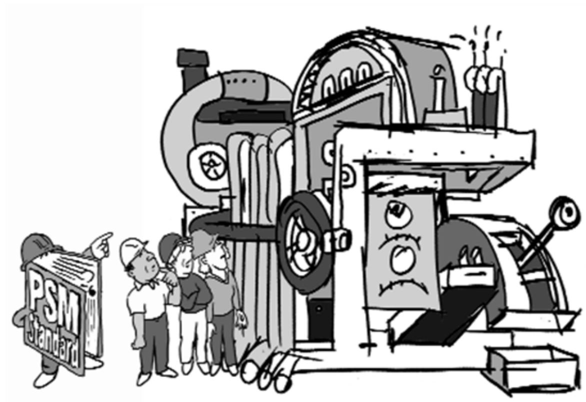
___

Factsheet 11: Mechanical Integrity — Paragraph (j)

(j) Mechanical Integrity

These requirements only apply to six types of process equipment where failure is likely to be catastrophic. The process equipment covered includes:

1. Pressure vessels and storage tanks;
2. Piping systems (including valves, other components);
3. Relief and vent systems and devices;
4. Emergency shutdown systems;
5. Controls (monitoring devices and sensors, alarms and interlocks); and
6. Pumps.



Requirements:

- Provide written procedures to maintain integrity of equipment.
- Train employees involved in maintaining integrity of equipment.
- Perform periodic inspection, testing and maintain records.
- Correct deficiencies in equipment.
- Assure that equipment is suitable and properly installed.
- Assure that maintenance materials, spare parts and equipment are suitable and correct for use in the process.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 12: Hot Work Permit — Paragraph (k)

(k) Hot Work Permit

Requirements:

- Hot work permits are required on or near process systems.
- Minimum permit requirements:
  1. Comply with 29 CFR 1910.252(a), OSHA's Hot Work Permit Standard;
  2. Date; and
  3. Name of equipment.

Retain the permit until completion.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 13: Management Of Change — Paragraph (l)

(l) Management of Change

Requirements:

- Establish written procedures to manage changes to:
  1. Process chemicals;
  2. Technology;
  3. Equipment;
  4. Procedures; and
  5. Facilities.
- Assess the impact of change on safety and operating procedures.
- Provide updated training to employees and contract workers prior to startup.
- If change is significant, then a pre-startup review is required.
- Update process safety information.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 14: Incident Investigation — Paragraph (m)

(m) Incident Investigation

Requirements:

- **Investigate** all incidents or near-misses which could result in a catastrophic release of a highly **hazardous chemical**.
- **Begin investigation** as soon as possible (within 48 hours).
- Form an **investigation team** which includes at least one person knowledgeable about the process involved and a contract worker if the incident involved work by the contractor.
- Prepare a **report** with dates, description of incident, contributing factors and recommendations.
- Establish a system to promptly **address and resolve findings** and recommendations.
- **Review** report findings with affected employees and contract workers.
- **Retain incident investigation reports** for five years.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 15: Emergency Planning and Response — Paragraph (n)

(n) Emergency Planning and Response

Requirements:

- Establish and implement an emergency action plan as required by OSHA 29 CFR 1910.389(a). Also include procedures for handling small chemical releases.
- Establish and implement a more comprehensive emergency response program as required by OSHA 1910.120, the HAZWOPER Standard.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 16: Compliance Audits and Trade Secrets — Paragraphs (o) and (p)

(o) Compliance Audits

Requirements:

- Review the PSM programs every three years for compliance.
- Include at least one person knowledgeable about the process on the team.
- Write a report of the findings of the audit.
- Respond to the audit report findings and document that deficiencies have been corrected.

(p) Trade Secrets

Requirements:

- Make all necessary information available to those people responsible for complying with the different sections of the Standard, including trade secrets.
- Give workers and union representatives access to trade secret information, subject to OSHA 29 CFR 1910.1200 (the Hazard Communication Standard).
- Allows the employer to require a confidentiality agreement that the employees must not disclose this information.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119,57 FR 6356, February 24, 1992.

Summary: How Can We Apply the PSM Standard?

1. The key driving force of PSM must be safety. PSM can never be viewed as a one-time fix.

2. PSM covers chemicals, liquids and gases at certain weights and levels. It is important to know those levels and exceptions.

3. PSM contains 14 elements along with definitions and applications. Knowing those definitions and practicing applying those elements to problems and incidents can prepare us for our work as PS Reps.

Checklist Activity 4

1. Your fellow PS Reps are a valuable resource. Making and staying in contact will help you if they have had, or are currently having, the same kinds of issues. Using others' experiences in handling issues can be of great benefit.

Tony Mazzocchi Center Proficiency Assessment

Activity 4: How Can We Apply the PSM Standard?

Learning Objectives:

13. **To review how the PSM Standard was intended to be applied.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

14. **To examine needed definitions.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

15. **To practice applying elements of the Standard to problems and incidents in the industry.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

16. **The key driving force of PSM must be safety. PSM can never be viewed as a one-time fix.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

17. **PSM covers chemicals, liquids and gases at certain weights and levels. It is important to know those levels and exceptions.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

18. **Knowing those definitions and practicing applying those elements to problems and incidents can prepare us for our work as PS Reps.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 5

How Is the PSM Standard Working?

Purpose

To take a focused, hard look at how this Standard is working in our corporations and our workplaces.

This Activity has four tasks.

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Incidents Since the PSM Standard Was Enacted

Scenario: Task 1

Though it has helped to make covered processes safer, the PSM Standard has by no means eliminated process safety disasters.

On March 23, 2005, an explosion at the BP refinery in Texas City, Texas, killed 15 workers and injured 180. It was the worst industrial disaster in the U.S. (outside of mining) in a quarter century. Financial losses exceeded $1.5 billion. OSHA issued the largest citation and penalty in its history.

A two-year investigation by the U.S. Chemical Safety and Hazard Investigation Board, a Federal agency, found that the accident resulted from "organizational and safety deficiencies at all levels of the BP Corporation." The specific technical causes included poorly designed and maintained alarms and instrumentation, the use of outmoded blowdown drums and atmospheric stacks to vent flammable liquids and vapors, the unsafe siting of temporary trailers leading to the presence of nonessential personnel in dangerous areas during critical operations, poor internal communications, inadequate training, fatigue from excess overtime and outdated and ineffective procedures for critical operations like unit startups.

A study released in 2007 by the USW found that similar conditions exist in a majority of U.S. refineries. There is no reason to believe that they don't exist in petrochemical plants as well.

Source: U.S. Chemical Safety and Hazard Investigation Board (CSB), "Investigation Report: Refinery Explosion and Fire (15 Killed, 180 Injured)," BP, Texas City, Texas, March 23, 2005, Washington, DC, 2007; and *Beyond Texas City The State of Process Safety in the Unionized US Oil Refining Industry; A Report on the USW Refinery Survey;* October 2007.

Task 1

Appoint one person as a spokesperson for the group to report back your response and your explanation of the response.

Please put a check mark next to the conditions that exist at your facility.

- ☐ Poorly designed and maintained instrumentation and alarms
- ☐ Atmospheric venting of flammable liquids and vapors, without flaring
- ☐ Trailers and other temporary structures sited too close to process units
- ☐ Nonessential personnel in potentially dangerous areas during critical operations like startups
- ☐ Poor internal communications
- ☐ Inadequate training
- ☐ Fatigue from excess overtime
- ☐ Outmoded and ineffective procedures for critical operations
- ☐ Not enough manpower to adequately handle demands of process units or maintenance requests
- ☐ The failure to properly analyze and respond to the potential for an accident in every aspect of the process
- ☐ Fear of Reporting

Give specific examples of those things you checked:

____

____

____

After looking at these conditions, is it possible an accident like the one at BP in Texas City could ever happen in your facility?

☐ **Yes** ☐ **No**

Task 2

Scenario:

Just four months later, BP Texas City had another process safety incident in their Resid Hydrotreater Unit that forced the surrounding community to shelter in place after a catastrophic failure of a pipe elbow. Though there were no fatalities, there was potential for a much worse incident.

The Chemical Safety Board stated:

> "Recycled gas, primarily hydrogen, was suddenly released when the pipe broke away. The hydrogen, under high pressure and temperature, was ignited, sending a large jet fire shooting an estimated 75 feet westward from the flange. Damage was localized along that fire path. Initial information indicates the hydrogen was pressurized at approximately 3,000 pounds per square inch at a temperature of over 500°F. Heat from the fire deformed piping and bent structural beams."

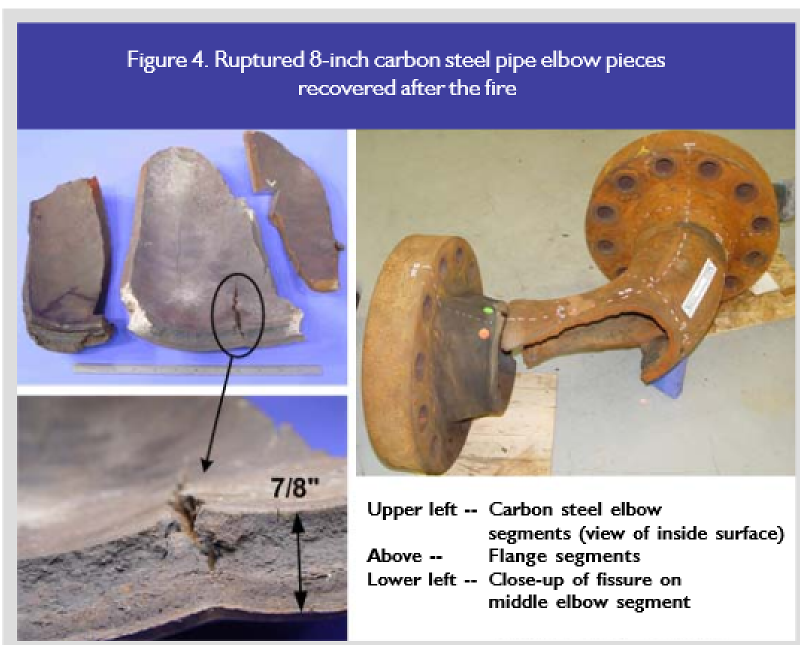


Figure 4. Ruptured 8-inch carbon steel pipe elbow pieces recovered after the fire

The investigation discovered that during the turnaround, an elbow of carbon steel was put in place where an alloy steel elbow should have been. The elbows were physically identical but the metallurgy was different.

Source: http://www.safetybok.org/assets/1/7/RHUBulletin1.pdf.

1. **Could an event similar to this take place at your facility?**

   Has it already?

   How would the PS Rep know?

2. **Do you have a procedure in place to identify different metallurgic properties of similar looking piping?**

   If "yes," please describe.

   If not, what would you include in a procedure?

Task 3

Scenario:

On November 25, 1998, after a total power outage and loss of steam and all utilities two days prior, an explosion and fire erupted at Equilon's Puget Sound Refinery in Anacortes, WA.

Six workers were killed while attempting to restart the delayed coking unit following the power outage.

Under normal conditions, coke drums are cooled with steam and water; but after the loss of utilities and the restart, the operators were unable to get the required flow of either steam or water into the drums. Equilon management decided to let the drum cool on its own for approximately 37 hours. Although outside the drum temperature sensors said the material in the drum had cooled to a temperature that would allow it to be removed, calculations by the Department of Labor estimated it would have taken approximately 236 days for the drum to cool down to safe levels.

Workers were able to safely remove the top head of the drum. When the lower head was removed, the cooled upper crust of the material in the drum broke, allowing condensed hydrocarbons that had been sitting on that crust to contact the still hot internal material. The product ignited and instantly expelled the material, consuming the workers in the ensuing fire.

Task:

What elements of the PSM Standard do you think that, if followed, may have helped prevent this accident? Explain your answer.

Source: http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=5618.

Notes

Task 4

Scenario:

On April 2, 2010, at approximately 12:35 a.m., Exchanger E-6600E at the Anacortes Tesoro refinery ruptured, releasing a mixture of hydrogen and naphtha (reactor effluent). The dispersed effluent auto-ignited, causing an explosion and fire that fatally injured seven employees who were in the area. Following the incident, the refinery was shut down for over six months and new exchangers were designed and constructed. Additionally, other rebuild activities were conducted in order to bring the Naphtha Hydrotreater (NHT) unit back into operation.

Photo 1: Sections 1-3 (from left) showing failure locations.

High temperature hydrogen attack (HTHA) was found to be the most likely cause for the catastrophic failure of this exchanger. Instrumentation to measure the heat the exchanger was subject to was not optimally placed, making it difficult to plan an effective inspection program.

Source for failed exchanger: TOP Investigation Team Report, July 21, 2011, Incident Tracking #100402OPR038.

There are many factors that can affect Mechanical Integrity (MI).

Task:

1. **Would your facility have handled inspections in the previous scenarios differently?**

   Is your facility in a preventive or reactive mode?

2. **How would you, as the PS Rep, know what is required under the M.I. Program?**

3. **How could you determine if the correct actions are being followed?**

Notes

Summary: How Is the PSM Standard Working?

1. Facilities that correctly handle their process safety issues have greater reliability and therefore the opportunity for greater profits. Despite these facts, the industry still drags its feet when it comes to living up to the full spirit of the Process Safety Standard regulations.

2. Process Safety is not a "one and done activity." It is a performance-based standard and requires constant vigilance.

3. Along with the OSHA Process Safety Management Standard, the EPA has its Risk Management Plan (RMP) regulations. The two regulations seek similar outcomes:

   - The OSHA regulations deal with onsite concerns; and
   - RMP concerns itself with offsite consequences.

Checklist Activity 5

1. Remember, these standards benefit everyone in your workplace. Catastrophic failures kill people, damage equipment and leave the surrounding community questioning the company's privilege to operate.

Tony Mazzocchi Center Proficiency Assessment

Activity 5: How Is the PSM Standard Working?

Learning Objectives:

19. To take a broad, hard look at how the PSM Standard is working in our industry. How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

20. To take a focused, hard look at how this Standard is working in our corporations and our workplaces. How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

21. Facilities that correctly handle their process safety issues have greater reliability and therefore the opportunity for greater profits. Despite these facts, the industry still drags its feet when it comes to living up to the full spirit of the Process Safety Standard regulations. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

22. Process Safety is not a "one and done activity." It is a performance-based standard and requires constant vigilance. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 6

Union Activism and Personal Skills

Purposes

To understand the Process Safety Representative role.

To explore the ways the Process Safety Representative interacts with others.

This Activity has three tasks.

Task 1

For the questions below, assume you are the Process Safety Representative out on a routine scheduled site visit. Using the scenario, discuss what action(s) you would take.

Scenario:

Carla (a union steward) and Keith (a supervisor) are in a heated debate over an MOC issue. Keith is instructing Carla, who has been on vacation, to put a spare piece of equipment into service. The equipment was modified while Carla was on vacation.

Because the primary equipment had some past issues with a process leak, Carla is pushing back and asking for the new procedure and a copy of the MOC for the modification work. These have not yet been received in the field. Keith says that the paperwork will come later and this equipment must be placed in service or the unit may have to be shut down.

Carla is still holding her ground, stating that it is unsafe to restart the equipment. She has not been trained on the modified procedures and he has not seen a copy of the MOC. Also, Carla is stating that the union contract gives her the right to stop a job if she feels it is unsafe.

You are making your rounds and enter the control room while the conversation is taking place.

Task:

1. **Would you intervene?**
   If yes, answer question 2.

2. **What actions would you take to attempt to resolve this issue? Give reasons for these actions.**

Actions	Reasons
1.	
2.	

3. **What points would you make in your conversations with Carla and Keith?**

Carla	Keith
1.	
2.	
3.	

Task 2

You are the PS Rep. Read the scenario and answer the questions.

Scenario:

As the site PS Rep, you are attending a Local Union meeting. You are a little late because of issues in the plant. Before you arrived there had been a lot of discussions about members being written up for not following procedures (out-of-date or incorrect procedures), MOC issues and members being accused by management of not following procedures and directions from unit foremen.

The members feel the directions and procedures are unsafe and the discussion becomes more intense as it continues. They are concerned because they feel that the answers they are getting do not address their issues. You have heard, prior to the meeting, about the issues which are really bothering the workers who are now attacking you.

It is your turn to give your report, but by now a couple of members are getting very upset because of the answers they have received. As you start to give the report, several members start challenging it and try to attack your knowledge of the PSM Standard and how you should be acting in your PS Representative role at the plant.

Task:

1. **What actions might you take to calm the situation?**

2. **Should you take control of the meeting at this point?**

   If "yes," how would you do that?

3. **What steps, if any, should you take after the meeting?**

Task 3

Scenario:

You and Sue are the PS Reps at Oil Chem and are conducting a field inspection in an area of the site. In the middle of the inspection you stop and talk about what you noticed in the field.

You asked, "Sue, did you notice the shafts on the pumps are not properly guarded? Also, when I walked under the fans I noticed there were some screens missing and others that need repairs."

"Yes, and I noticed that some of the equipment is missing identification tags and there were some unlabeled drums filled with liquid and powder," Sue replied.

You and Sue finished the inspection and as you arrived back at the control room, you noticed alarms flashing but no audible sound.   It looked like no one was paying attention to the alarms. Employees were gathered in the corner across the room discussing how to put a piece of equipment in service. As you and Sue listened, you heard that the employees were not sure how to begin the job. You spoke with one of the employees about the issues. The employee stated he was new and this was his first time having to put the equipment in service.

You and Sue met with the Union Steward and the supervisor of the area for debriefing of the field inspection. You stated that you noticed issues with mechanical guarding around rotating equipment and discussed the other issues you had seen. Sue stated that she had concerns with the labeling process of the area equipment and containers. Then you mentioned the alarms that were flashing when you entered the building and that no attention was being paid to the alarms. You also mentioned the issues with the individuals having the discussion of not having clear direction for the task.

"We have been turning in work order tickets and discussing these issues in safety meetings but the company only tells us that they are working on them," the Union Steward responded. "On the direction issue, we have discussed training and the need to have current procedures."

The supervisor responded, "We have the work planned and we are creating a project to resolve some of these issues. On the direction issue, we have employees that are working on updating procedures at this time, but we are also hiring new employees. This is good, but it means that we have inexperienced employees in the field."

As the PS Rep in this scenario, answer the questions on the next page.

1. **What would your primary responsibility be in this scenario?**

2. **What action(s) would you take after the meeting?**

3. **How would you utilize other resources?**

   A. Joint Health and Safety Committee:

   B. Management Resources:

   C. Other Resources:

Summary: Union Activism and Personal Skills

1. As a PS Rep, you will hear many different viewpoints on PSM issues.
2. All opinions deserve your attention.
3. Your objective as the Union PS Rep is the safety of all workers through compliance with the PSM Plan in your facility.
4. It is important to be well prepared before meetings, investigations and inspections so that you can respond to questions or even accusations.

Checklist Activity 6

Understand:

- Who you represent;
- How this job was created;
- Why this job was created;
- The importance of having a letter of agreement for this job;
- PSM (Process Safety Management);
- Your contract; and
- That you are not a negotiator.

Union Meeting:

1. Be part of the regular agenda at the local union meeting to give a report;
2. Be prepared for your report:
    a. Be clear and brief;
    b. Be factual; do not give your opinion; and
    c. Answer questions but do not get into a debate.

Interacting with Members:

1. Be accessible to the site;
2. Have a structured schedule to visit areas of all sites on a weekly basis;
3. Share information with union stewards on all issues in their area;
4. Be a trainer and conduit for PSM issues to and from the workers in the field;
5. Be open minded and a good listener;
6. Be able to hold your ground on PSM standards whether you are speaking to the company or Union;
7. Be able to communicate with the company;
8. Be able to separate and understand the differences between contractual issues, Health and Safety issues and PSM issues; and
9. Know when actions are necessary vs. being a sounding post.

Notes

Tony Mazzocchi Center Proficiency Assessment

Activity 6: Union Activism and Personal Skills

Learning Objectives:

23. To understand the Process Safety Representative role. How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

24. To explore the ways the Process Safety Representative interacts with others. How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

25. As a PS Rep, you will hear many different viewpoints on PSM issues. You need to be prepared for many different viewpoints in this position. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

26. Your objective as the Union PS Rep is the safety of all workers through compliance with the PSM Plan in your facility. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 7

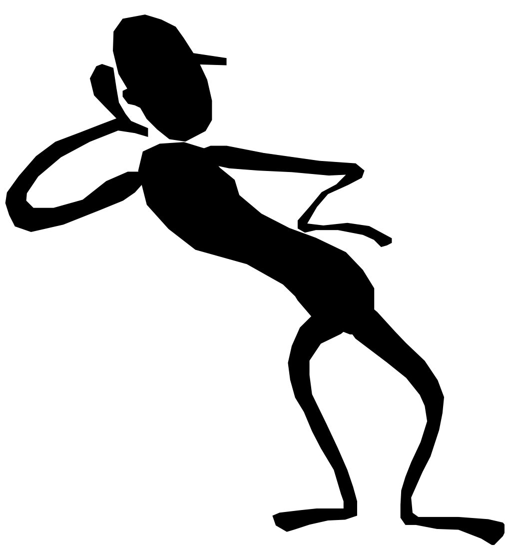
Communication and Interaction

Purposes

To understand how listening can improve your communication skills.

To understand the importance of clear communication.

This Activity has two tasks.



Task 1

Scenario:

You are the PS Rep. When you walk into the control room, you hear Joan and Brian, two operators on the unit, arguing about whether or not to do a job.

“Hey, here’s the new PS Rep. Let’s find out who is right,” says Joan.

“I’m telling you that if I’m not trained by someone on the MOC for the new pump, I’m not putting it in service,” says Brian.

“They sent out an MOC email notice that the pump has been changed from a steamer to an electric. How tough can it be to start an electric pump?” asks Joan.

“OK Process Rep, you tell us. Do we need to have hands-on training or is the reading of the email sufficient?” asks Brian.

Factsheet 1: A Good Communicator Is a Good Listener

In order for you to make your point, you have to understand the other person's position. Effective communication can help you better understand a situation so that you can help resolve differences and develop creative, problem-solving ideas.

Active listening is one of the most important skills to develop in becoming an effective communicator.

1. Focus on the speaker;
2. Avoid interrupting;
3. Do not appear judgmental; and
4. Show your interest.

Source: http://www.mindtools.com/CommSkll/ActiveListening.htm.

Factsheet 2: Roadblocks to Listening

In addition to working on good listening techniques, it is a good idea to work on eliminating bad habits or things that may have an adverse effect on your ability to listen.

Items like using interrogation tactics, preaching, demanding or scolding will not achieve the desired results. Likewise, blaming, ridiculing or criticizing will not get you what you are after. You also cannot be too sympathetic or reassuring.

You are there to get the facts as someone sees them. Don't be judgmental or offer solutions. You are there to hear everyone's side of the story and then make the best use of the information to handle the problem correctly.

Don't form opinions until you get all possible information.

Source: http://www.livestrong.com/article/14657-improving-listeningskills/#ixzz2TwW47ajm.

Factsheet 3: Good Communication Requires Practice

If you don't practice your communication skills, they won't improve.

Good listening requires a conscious effort on the part of the listener. You can "read between the lines" by picking up not only on verbal messages, but also non-verbal messages. This is often referred to as body language.

Focus your attention on the speaker so you hear what they say. Do not try to formulate questions while they are speaking. Listen to **how** things are being said and not just **what** is said. If possible, try to formulate questions in advance and then let new questions come from their responses.

Use your body language to assure the individual that they are important to you and that you are interested in what they are saying. Face them; maintain eye contact. Try to put yourself in their shoes to see things from their perspective. Listen with empathy.

Take notes to assure you don't forget something important and use the notes for asking questions later. Do not make assumptions; be clear on what they are trying to say.

- Observe people to understand how body language (non-verbal signals) is used to communicate.
- Understand differences relating to age, culture, gender, religion and even emotional state at the time.
- Don't read too much into an individual action, but look at non-verbal gestures collectively.

Most importantly, do not interrupt. Let them talk.

Source: Incident Investigation Training, Ed 3.0, May, 2013 Tony Mazzocchi Center for Health, Safety and Environmental Education.

Task 1 *(continued)*

Using the Factsheet Reading Method for Factsheets 1 through 3 and the scenario, answer the following questions.

1. **Who would you talk to first, Joan or Brian?**

   Why?

2. **What information will you attempt to get from Brian?**
   (Refer to Factsheet 2. What might you need to guard against in your approach to interviewing Brian?)

3. **What information will you attempt to get from Joan?**
   (Refer to Factsheet 2. What might you need to guard against in your approach to interviewing Joan?)

4. **What information do you think will be the most important in formulating your response?**

Task 2

Scenario (You are the PS Rep in this scenario.)

During the monthly union meeting of USW Local 14-007, President Dave brought up under new business that Oil Chem would be instituting a new fatigue policy. The policy, President Dave explained, would be beneficial for all workers and will help the local expand its membership.

"Whoa, wait a minute," said Mike. "You mean they're going to take away my overtime? They can't do that; I just bought that bass boat."

"Yeah," said Bill, "everybody is used to the overtime now. We're used to seeing that extra money. And besides, I don't mind working all the overtime that I can get my hands on."

"The only way they can do this is by hiring more people. Who's going to train these people and are we going to get overtime to do that?" asked Tony.

"We're not sure when or how they're going to do the training," responded President Dave. "This is a good thing guys. We're going to finally get a break from all the overtime we've been working."

"I agree," said Les. "I'm exhausted. I've worked here 36 years and we've worked overtime every year I've been employed. It's about time they do something about it.

"I've only been here for a year, but I don't see the big deal on working all this overtime," said Tim.

"The big deal," yelled Les, "is that you're 24 years old and you've only been here a year. Wait until you have some dust on your locker before giving your stupid opinion! Who cares what you think punk?!!"

"I'm sure there will still be overtime," President Dave interjected, hoping to quell the impending uprising. "They are trying to get away from the mandatory overtime."

"That may be true," Mike interrupted, "but that mandatory overtime is what gave me the cash to buy that bass boat."

"Mike, without all that overtime, you'll actually get to enjoy that bass boat and some time with your wife; maybe even enjoy your life for a change," responded President Dave.

Les turned to you, "So what do you think of this overtime stuff?"

You are the PS Rep for local 14-007 and you are present during this discussion at the union meeting.

You have now developed effective listening skills. As you listened to the discussion, you jotted down the concerns and positions listed below. It is now time for you to calmly respond to each:

Concern	Response
A. They are taking away all my overtime.	
B. I am going to lose my boat or whatever.	
C. I don't mind working overtime.	
D. Hiring more people.	
E. Who's going to train the new people and when?	
F. Some are tired; others are young and want to work all available overtime.	
G. Time off with family (health issues).	

Notes

Summary: Communication and Interaction

1. Listening is a skill that must be learned and practiced.
2. Practicing good interview techniques can lead to better listening skills.
3. You must maintain a non-biased approach and work to get the correct solution.
4. Don't go into a conversation with pre-conceived notions. Start each discussion from a neutral standpoint.
5. Learn to disagree without being confrontational.

Tony Mazzocchi Center Proficiency Assessment

Activity 7: Communication and Interaction

Learning Objectives:

27. To understand how listening can improve communication skills. How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

28. To understand the importance of clear communication. How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

29. Listening is a skill that must be learned and practiced. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

30. Practicing good interview techniques can lead to better listening skills. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

31. You must maintain a non-biased approach and work to get the correct solution. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 8

How to Use Tools to Eliminate / Mitigate Hazards

Purposes

To understand OSHA's requirements for accident, incident and near-miss investigations.

To reinforce that employee knowledge and participation are vital to an effective Process Safety Management (PSM) organizational structure.

To understand Process Hazard Analysis and its role as a tool to help eliminate/ mitigate hazards.

This Activity has three tasks.

Task 1

Scenario:

"What are you guys talking about?" asked Mark, an Oil Chem Operator, as he entered the central control room.

"I almost got sprayed with sulfuric acid," replied Bill, a coworker. "I was getting ready to take my fresh acid sample and it blew back out of the sample collection bottle. It barely missed me."

"The problem is that he wasn't wearing his protective gear, and now he's trying to decide whether or not to report the near-miss," said John.

"After Sarah got splashed last year, they made the full PPE a requirement whenever you take a fresh acid sample," said Mark.

"I got the sample taken and didn't get sprayed, so let's just forget about it," said Bill.

"John's probably right. I've only heard of that happening a time or two when acid blew back out of the sample bottle," said Bill.

"They have been telling us to report near-misses, but I'm not even sure that this would qualify as one," said John.

"Now that I think about it, maybe it wasn't really that close," said Bill.

"Others are not going to know about this unless it's reported. It's your decision Bill," said Mark.

Factsheet 1: All Incidents Should Be Investigated

What OSHA says:

"Each incident which resulted in, or could reasonably have resulted in, a catastrophic release of highly hazardous chemicals in the workplace (should be investigated)."

What CCPS says;

"The management process by which underlying causes of undesirable events are uncovered and steps are taken to prevent similar occurrences."

In everyday language:

If a small leak could have been worse, and even if no one or the environment was hurt, it still needs to be investigated.

Sources: OSHA Process and Safety Management Standard, 29 CFR 1910.119(m), 57 FR 6356, February 24, 1992, available at: www.aiche.org/ccps/glossary/process-safety-glossary/incident-investigation.

Factsheet 2: OSHA Requires a Comprehensive Investigation

The Process Safety Management Standard requires the following regarding incident investigation:

- An investigation shall be initiated as soon as possible, but no later than 48 hours following the incident.
- An incident investigation team shall be established and shall include:
  1. **At least one person with knowledge about the process involved;**
  2. A contract employee if the incident involved work of the contractor; and
  3. Other persons with knowledge and experience to thoroughly investigate and analyze the incident.
- A report will be prepared which includes:
  1. Date of incident;
  2. Date investigation began;
  3. Description of incident;
  4. Factors that contributed to the incident; and
  5. Recommendations from the investigation.
- The employer is required to establish a system to promptly address the incident report findings and recommendations, documenting all resolutions and corrective actions.
- Incident reports shall be reviewed with all affected personnel whose job tasks are relevant to the investigation, including contract employees, where applicable.
- Reports shall be retained for five (5) years.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119(m), 57 FR 6356, February 24, 1992.

Factsheet 3: "Near-misses"— A Direct Line to an Accident

Workplace hazards cause accidents. They are always the root cause for illnesses, injuries and deaths at work.

Any workplace hazard that has not caused an illness, injury or death is a near-miss. A near-miss is a hazard waiting to spring into action and eventually be a workplace illness, injury, death or some kind of terrible event.

A hazard Is a near-miss!
A near-miss Is an undetected and uncontrolled hazard.

Fact-Based Investigations Result in Prevention

Incidents cannot be investigated if they are not reported. A common reason incidents go unreported is that, in some organizations, incident investigations tend to be searches for the "guilty" rather than searches for the facts.

> "When incident investigations are handled as searches for facts, the entire organization is more likely to work together to report incidents and to correct deficiencies; be they procedural, training, human error, managerial or other."

There will likely be an increase in the number of incidents reported with this approach. This is good. The objective is to get the situation into the open so the entire organization can work to correct deficiencies and prevent recurrence.

Sources: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992, Appendix D; and Factsheet 4, *Near-miss Prevention Project*, 2010, Tony Mazzocchi Center, Edition 4, Draft 1, p. 27.

Factsheet 4: The Best Investigation Team Is at the Site

OSHA states in the non-mandatory appendix that:

1. Employers need to develop in-house capability to investigate incidents that occur at their facility.
2. A team should be assembled by the employer and trained in the techniques of investigation, including how to conduct interviews of witnesses, needed documentation and report writing.
3. A multi-skilled team is better able to gather the facts of the event, analyze them and develop plausible scenarios as to what happened and why.
4. 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.
5. Workers in the process area where the incident occurred should be consulted, interviewed or made members of the team.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992, Appendix C, p. 6415.

Task 1

Using the Factsheet Reading Method for Factsheets 1 through 4, the scenario on page 128 and your experience, answer the following questions. (For questions 3 and 4, assume Bill made the decision to report the near-miss.)

1. **Why would you, as the PS Rep, encourage Bill to report this near-miss?**

2. **What would prevent Bill from reporting this incident?**

3. **According to the OSHA PSM Standard, is a worker representative required to be a member of the investigation team?**

continued

Task 1 *(continued)*

4. **Who would the team members be on an effective investigation team and what role would each play?**

Team Members	Role
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

Factsheet 5: Jointness Is a Must

Each facility must have a written plan for worker and union involvement. The plan must specifically address how workers and the Union will participate in each element of the OSHA PSM Standard. This plan should be jointly written by workers and management representatives.

If an employer has written or implemented its plan alone, it is not in compliance!

For example:

Labor Secretary, Robert B. Reich, proposed penalties of $1,597,000 against a West Virginia fertilizer/pesticide manufacturer. The action against Rhone-Poulenc AG Co. of Institute, West Virginia, follows an investigation by the department's Occupational Safety and Health Administration (OSHA) into an explosion and fire that killed one worker and seriously injured two.

Listed below is only one of 26 citations:

Citation 1 Item 1, Type of Violation: Serious

1. **29 CFR 1910.119(C)(2): The employer did not consult with employees and their representatives on the conduct and development of other elements of the Process Safety Management Standard:**

   a) The employer did not provide for the effective exchange of information, solicitation of input and participation of employees and their representatives in the development of the process safety program on the change of process.

   b) Nor did they provide for the participation of employees and their representatives in the formation of the Process Support and Improvement Group (a steering committee) which developed and implemented the ratio control method that was responsible for the disaster.

Sources: *Chemical Week*, Vol. 154, Issue 7, p. 6, February 23, 1994; and U.S. Department of Labor (OSHA) Filename OSHA94.89.

Factsheet 6: Is Your Committee Legal?

The Process Safety Management Standard does not require the establishment of PSM steering committees. Nor does it require that a union representative be included if a committee is formed.

Many employers, however, have found that the most effective way of fulfilling the consult requirement of the Standard is to form such committees and to include union representation. If worker participation is solicited, it is the Union's right to designate who their representative will be.

In a December 1992 ruling, the National Labor Relations Board found that the Electromation Corporation violated the law by not giving the workers the opportunity to choose their own method of selecting committee members.

It is illegal for the employer to decide who the hourly representative is on a committee and/or what the committee should work on!

It is important for union employees to select their own representatives for joint labor-management committees.

Not only is it important, but it is the only legal way.

Sources: OSHA Process Safety Management Standard, R9 CFR 1910.119, Appendix C, 57 FR 6356, February 24, 1992; and Bureau of National Affairs, *Labor Daily*, Inc., June 7, 1993.

Factsheet 7: A Look at an Effective Committee

Some workplaces have chosen to use contractually negotiated Joint Health and Safety Committees to oversee the implementation of the PSM Standard. Others have created a separate oversight committee and have used the Joint Health and Safety Committee as a model.

Joint Health and Safety Committees have equal numbers of union and management representatives. Representation is typically based on each major work area or work group. A structure such as this is seen as very effective, especially when care is exercised by union and management in choosing the members.

The following list was provided by USW sites that have effective committees:

1. We view each other as equals. We even have co-chairs of the committee.
2. Our members are very diverse. Each member has special skills: One for paperwork; another for verbal communication; and some from the Laboratory, Maintenance and Operations. They are the eyes, ears and voices of their departments.
3. We ensure our members are thoroughly trained.
4. The workers have the necessary time for committee work, paid for by the employer and encouraged by their immediate supervisor and work group.
5. We post the committee minutes, but we also make a formal report at the union meetings.
6. Our alternates to the committee are actually safety stewards. This maintains our lines of communications.

Source: John Gray Institute, "Managing Workplace Safety and Health: The Case of Contract Labor in the U.S. Petrochemical Industry," *Lamar University System*, July 1991, pp. 202-3.

Task 2

Use the Factsheet Reading Method for Factsheets 4 through 7 and the scenario below to answer the following questions.

Scenario:

Although not required under the PSM Standard, Oil Chem has decided to form a Joint Process Safety Management Committee.

The Committee will be comprised of six people: Four management representatives and two hourly (one from operations and one from maintenance).

Oil Chem will inform the Union of all actions taken by the Committee.

You, as the new union PS Rep, are upset about the formation of this committee. There have been problems in the past with Oil Chem picking members of committees. You are also concerned that the Union will have no say in this committee and that the Union, by participating in this committee, may be open for blame in the future.

At the same time, you see value in having a PSM Committee.

Task:

1. **Is Oil Chem in compliance with the *PSM Standard* in forming the PSM Committee? Give reasons for your answer.**

2. **List ideas you would propose to improve the PSM Committee.**

Ideas	Support for Each Idea
1.	
2.	
3.	
4.	

3. **List reasons worker involvement is vital to a PSM Committee.**

Task 3

Scenario:

The five-year revalidation period is coming to an end and the Process Hazard Analysis (PHA) for the Hydrotreater No. 2 Unit needs to be revalidated.

The company has asked Steve, the newest operator on the unit, to be on the PHA team. You, as the PS Rep, have intervened and suggested that Don, who has 30 years on the unit and has a wealth of knowledge about the process, be used instead of Steve.

The company says that Don, who is the lead operator, will be harder to replace and there are not many people who can fill that position; while Steve, as the new man, will be easier to replace because anyone on the unit can fill in for him.

Factsheet 8: What Is a Process Hazard Analysis?

A PHA is defined as:

1. A systematic effort designed to identify and analyze hazards associated with the processing or handling of highly hazardous materials; and

2. A method to provide information which will help workers and employers in making decisions that will improve safety.

A PHA analyzes:

1. The potential causes and consequences of fires, explosions and releases of toxic chemicals; and

2. The equipment, instrumentation, human actions and other factors which might affect the process.

A PHA attempts to determine:

The failure points, methods of operations and other factors that can potentially lead to accidents.

A PHA team should include:

Those with expertise in engineering, process operations and at least one employee who has experience and knowledge specific to the process being evaluated. One member must be knowledgeable in the methodology being used to conduct the analysis.

Source: Adapted from OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992, Appendix C.

Factsheet 9: PHA: What Is It Good for?

You should identify the hazard and then determine the risk. The goal of the process hazard analysis (PHA) is to determine how to best manage the risk.

You need to assure that the information is correct; you cannot make assumptions regarding chemical hazards (e.g., reactivity). The same goes for the process. You must be sure that P&IDs are correct with field verification. You cannot just assume the documents are correct.

And lastly, document and maintain the reason for the design. Someone in the future may see a way to simplify or shorten a run of pipe without realizing that it was designed and built that way for a particular safe operating process.

What can go wrong? How bad can it be? What is the chance of it happening?

Factsheet 10: Common PHA Methods

The following is a list of some of the better common methods used to evaluate process hazards. (All these methods should include workers.)

Hazard and Operability Study (HAZOP)
A structured, systematic review that identifies equipment that is being used in a way that it was not designed to be and which might create hazards or operational problems. HAZOPs are usually conducted by a multi-skilled team that studies piping and instrument diagrams. Each pipeline and vessel is evaluated for certain limitations and deviations in flow, temperature, pressure, etc.

Failure Mode and Effect Analysis (FMEA)
A systematic study of the consequences of failure (breakdown) of certain operational hardware; such as transmitters, controllers, valves, pumps, rotometers, etc.

Fault-Tree Analysis
This method draws a picture (model) that shows what undesirable outcomes might result from a specific initiating event (for example, a pipe rupture in a pipe rack). It uses graphics and symbols to show the possible order of events which might result in an accident. This method is sometimes used in accident investigations to determine probable cause.

Source: The Workplace Health Fund, *Blueprint for Prevention*, Washington, D. C., 2006.

Factsheet 11: Process Knowledge Is a Must

According to OSHA, Process Hazard Analyses must be performed by a team with process and engineering knowledge and include at least **one employee who has experience and knowledge specific to the process being evaluated**. Also, one member of the team must have experience with the PHA method being used.

PHAs must address all of the following issues:

1. The hazards of the process;
2. Previous incidents which could have been catastrophic;
3. Engineering and administrative controls;
4. The consequences of failure of engineering and administrative controls;
5. Facility siting;
6. Human factors; and
7. The range of possible safety and health effects caused by the failure of controls.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

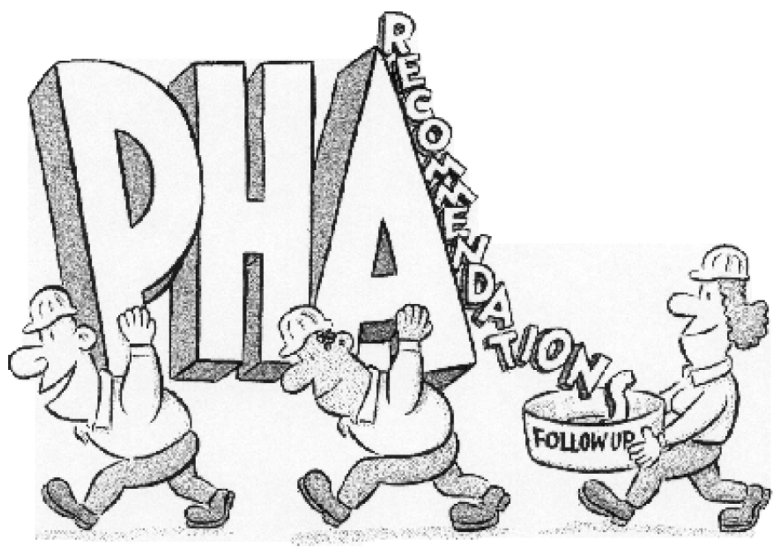
Factsheet 12: Take Action and Follow Through

OSHA sets specific timelines for the completion of PHAs. However, OSHA has no equivalent time requirements for the implementation of PHA recommendations. Follow-up is a critical part of any PHA, yet this is usually the weakest link in the process.

Any actions taken to correct hazards uncovered by the PHA team must be communicated to the workers in the area and to any other workers who might be affected. [1910.119(e)(5)]

Any recommendation not acted on must have a written response as to why it was not acted on (not needed and why) or another action was taken to address the recommendation including the action details.

The USW recommends that each PHA open action item be given a completion date, be assigned to management personnel and be reported on monthly to the PS Rep and the PSM Committee or the Joint Health and Safety Committee until completion.



Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Task 3

Using the Factsheet Reading Method for Factsheets 8 through 12, please answer the following questions.

1. **Why would you, as the PS Rep, be concerned about which employee is used on the unit's PHA team?**

2. **What PHA method, or combination of methods, should be used and how would they identify, evaluate and control the hazard?**

Method	How Would This Method Identify, Evaluate and Control the Hazard?
1.	
2.	
3.	

3. **Is Oil Chem required by OSHA to fix faults in design or operating procedures identified by a PHA?**

4. If a recommendation is not followed, what is the company required to do?

5. What recommendations should an effective program for PHA include?

Notes

Summary: How to Use Tools to Eliminate/ Mitigate Hazards

1. The Joint Union and Management Safety Committee can be a good team to use to conduct investigations.

2. Participation of workers who are uniquely qualified to be on the investigation team is a must.

3. Investigations should start immediately; seek root causes of incidents; and not be a “place-the-blame” hunt.

4. Process knowledge is a must for members of the PHA Team.

5. PHA action items should be tracked. Tracking should include which management person(s) the item is assigned to and how the status of the item will be reported (e.g., to the PS Rep, and/or the PS Committee or the Joint Health and Safety Committee).

Checklist Activity 8

Worker Participation

1. If an employer has already established its PSM program and failed to involve the union or workers, it is illegal and the union should request to bargain the issue.

2. The NLRB has ruled that the union must select its own representatives.

3. Your Joint Health and Safety Committees can serve as the PSM Oversight Committee or as a model for establishing a separate PSM Committee.

Process Hazard Analysis

1. Ask for the written plan for your site. Know your rights and roles.

2. PHAs are methods to systematically determine process hazards.

3. Most PHAs do not examine worse-case scenarios. Experience has shown that these catastrophic events do happen and should be studied in a PHA.

4. The subjectivity and experience levels of PHA team members have a large impact on the effectiveness of the team. Worker representatives on PHA teams play a crucial role due to their unique knowledge of process facilities.

5. Who are the team members on your site's PHA team(s)?

6. Track action items from PHAs and create an exception report for those that get delayed from original completion date.

7. What does your site have in place to track action items or those that are delayed?

8. Send a letter to your local OSHA and EPA office informing them that your facility is represented by the USW (local number) and list the union contacts for each agency. This will give them information they will need if they visit your facility.

9. Find out when and where your Local Emergency Planning Committee (LEPC) meets and attend those meetings.

10. Get a copy of the site's RMP plan.

11. Review worst-case scenario for your facility. What are secondary events?

12. Educate members on each unit to prepare them for sitting on a PHA team.

13. Approach company with requested employee participants for PHAs.

14. As a PS Rep, you have a responsibility to understand the job requirements and carry them out. This includes understanding your unit (assigned area).

Notes

Tony Mazzocchi Center Proficiency Assessment

Activity 8: How to Use Tools to Eliminate/Mitigate Hazards

Learning Objectives:

32. **To understand OSHA's requirements for accident, incident and near-miss investigations.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

33. **To reinforce that employee knowledge and participation are vital to an effective Process Safety Management (PSM) organizational structure.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

34. **To understand Process Hazard Analysis and its role as a tool to help eliminate/ mitigate hazards.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

35. **The Joint Union and Management Safety Committee can be a good team to use to conduct investigations.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

36. **Process knowledge is a must for members of the PHA Team.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 9

Fatigue in the Workplace

Purpose

To understand the effects of fatigue in the workplace.

This Activity has two tasks.

Task 1

Scenario:

John and Beth were working the night shift during a maintenance turnaround at the Oil Chem Refinery. They were on their last shift of a 45-day outage, during which they had worked the last 26 nights in a row. They started at 6 p.m. and worked through to 6:30 a.m. The day-shift crew started at 6 a.m. and that half-hour overlap was used for night-crew cleanup and work-progress turnover with the day shift.

John and Beth were working on installing a rebuilt pump and had to go back to the shop to pick up more shim stock (which was used to align the pump). They had set the pump in place, hand tightened the oil lubrication lines and begun aligning the shaft. They were going to run the pump and check the alignment when they realized they did not have any more shim stock.

It was close to 6 a.m. when they got to the shop so they relayed where they were in the process to Sam and Fred, the day-shift machinists. Sam and Fred took shim stock and finished balancing and aligning the pump and called the electricians to wire it up.

Sam and Fred knew this was one of the last pumps to be set in place and they were looking forward to a day off, as they also had been working for 26 straight day shifts.

After the electricians wired the pump, Sam and Fred pulled their locks and were going to check rotation. They started the pump and it was rotating correctly when they received a radio call to come to the shop and pick up some seals that they had been waiting for.

When they got back to the unit, the pump was not running and there was oil all over the ground. They reset the electrical switch for the pump, but it immediately tripped out. Upon further checking, the lubrication lines had not been tightened adequately. The oil had all run out and the bearings on the pump had seized up.

Factsheet 1: Circadian Rhythms and Health Effects of Fatigue

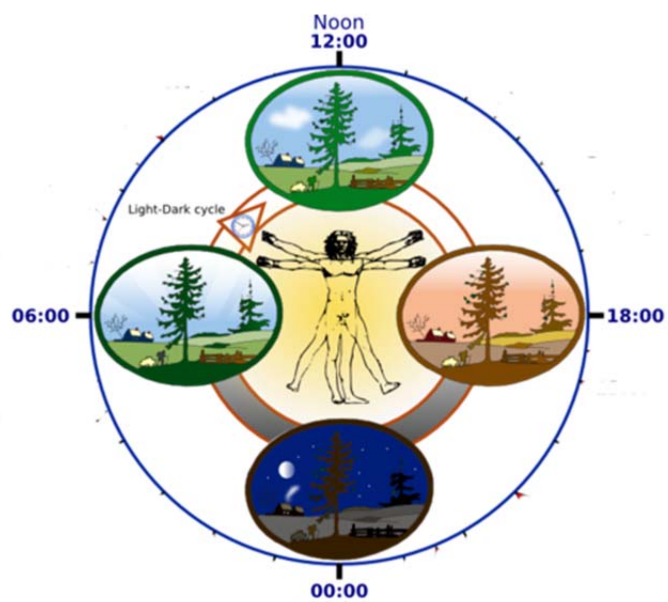
Our bodies rely on a 24-hour clock that allows us up periods when we are awake and down periods when we need sleep to rejuvenate. This is what is meant by a **circadian rhythm**.

People who work a 24-hour schedule are having their circadian clock disrupted whenever they change shift schedules. This affects their ability to get the meaningful sleep required to fully recharge their bodies and also may affect their ability to learn or retain what they are learning.

Circadian rhythm affects the physical well-being of shift workers whose internal biological clocks are out of sync.

According to an article in *Science Daily:*

> "Chronic sleep disruption can cause heart and kidney disease, researchers at the Peter Munk Cardiac Centre of the Toronto General Hospital have discovered.
>
> "Disrupted circadian rhythms have a devastating effect on the heart, kidneys and possibly other organs.' says Dr. Michael Sole, Cardiologist and founding director of the Peter Munk Cardiac Centre and Professor of Medicine and Physiology at the University of Toronto. 'This is the first study of its kind to demonstrate that sleep cycle disruption actually causes heart and kidney disease.'"



Source: Adapted from materials provided by University Health Network, "Chronic Sleep Disruption Can Cause Heart and Kidney Disease," *Science Daily*, March 18, 2008.

Factsheet 1: Circadian Rhythms and Health Effects of Fatigue *(continued)*

Recent studies have shown adverse health effects such as:

- Increased risk of depression;
- Obesity; and
- Diabetes.

These effects can occur when we work outside of the parameters of our natural circadian clock.

Health effects that can be long-term include:

- Gastrointestinal problems;
- High blood pressure; and
- Anxiety.

Short-term problems can affect:

- Concentration and decision-making;
- Association and recognition;
- Effective communication; and
- Control of emotions.

The ability to remember and recall events and their sequence can also be diminished, and all of these issues can be extremely important during an abnormal operating condition.

Sources: Adapted from materials provided by University Health Network and American College of Occupational and Environmental Medicine (ACOEM) Guidance Statement, "Fatigue Risk Management in the Workplace," February 9, 2012.

Factsheet 2: Fatigue Can Take a Heavy Toll on You and Your Family

An individual operates best on approximately eight hours of sleep daily. The best time for that sleep is when it is dark outside. Studies have shown that when sleep is reduced, there is a corresponding reduction in the ability of the person to perform.

Effects of shift work include:

- Disruption of the normal social cycle and relationships;
- Trying to sleep in the daytime when your body is programmed to be awake often causes you to experience a poor quality of sleep;
- When you do not get deep, prolonged periods of sleep, your body lacks what it requires for regeneration;
- Not being able to participate with family and friends during regular socializing hours or attend events with your children causes mental and physical stress; and
- You and your spouse may be on opposite shifts, which causes further disruptions to household responsibilities or child care.

Some ways to address fatigue associated with shift work:

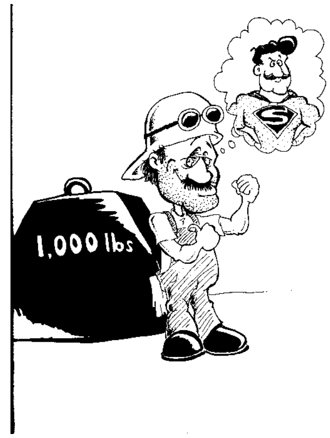
- Work shorter shift durations (a maximum of three nights or days in a row) and take adequate rest breaks in between (preferably a minimum of two days).
- Daily work hours should be limited to assure the person is able to get about eight hours of sleep.
- Avoid quick shift turnovers such as ending night shift at midnight and starting days at 7 a.m.
- Try to have consecutive days off, including one weekend a month.
- Try to avoid last minute, non-voluntary overtime assignments.

Source: "Fatigue and Shift Work," *UE Information for Workers*, February 1998, http://www.ranknfile-ur.org/h&s0298.html. Adapted from ACOEM Guidance Statement , "Fatigue and Risk Management in the Workplace," February 12, 2012.

Factsheet 3: Fatigue Causes Impaired Mental Performance

One study conducted by the University of Pennsylvania's School of Medicine involved volunteers who were kept awake until 4 a.m. and then awakened at 8 a.m. for five nights in a row to measure the effects of "chronic partial sleep deprivation."

The study showed that a cumulative impairment develops in the ability to think fast, react quickly and remember things. After a single night of four, five or even six hours of sleep, most people begin to show effects to their attention, memory and the speed with which they think. After a second night it is worse and after a third night even worse.



Chronically sleep-deprived persons often have no sense of their limitations. They believe they have trained themselves to handle the situation.

Virginia Tech's Transportation Institute did a study of the causes of car crashes. Over a period of a year's study, they found that driving drowsy was the riskiest behavior. Lapses known as "micro-sleeps" can occur even when a person's eyes are open. In a car traveling at 60 miles per hour, a lapse of a few seconds can result in a crash.

Source: Some information in this section was taken from a CBS *60 Minutes* segment originally broadcast on March 13, 2008, and updated on June 12, 2008, also available at: http://www.worksafe.vic.gov.au/wps/wcm/resources/file/eb87fc08b727473/vwa_fatigue_handbook.pdf.

Factsheet 4: Fatigue Can Impair Performance Similar to Alcohol Consumption

Forty subjects participated in a test where one-half of the group was kept awake for 28 hours and the other half consumed 10 to 15 grams of alcohol at 30-minute intervals until their blood alcohol concentration reached 0.10 percent. Hand-eye coordination was then measured at half-hour intervals. Performance was shown to decrease significantly in both conditions.

Equating the two rates at which performance declined showed decrease in performance for each hour of wakefulness between 10 and 26 hours was equivalent to the decrease in performance observed with a 0.004 percent rise in blood alcohol concentration.*

These results underscore the fact that relatively moderate levels of fatigue impair performance to an extent equivalent to, or greater than, is currently acceptable for alcohol intoxication.

By expressing fatigue-related impairment as a "blood-alcohol equivalent," we can provide policy makers and the community with an easily-grasped index of the relative impairment associated with fatigue.

*All states impose penalties for driving with a BAC greater than 0.08 (National Institute of Alcohol Abuse and Alcoholism; http://alcoholpolicy.niaaa.nih.gov/Blood_Alcohol_Concentration_Limits_Adult_Operators_of_Noncommercial_Motor_Vehicles.html) (down from 0.15% just a few decades previously). Even below those levels, drivers can have civil liability and other criminal guilt. Drivers under 21 (the most common U.S. legal drinking age) are held to stricter standards under zero tolerance laws adopted in varying forms in all states: Commonly 0.01% to 0.05% of common carriers, such as buses; available at: (http://en.wikipedia.org/wiki/Blood_alcohol_content).

Sources: "Fatigue, Alcohol and Performance Impairment," Nature, Vol. 388, July-August, 1997; and Williamson and Feyer, "Moderate sleep deprivation produces impairments in cognitive motor performance equivalent to legally prescribed level of alcohol intoxication," Occupational and Environmental Medicine, Vol. 57, Issue 10, 2000.

Factsheet 5: USW Local Worried About Overtime and Accidents

A shortage of hourly workers increased fatigue and safety risks in the Alaskan oil field. It's not unusual for technicians at Prudhoe, the nation's largest oil field, to work 18 hours per day for 10 days of their two-week shifts, reported Glenn Trimmer, Secretary-Treasurer of the USW Local.

> "No reasonable person is going to say that, by working 18 hours a day and getting four hours of sleep at night, you aren't taking a hell of a chance," he said.

A 2005 study by the University of Massachusetts Medical School's Center for Health Policy and Research showed that those who worked overtime face a 61 percent higher risk of injury than those who work normal hours. The study also showed that injury rates rise in relation to the number of hours worked.

The National Transportation Safety Board raised concern about fatigue after investigating a 1996 pipeline rupture in Fork Shoals, South Carolina, which sent nearly one million gallons of fuel oil into a river. The operator controlling the pipeline said he had adequate sleep the night before, but he had been awake for almost 17 hours at the time of the accident.

Source: *Anchorage Daily News*, February 22, 2007.

In your groups, using the Factsheet Reading Method for Factsheets 1 through 5, discuss and answer the following questions.

1. **In what ways could fatigue have played a role in the incident described in the scenario?**

2. **Thinking of your own workplace, have any incidents taken place that could have involved fatigue? Please describe.**

3. **Should limits be placed on the hours and days of work in your workplace?**

   Why or why not?

continued

Task 1 *(continued)*

4. **List ways, other than limiting hours and days of work, to help control fatigue in the workplace. These would be elements of a fatigue risk management system.**

5. **Can you as the PS Rep have an influence on whether there is a limit on the hours and days of work in your workplace?**

   Why or why not?

Notes

Task 2

Fatigue Standard Scenario:

John and Tim were working night shift at Oil Chem and were discussing the new fatigue standard the company said they were implementing. John said he didn't understand the standard or why it was being implemented and wanted more information.

Tim said he was at the union meeting the previous week and the new Process Safety Rep mentioned the Fatigue Standard the company was implementing, but he couldn't remember exactly what was said about it.

Tim said, "I don't like working very much overtime and I am afraid I will be forced to work more overtime than I am already working."

John said, "Don't worry Tim, I will work all your overtime as well as mine."

"I don't know if you will be able to after looking at this standard," said Tim.

"Why not? I can do that now. The company and the union are OK with it. I have bills to pay and a new baby that's only three months old. I need the overtime to buy that new house I have been looking at," said John.

Tim suggested they contact the Process Safety Rep and see what he has to say about how and why the company is implementing this standard and how it will affect the balancing of overtime.

John said, "Sure; let's contact him to find out how he will protect my right to work overtime."

Factsheet 6: Fatigue in the Petrochemical Industry

Refinery workers put in as much as 600 hours or more of overtime a year. A Sunoco refinery reported that overtime averaged 42 percent facility-wide with some areas reporting as much as 60 percent.

It is not unusual for workers to work 12 hours a day, with no days off, for several weeks at a time. Overtime can come in intense, weeks-long bursts during turn-arounds. Operators have worked 29 consecutive 12-hour shifts or more during a turnaround.

The Chemical Safety Board issued a recommendation to the American Petroleum Institute (API) and the USW to develop fatigue prevention guidelines for the refining and Petrochemical Industries that, at a minimum, limit hours and days of work and address shift work. This recommendation came from the investigation into the BP Texas City explosion and fire that killed 15 workers and injured 180 others in 2005.

New Recommended Practice from API

The API issued a Recommended Practice on Fatigue Management, RP 755. RP 755 was published in April 2010 and has guidelines on hours of consecutive days worked as well as consecutive hours worked.

The USW and the Oil Industry agreed to implement RP 755 during the National Oil Bargaining of 2012.

Source: U.S. Chemical Safety and Hazard Investigation Board, "Investigation Report: Refinery Explosion and Fire," March 2007.

Factsheet 7: Fatigue Prevention: A Joint Labor and Management Safety Challenge

Successful prevention of fatigue requires discussion and agreement between employers, workers, health and safety representatives and bargaining committees. Consultation should occur:

- When the Local Union identifies fatigue as a hazard in the workplace;
- When the company and union review how fatigue is currently managed;
- When changes are proposed to work schedules and overtime distribution;
- Prior to new work schedules;
- During each step of the risk management approach;
- When there are indications of fatigue affecting the health and safety of workers; and
- After an incident (or near-miss) occurs.

Additional points to consider:

- Schedule safety-critical operations during time periods when workers are fresh.
- Minimize physically demanding and mentally strenuous workloads with adequate rest breaks.
- Be aware of workload and have adequate staff and resources to handle the demand.

Factsheet 8: RP 755 and the Process Safety Rep

The PS Rep can be the Local's expert on fatigue. Reading the RP and understanding how your company is implementing the practice will benefit the membership by reducing fatigue and improving safety.

- Being involved in the auditing of the practice is a good way to gain an understanding of how the practice is being implemented.
- The exception process is used when the requirements of the RP are not able to be met. The exception process should not be used as a convenient way to fill open positions with overtime.
- Be aware of the differences in our members wanting to work overtime or not wanting to work overtime and how to address their concerns.
- The PS Rep should make it a priority to understand the bargaining issues associated with RP 755 and to know where concerns should be directed.
- The RP 755 requires an initial and periodic review for continuous improvement (4.9). The PS Rep may be able to assist in the periodic review of items such as the number of exceptions, open shifts, workset length and overtime on units and in maintenance departments, etc.

Source: Steven Lerman, "Report on ANSI/API RP 755 — Fatigue Risk Management Systems for Personnel in the Refining and Petrochemical Industries," Exxon Mobil, December 7, 2010.

Factsheet 9: Overtime and Fatigue

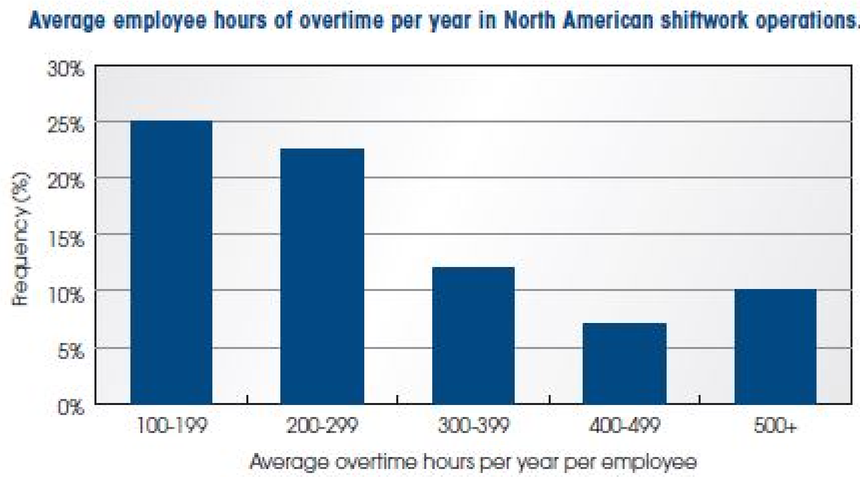
Because the number of positions to be filled on each shift is essentially fixed in most 24/7 operations, it is the staffing levels, not shift schedules, which play the largest role in determining:

- The actual amount of overtime per employee;
- The actual time off between shifts;
- The actual time off between consecutive blocks of shifts;
- The actual length of shifts;
- The actual work hours per week;
- The actual number of consecutive days worked;
- The overall discrepancy between the published shift schedule and the actual shift schedule worked; and
- The negative impact that all of the above has on sleep opportunity, quantity and quality in terms of fatigue related to health, safety and performance.

Up to a point, overtime is often welcomed, if not desired, by many employees as an understandable way to increase their paychecks. Some employees will volunteer for all of the overtime they can get, which buffers those who don't want the extra hours. This also makes life easier for their supervisors. However, from every scientific and operational perspective, any significant understaffing, especially when there is uneven distribution of overtime, will affect both acute and chronic fatigue levels and can represent a high-risk occupational health and safety exposure.

Overtime Levels in North American 24/7 Operations

Studies of average overtime levels show that overtime is a frequent feature of North American 24/7 shiftwork operations. The chart below shows the statistics for the average overtime levels from a survey of 623 North American shift work operations.



However, these average levels of overtime are not evenly distributed between employees. In many cases, the **majority of the overtime is worked by a minority of employees**, with the result that the overtime levels for these individuals is much higher than the facility average.

If this overtime practice is left unmanaged, it quickly builds a **financial dependency on overtime and a hard-to-break overtime culture that sets workers up to fail due to the resulting fatigue**, thereby creating serious safety risks.

Consequently, the **risk** of serious incidents is spiraling ever upwards, where risk is defined as the probability of an incident multiplied by its costs. **Thus, it is critical to monitor and manage both the average levels of overtime and the individual overtime levels for each employee.**

Source: William C. Sirois and Martin Moore-Ede, "Circadian Information LP 201; Staffing Levels, A Key to Managing Risk in 24/7 Operations," *Circadian 24/7 Workforce Solutions.*

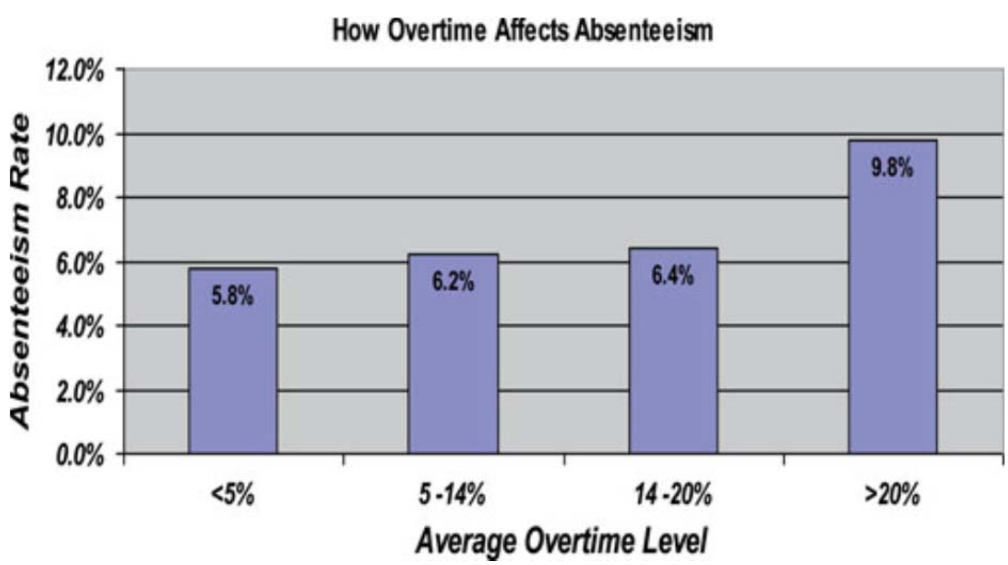
Factsheet 10: Effects of Staffing

Let's consider the often-cited argument that by cutting staffing levels and relying on overtime to fill open shifts, a company's overall benefits and training costs are reduced. Normally these employee benefits average between 30 and 40 percent of base salary unless there are substantial pension commitments. In other words, with a generous benefit package, including "accounting factors," each new employee costs a company one and a half times base pay.

Alternately, running "lean" by short staffing and creating more open shifts that have to be covered with overtime also requires paying at least time and a half and often double time. So what's the difference? Where's the savings?

The difference, of course, is the increased risk of fatigue which causes human error, increased absenteeism, reduced productivity and increased workers' compensation costs.

The chart below shows how increased absenteeism creates more overtime coverage requirements, compounding the fatigue and employee stress problems, and thus creating a vicious cycle of "fabricated" overtime.



Source: "Staffing Levels Key to Managing Risk in 24/7 Operations," *Circadian 24/7 Workforce Solutions*.

Task 2 *(continued)*

You are the PS Rep.

In your groups, using the Factsheet Reading Method for Factsheets 6 through 10, discuss and answer the following questions.

1. **How would you respond to John and Tim about why RP 755 is being implemented?**

2. **Describe the bargaining issues vs. the safety issues of the RP 755 plan.**

3. **What might be your response on the balancing of overtime and how that will be implemented (considering you don't know the specifics of this workplace)?**

4. **How would you respond to the personal situations?**

Notes

Summary: Fatigue in the Workplace

1. The Fatigue Risk Management System (FRMS) says fatigue is a safety risk.
2. Process Safety Reps must understand their role in fatigue management to help eliminate or mitigate this safety risk.
3. Be able to answer questions from your negotiating group on the FRMS.
4. Fatigue is not only harmful at work, it also has a negative effect on your workers' lives as well as on their physical and mental well-being.
5. Fatigue can affect reaction time and problem solving ability.
6. Fatigue is more than being tired from a long workday and overtime; it is also a cumulative result from too many successive workdays, no matter the duration of hours per day.
7. A person who is fatigued usually does not recognize the fact that they are suffering from fatigue.
8. Too many days/hours worked has been found to be a contributing factor in numerous process safety incidents.

Checklist Activity 9

1. Get a copy of the API RP 755 Fatigue Standard.
2. Get a copy of your company's written Fatigue Standard.
3. Discuss your role in the Fatigue Standard with your local Union Leadership.
4. Get copies of the exceptions to the Fatigue Standard or at least audit the exceptions.
5. Audit schedules and match up with the exception process to insure the exceptions are being documented.
6. Read Circadian 24/7 Workforce Solutions White Paper "Staffing Levels: A Key to Managing Risk in 24/7 Operations."
7. Read ACOEM GUIDANCE STATEMENT "Fatigue Risk Management in the Workplace." (Available at: http://journals.lww.com/joem/Fulltext/2012/02000/Fatigue_Risk_Management_in_the_Workplace.17.aspx.)

Tony Mazzocchi Center Proficiency Assessment

Activity 9: Fatigue in the Workplace

Learning Objectives:

37. **To understand the effects of fatigue in the workplace.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

38. **Understand that your Fatigue Risk Management System (FRMS) says fatigue is a safety risk**. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

39. **Fatigue is more than being tired from a long workday and overtime; it is also a cumulative result from too many successive workdays, no matter the duration of hours per day.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

40. **A person who is fatigued usually does not recognize the fact that they are suffering from fatigue.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 10

PSM Standard: Management of Change

Purposes

To gain a better understanding of management of change.

To understand how to manage change safely.

This Activity has two tasks.

Task 1

Scenario:

A refinery's saturated gas plant is having issues with its heat exchangers fouling with salts and hydrates. Management presents an idea for a water injection point. This is agreed upon as a quick, inexpensive fix that would not require much, if any, downtime. It even turns out there is an existing nipple that would be perfect for hooking up a water injection line.

Task:

Based on your experience, please answer the following questions:

1. **An operator reports to you that the project is proceeding without a MOC process. As a PS Rep, how would you respond to this issue?**

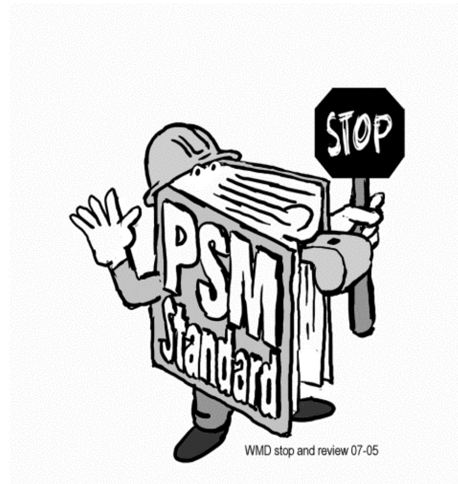
2. **Has a similar situation ever occurred at your workplace?**

   What were the results?

3. **What is the first resource you would use to get the situation resolved?**

Factsheet 1: Management of Change — Paragraph (l) of OSHA's PSM Standard

(l) Management of Change



Requirements:

1. Establish written procedures to manage changes to:
   a. Process chemicals;
   b. Technology;
   c. Equipment;
   d. Procedures; and
   e. Facilities.
2. Assess the impact of change on safety and operating procedures.
3. Provide updated training to workers (this includes operations, maintenance and contractors) prior to startup.
4. If change is significant, then a pre-startup review is required.
5. Update process safety information.
6. Update operating procedures.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 2: What Is "Change?"

For a Process Safety Rep, a useful definition of change is all modifications to equipment, procedures, raw materials and processing conditions other than “replacement in kind.”

“Replacement in kind” is a specific category of change which, quoting CCP Guidelines, is “an identical replacement or any other alternative **specifically provided for in the design specification**, as long as the alternative does not in any way adversely affect the function or safety of the item or associated items. . .” The saying “close enough for government work” does not apply in the process safety arena.

Some situations that can/should trigger an MOC being done are:

1. Adding lines, equipment, etc.;
2. Changes to the Digital Control System (DCS);
3. Findings from PHAs, incident investigations and audits;
4. Changes to staffing;
5. Changes in contractor agreements; and
6. Procedures.

Source: Appendix C 1910.119; available at:
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9763.

Factsheet 3: Temporary vs. Permanent vs. Emergency MOC's

Emergency changes typically are called for when there is imminent danger (personnel in jeopardy; a threat to the community; a high potential for loss of containment or equipment damage). The process for emergency MOCs typically has a streamlined review and approval process. It is very important that once the emergency has cleared, follow up is done to put a permanent solution in place. The whole concept behind MOCs is to take the time to assess if the change created hazards to the process. Time is one thing in short supply during an emergency.

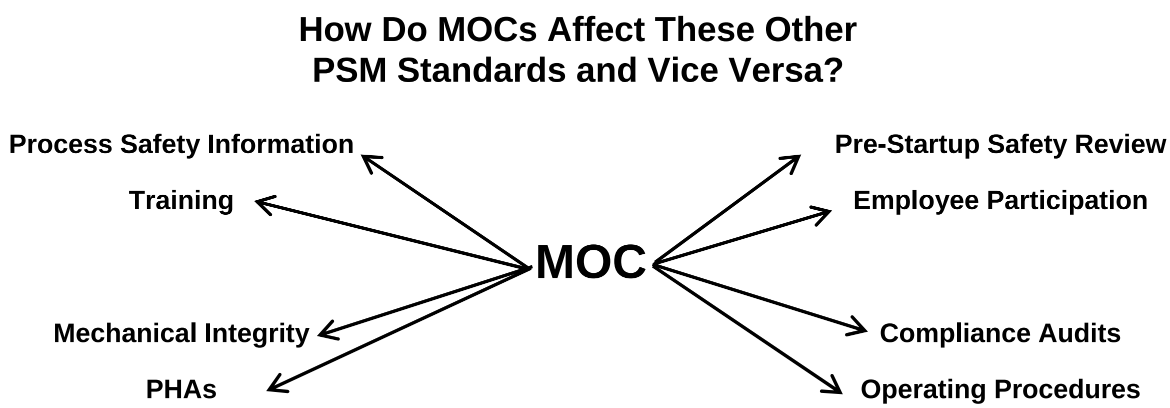
Temporary changes should have a defined endpoint and not be left to fall into the "temporary/permanent" minefield. This means there needs to be a system in place to manage deadlines for temporary changes.

Permanent changes require a timeline for all the different phases of the proposed change: Equipment changes, process safety information updates, training, procedures, etc.

Source: Appendix C 1910.119; available at:
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9763.

Factsheet 4: Process Safety Elements

Management of Change is not a stand-alone Process Safety element. It links very closely with many of the other standards: Mechanical Integrity, Procedures, Contractors, Process Safety Information, etc.; each affect one another.



Task 1 *(continued)*

Scenario (restated):

A refinery's saturated gas plant is having issues with its heat exchangers fouling with salts and hydrates. Management presents an idea for a water injection point. This is agreed upon as a quick, inexpensive fix that would not require much, if any, downtime. It even turns out there is an existing nipple that would be perfect for hooking up a water injection line.

Task:

Using the Factsheet Reading Method for Factsheets 1 through 4, and based on your experience and class discussion, please answer the following questions.

1. **Are there things that you might now add to your response or at least consider? List these below.**

____

____

____

2. **Using the situation from your workplace that you described earlier:**

   a. **Did your view of this situation change?**

   b. **Could the results now be different with your input?**

3. **Are there other resources you may add to the one you listed earlier?**

Factsheet 5: The Quick Change

Sometimes the hardest changes to manage are those easiest to make. They are inexpensive and don't receive the same detailed consideration a larger, more expensive change might get. They are usually simple in nature so they don't receive a review by the Engineering Department. In fact, a work order may not even be generated.

Quick changes might include using a different lubricant in a compressor; using a different gasket in an unloading hose; changing a hose connection on an airline to temporarily purge it with air; or making a minor set point adjustment on top of a minor set point adjustment that was made following a previous set point adjustment. . . you get the idea.

Writing new policies or procedures is not very effective in eliminating this problem. Operators, supervisors, mechanics, and in fact every worker in the workplace, must be retrained to be aware of the potential, long-lasting hazards involved in making even small changes to their worksites. Nor should this be a one-time occurrence. It must become a way of life — a new part of the workplace's culture — as commonly discussed at safety meetings as OSHA recordables or any other important item.

Source: Sanders, R.E., *Management of Change in Chemical Plants: Problems and Case Histories*, Butterworth-Heinemann, LTD., 1993.

Factsheet 6: "Other" Changes

When beginning a MOC Program, it is common to focus primarily on strictly mechanical changes first (i.e., swapping equipment parts; switching hose gaskets; using a different type of valve). But other types of changes also have a significant impact on safety and are often some of the more difficult ones to track. These can include:

1. **Changes in Process *Technology***
   Production rates, raw materials, new product development, operating conditions and specifications; such as pressure, temperature and flow rate.

2. **Changes in *Equipment***
   Programming on a computer-controlled unit; changes in alarms; interlocks and mitigation devices (e.g., pressure relief valve settings or piping, auto-shutdown device set points); and increasing the load on a control system, such as adding one more heat exchanger to an already overloaded cooling system.

3. **Changes in *Procedures***
   Most changes in a process will cause a necessary change in procedures for both operators and maintenance workers. In addition, most changes will require additional training.

4. **Changes in Human *Factors***
   Staffing levels, physical conditions (e.g., lighting, temperature, etc.), work schedules, system of supervision, etc. The potential effects of such changes should be studied carefully before the changes are implemented.

Sources: Sanders, R.E., *Management of Change in Chemical Plants: Problems and Case Histories*, Butterworth-Heinemann, LTD., 1993; "Management of Process Hazards," API recommended practice 750, 1990; and "Management of Change," a presentation to the Oil, Chemical and Atomic Workers International Union, AFL-CIO Process Safety Management School by Richard Budler, Manager of Process Safety, 76 Products Company, Denver, CO, 1996.

Factsheet 7: Maintenance and Change

Management of Change issues most often come into play during maintenance work of some kind and can happen in a variety of ways:

1. **Equipment/parts replacement**
   What happens when a part isn't available? Do we substitute whatever is on hand to keep things running?

2. **Changes made to isolate, protect, clean or clear equipment**
   Temporary changes are often made when preparing equipment for maintenance. Temporary changes must be analyzed for unseen hazards. When work is complete, equipment must be returned to a safe condition.

3. **Startups**
   This is a time of intense pressure in time and capital. Focus is often on these issues and not on safety.

4. **Changes to design**
   Maintenance workers often perform most of the engineering changes in the workplace. MOCs are often overlooked in this process.

Managing change during maintenance work means using good communications and good planning with approved procedures, proper materials and qualified workers.

Sources: Sanders, R.E., *Management of Change in Chemical Plants: Problems and Case Histories*, Butterworth-Heinemann, LTD., 1993; "Management of Process Hazards," API recommended practice 750, 1990; and "Management of Change," a presentation to the Oil, Chemical and Atomic Workers International Union, AFL-CIO Process Safety Management School by Richard Budler, Manager of Process Safety, 76 Products Company, Denver, CO, 1996.

Factsheet 8: Evaluation Team

One way to ensure that MOC concerns are not overlooked is to establish an evaluation team. This team should be made up of members with a wide variety of backgrounds. Engineers, safety professionals, operators, production supervisors, mechanics, etc., bring their own knowledge and/or expertise to an MOC Evaluation Team.

The team's duties will include:

Evaluation

1. Analyzing proposed changes and determining whether or not the change is feasible.

2. Determining the degree of response that will be required (e.g., will a checklist filled out by the operator/supervisor suffice or is a PHA called for, etc.).

Follow-up
Team member(s) are assigned to follow a project and report back to the full team on its progress until completed. (Note: A large-scale project may be broken into smaller tasks and assigned to several members.)

Auditing
Prior to completion of the project, the team (or sub-groups of the team if the change is determined to be small) will audit the change. This will include making sure that updates and changes to written procedures and process safety information documents have been made and training for operations and maintenance employees on the change has been completed or scheduled.

Sign off
When the project is completed, team members will ensure that all tasks have been completed. Startup of the process will not be permitted until each member signs off on it.

Source: Jadubowski, Jake A., "Lessons Learned: Management of Change," *Professional Safety Magazine,* November 1996.

Factsheet 9: MOC Tools

Analyzing changes for potential problems is not an easy task. Ideally, a MOC Evaluation Team would receive extensive training in this area. There are, however, tools that can help to make the job a little easier and systematic.

A tool often used in MOC programs is a MOC checklist. The checklist is made up of questions designed to help the user evaluate a change without overlooking any important questions. By no means is any checklist ever complete in itself; it is just a guide through the evaluation process.

Even more common, and the focal point of most Management of Change programs, is the MOC Change Request Form or permit. This form is basically used to gather information about the change and may also include a brief checklist of MOC.

What goes into a checklist? That will vary widely from site to site. But at a minimum, the questions or guidelines should cover possible effects of change to each safety system.

Where the impact of the change is minor and well understood, a checklist may be sufficient. However, for a more complex or significant design change, the health and safety committee should develop a hazard evaluation procedure.

Everyone from engineers to production managers to operators and maintenance should be involved when developing new procedures for a process change. Hourly workers run the equipment day in and day out and have the best understanding of the safety hazards involved in a process and can identify potential problems.

Copies of process changes, health and safety information and emergency procedures need to be kept in an accessible location to ensure the health and safety of all employees.

Sources: Jadubowski, Jake A., “Lessons Learned: Management of Change,” *Professional Safety Magazine*, November 1996; and *Process Safety Management Guidelines for Compliance*, OSHA Publication 3133, 1994.

Factsheet 10: Sample Checklist

Notification of Process Change Checklist

Information about the Change:

Originator ______________________________ Date of Origination ______________________________
Proposed Date of Change ____________________ Area ______________________________
☐ Permanent ☐ Temporary From __________________ To____________________

Description and Location of Change ____
____

Technical Basis for Change ____
____

Nature of the Change:

Change affects: ☐ Safety ☐ Loss Prevention ☐ Environment ☐ Health

Type of Change: ☐ Alarm ☐ Shutdown Point ☐ Addition or Removal of Equipment

☐ Piping Modification ☐ Chemical ☐ Process Computer Control

☐ Job Procedure ☐ Instrument ☐ Equipment/Material Modification

☐ Other

Pre-modification Checklist:

Applicable	NA	Initials	
☐	☐	______	Consult piping and equipment specifications.
☐	☐	______	Perform reactive chemicals testing.
☐	☐	______	Add involved materials to Toxic Substance Control Act (TSCA inventory).
☐	☐	______	Comply with Engineering Practices.
☐	☐	______	Comply with Technology Center guidelines.
☐	☐	______	Comply with Environmental Protection Guideline for Operations.
☐	☐	______	Comply with Safety and Loss Prevention requirements.
☐	☐	______	Consult maintenance (name) ____________________
☐	☐	______	Consult instrument and electrical technician (name) ____________
☐	☐	______	Consult parts technician (name) ____________________
☐	☐	______	Evaluate and modify relief system (name) ____________________
☐	☐	______	Consult Industrial Hygiene (name) ____________________
☐	☐	______	Consult Process Engineering (name) ____________________
☐	☐	______	Complete required reviews (name reviews) ____________________
☐	☐	______	Other ______________________________

Post-modification Checklist (Before Startup):

Applicable	NA	Initials	
☐	☐	______	Performed pre-startup audit.
☐	☐	______	Completed or updated training program.
☐	☐	______	Wrote and obtained approval for job procedures.
☐	☐	______	Updated P&IDs, process flow sheets and plot plans.
☐	☐	______	Trained personnel on the change.
☐	☐	______	Updated critical instrument checklist.
☐	☐	______	Changed computer code and documentation.

Approvals:	Name	Date
Originator		
First Reviewer		
Department Head/Superintendent		

Source: Process Safety Management Guidelines for Compliance, OSHA Publication 3133, 1994.

Task 2

Using the Factsheet Reading Method for Factsheets 5 through 10 and the scenario, answer the following questions.

Scenario (restated):

A refinery's saturated gas plant is having issues with its heat exchangers fouling with salts and hydrates. Management presents an idea for a water injection point. This is agreed upon as a quick, inexpensive fix that would not require much, if any, downtime. It even turns out there is an existing nipple that would be perfect for hooking up a water injection line.

Task:

1. **Are there any last responses you might consider to this scenario?**

2. **Are there now any new items to consider from your workplace example?**

3. **Are there now any more resources to add to your list in addressing this scenario?**

Summary: PSM Standard: Management of Change

1. In its simplest form, Management of Change is about bringing to bear 20/20 hindsight before an incident/unintended consequence occurs.
2. Change can occur in a variety of ways: Temporary, emergency, permanent, as well as changes to the process itself. Changes in temperatures, rates and crude slates are all potential sources that can lead to unwanted consequences.
3. When an MOC is done, it is only as good as the people involved. It is important to make sure the right people are involved. MOCs truly require employee participation.
4. Completing the MOC is just the start. The real work begins in making sure employees are really trained on the changes made and do not just receive a "quickie email." Also, tracking needs to be done to make sure the changes everyone agreed on are the changes that actually took place in the field.
5. Changes made in process safety information need to be updated as soon as possible — e.g., changes in piping and equipment.
6. Finally, like all the PSM elements, all MOCs should be covered in a written plan.

Checklist Activity 10

1. Get a copy of the written plan and review for compliance.
2. Do not be put off! MOC is a standard that benefits everyone at a site. Catastrophic failures kill people, damage equipment and leave the surrounding community questioning the company's privilege to operate.
3. Know who your PHA leaders are as well as who updates procedures, training manuals and P&IDs.
4. When trying to determine if a MOC should be conducted, examine the many incidents online that stem from MOC root causes.
5. Find your allies. If you think how your facility would look if your inspection department made all the decisions, you get an idea where you might be able to find someone to help you in your efforts.
6. And by all means, call, email or, if need be, send a S.O.S. to your fellow PS Reps. Without a doubt, they are having the same sorts of issues you are and are an invaluable resource.
7. A MOC should not become a Matter of Convenience (MOC).
   - Not asking the right questions;
   - Doing it for the paper work; and
   - The MOC should be done asking questions about what effect the change can have on the process, not done to justify the change.

Tony Mazzocchi Center Proficiency Assessment

Activity 10: PSM Standard: Management of Change

Learning Objectives:

41. **To gain an understanding of management of change.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

42. **To understand how to manage change safely.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

43. **Change can occur in a variety of ways: Temporary, emergency, permanent, as well as changes to the process itself. Changes in temperatures, rates and crude slates are all potential sources that can lead to unwanted consequences.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

44. **Changes made in process safety information need to be updated as soon as possible — e.g., changes in piping and equipment.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

45. **Like all the PSM elements, all MOCs should be covered in a written plan.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 11

Operating Procedures/Safe Work Practices, Hot Work Permits and Training

Purpose

To understand the PSM elements of:

1. Operating Procedures/Safe Work Practices;
2. Hot Work Permits; and
3. Training.

This Activity has three tasks.

Task 1

Scenario:

After the last shutdown of the Reformer at Oil Chem, the deethanizer tower showed signs of plugging. A team worked for a week diagnosing the problem and trying to fix it on line. The team decided the deethanizer tower would need to be bypassed and water washed.

The unit will have to be brought down to minimum charge rates to be able to take the tower off line. The spare low pressure separator pump is not a full size spare so this opportunity will be used to have the operators wash the main low pressure separator pump.

Once this work has been completed, the tower will be put back on line and the charge rates on the Reformer will be returned to maximum rate.

Factsheet 1: Operating Procedures — Paragraph (f) of OSHA's PSM Standard

(f) Operating Procedures

Requirements:

The employer shall develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information and shall address at least the following elements:

Each operating phase:

1. Initial startup;
2. Normal operations;
3. Emergency operations;
4. Temporary operations; and
5. Startup following a turnaround, or after an emergency shutdown:
    - Conditions which require emergency shutdown;
    - Operating limits;
    - Safety and health considerations; and
    - Safety systems.

Keep these procedures current and update once a year.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, Appendix C.

Factsheet 2: Operating Procedures

Operating procedures should:

1. Be prepared and reviewed with worker input;
2. Undergo review and approval by the safety authority;
3. Be field-validated (walkdown of operating procedure prior to release for work, or re-release for work; such as when modifications to the procedure or system have been made);
4. Specify that modifications to the procedure or system must be documented and verified;
5. Be made accessible and available to all workers;
6. Be reviewed and updated periodically;
7. Identify who is authorized to operate and/or maintain the equipment; and
8. Define what personal protective equipment (PPE) must be worn.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, Appendix C.

Factsheet 3: Written Hazards in Procedures

We use procedures to help us eliminate the risk of hazards, but many times procedures have risks and hazards written into them. We can identify these cautions and warnings in the following three ways:

1. **First** and easiest is when the words "caution," "alert" or "warning" are used with a step in the procedure.
2. **Second** is when the worker is asked to use personal protective equipment. This often indicates there is a hazard that should be eliminated or reduced.
3. **Third** is when there is a step in the procedure in which the worker clearly identifies a danger. Workplace rules stress following procedures exactly.

Including the worker in writing and reviewing all procedures will help eliminate many of the risks and dangers.

Source: "Identifying Hazards through Procedures and Eliminating Them with Systems of Safety," *DOE Annual Refresher Training for Hazardous Waste Operations*, Edition 12.1, May 2006, Tony Mazzocchi Center.

Factsheet 4: Safe Work Practices

The employer shall develop and implement safe work practices to provide for the control of hazards during operations such as:

1. Lockout/tagout;
2. Confined space entry;
3. Opening process equipment or piping; and
4. Control over entrance into a facility by maintenance, contractor, laboratory or other support personnel.

These safe work practices shall apply to employees and contractor employees.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, Appendix C.

Task 1 *(continued)*

Your table represents the planning team for this equipment bypass, tower wash and restart. You are the Process Safety Rep and a member of this team. Using your experience and the Factsheet Reading Method for Factsheets 1 through 4, answer the following questions.

1. **What procedures do you need to use to bypass and restart the tower? If there are no procedures that cover this situation, what should be done next? Please explain your answer in detail.**

2. **Should the operators doing the pump wash have a procedure?**

   Why and what kind of procedure?

Task 2

Scenario:

Jim and Ken, OilChem operators, reported to work on Monday morning. About 9 a.m., their supervisor (Steve) called them into a meeting. Steve told Jim and Ken that a pressure washer he ordered had just arrived and he wanted Jim to wash some pump bases with it to see how well it works.

Ken asked why they needed a pressure washer instead of using a water hose and soap like they always did. Steve said that the effluent plant is having problems so water and soap usage needs to be reduced to a minimum. Ken said he had some maintenance permits to issue which would take a couple more hours.

Steve showed Jim the pressure washer located outside. It had a 5 hp gasoline motor and an open flame boiler on a cart with wheels. Steve said the operation of the pressure washer was pretty much straight forward, so all Jim needed to do was read the starting directions on the side and get to work. Steve said he wanted an update by lunch on how well the pressure washer worked, and then he left to go to a meeting.

Jim was feeling like the pressure washer was not a tool an operator should be using and didn't know if a hot work permit was needed, so he called Ken on the radio to ask what he thought. Ken looked at the pressure washer and said, "There is a lot more to that machine than just running water through it. We haven't been trained on it and I think a hot work permit is required. Why don't you call the PS Reps and have them come down and look into this since it deals with elements of the Process Safety Management Standard?"

In your groups, discuss the following questions. As you answer each question, note which factsheet(s) helped you arrive at your answer. (Include Factsheets 1 through 4 that you have reviewed in this activity.) Your scribe will record your answers to report back to the class.

1. **How would you answer the question about issuing a hot work permit for using this power washer? Explain what information you used to come to your conclusions.**

2. **What precautions would you recommend to be followed for using this power washer?**

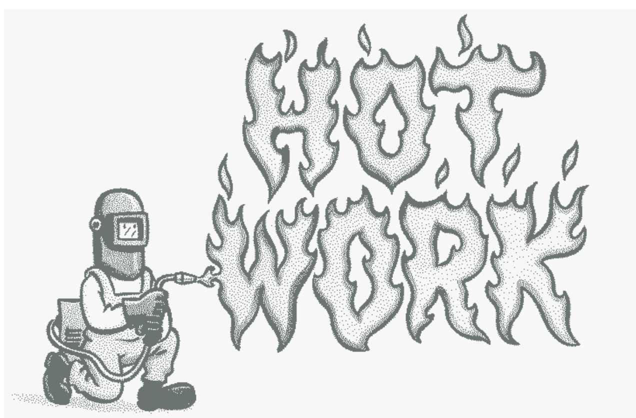
3. **How will you answer the question, "Is this work an operator should be doing?"**

   Why?

Factsheet 5: What Is Hot Work and Why Is It Hazardous?

OSHA defines hot work as: "Work involving electric or gas welding, cutting, brazing or similar flame- or spark-producing operations." We should be concerned about hot work because:

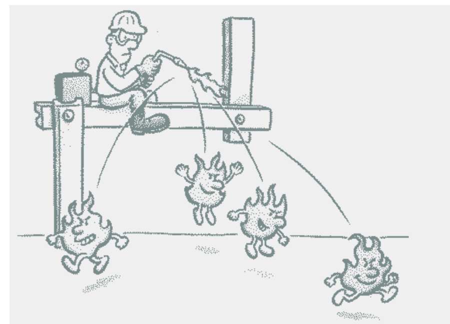
1. In our workplaces, a spark invites disaster because of the tremendous potential for flammable vapors or gases to be present.
2. When we cut, weld or grind in our facilities, literally thousands of ignition sources in the form of sparks and hot slag are created.
3. Sparks and slag can scatter throughout an area where hot work is going on — sometimes up to 35 feet or more.
4. Sparks and slag can also pass through cracks, gratings, doors, drains, open hatches and other openings in walls, floors or vessels, creating fire/explosion hazards in sometimes distant areas.



Source: NFPA 51B "Fire Prevention in Use of Cutting and Welding Processes," 1989.

Factsheet 6: Hot Work May Be More Than You Expect

Anything combustible or flammable can be ignited by hot work. Welding, cutting and brazing are pretty obvious; but what about those other "flame- or spark-producing operations" OSHA talks about?



1. Grinding, sanding and sand blasting;
2. Metal-on-metal contact, metal-on-concrete contact;
3. Internal combustion engines;
4. Electric tools, such as drills or saws;
5. Cameras, battery-powered instruments, radios, etc.; and
6. If your hot work permit system does not address these sources, it is not giving you the protection the law requires.

When you check out an area before doing hot work, it's natural to focus on the hazards of the process (solvent vapors, flammable gases and explosive dust-in-air mixtures, etc.). But wait; it's easy to overlook other combustible materials in a hot work area. It pays to check the area out thoroughly.

Move it!

Move combustible materials at least 35 feet from the hot work area. If they can't be moved, they must at least be protected with flame-proof covers or shielded with metal or asbestos guards or curtains. Edges of covers at sewer openings should be tight to prevent sparks from going under them. Combustible flooring should be wet down or protected by fire-resistant shields. Cover floor drains, trenches, sewer boxes, etc.

Source: OSHA 1910.252(a); and NFPA 51B, "Fire Prevention in Use of Cutting and Welding Processes," 1989.

Factsheet 7: Hot Work: Your Last Resort

It has become routine to do hot work in process areas in many chemical plants and refineries, often with the units still running. Call it increased production demands, profit maximization or whatever, the current trend in our industry is to take the least amount of time possible to do maintenance work. Planned shutdowns and turn-arounds for maintenance are held much less frequently than in the past. Even when such work is scheduled, the length of time allowed is enough to take care of only the most serious work orders.

But remember, it is almost always safer to move that piece of equipment out of the process area to a safe place before doing hot work on it.

Sources: U.S. Chemical Safety and Hazard Investigation Board (CSB), "Investigation Report: Refinery Explosion and Fire (15 Killed, 180 Injured)," BP, Texas City, Texas, March 23, 2005, Washington, DC, 2007; and "Beyond Texas City: The State of Process Safety in the Unionized US Oil Refining Industry; A Report on the USW Refinery Survey," October 2007.

Factsheet 8: Where There's Smoke There Should Be a Fire Watch!

When hot work is being performed the sparks fly — literally!

Sparks produced by hot work operations like grinding, cutting or welding are often spread over a large area. This makes it impossible for grinders, welders or torch operators to do their work while also watching for fires. OSHA says a fire watch must be assigned to the job if there is a chance of more than just a minor fire. No fire is minor. Consider the following real-life examples:

1. Rouseville, PA: A welding operation on a stairway to a tank was prepped and permitted in the morning. The area was gas-tested and found to be clear of any LEL levels. The liquid in the tank was not considered flammable as it was a mixture of water and various products from the vacuum truck recovered spills. As the day warmed up and conditions changed, flammable vapors formed and began rising off the tank. The vapors were ignited and three contractors were killed.

2. Delaware City, DE: A welding operation was taking place on a catwalk on a tank. The work crew had been repairing a catwalk on a sulfuric acid storage tank when a spark from their hot work ignited flammable vapors in one of the tanks. This tank had holes in its roof and shell due to corrosion. The tank collapsed and one of the contract workers was killed; eight others were injured.

Establishing a Fire Watch

A trained fire watch attendant (more than one, if necessary) must be on duty at the hot work site until at least 30 minutes after the hot work is completed.

In addition, a hot work permit must include the date and time the work is authorized and must identify the equipment to be worked on. The permit must be kept on file until the hot work operation is completed.

Remember, if the nature of the job changes (e.g., another craft becomes involved, new equipment is used or conditions surrounding the job change), a new hot work permit should be issued.

Sources: OSHA 1910.119; and NFPA 51B, "Fire Prevention in Use of Cutting and Welding Processes," 1989, CSB Investigation, available at: http://www.csb.gov/partridge-raleigh-oilfield-explosion-and-fire/.

Factsheet 9: Hot Work Permits: No Guarantee of Safety

A hot work permit is only as good as the information included on it and the skills of the person issuing it. Several factors have to be considered before issuing a permit.

Explosive Atmospheres

Hot work obviously can't be done near explosive atmospheres. The area should be checked with a combustible gas analyzer at different levels. Even if the air is clear, will it stay that way? Continuous monitoring should be standard practice.

Nearby Combustibles

Move combustible materials in the area 35 feet from the hot work area. If impractical, protect them with flame-proof covers or guards.

Fire Protection Equipment

Inspect all fire equipment and do not allow hot work in sprinklered buildings if that protection is impaired.

Safe Condition of Surrounding Areas

If something is going on near a hot work area that could create a hazardous condition, those operations must be made safe until the hot work is finished. If there are floor openings, gratings, wall openings or open ductwork or conveyors that could allow sparks from the hot work to be carried into another area, they must be covered or blocked. One hundred percent spark containment should be required to control sparks.

Source: 29 CFR 1910.252 Fire Prevention and Protection.

Factsheet 10: What the PSM Standard Says

1910.119(k)

Hot work permit.

1910.119(k)(1)

The employer shall issue a hot work permit for hot work operations conducted on or near a covered process.

1910.119(k)(2)

The permit shall document that the fire prevention and protection requirements in 29 CFR 1910.252:

a) Have been implemented prior to beginning the hot work operations;

b) It shall indicate the date(s) authorized for hot work; and

c) Identify the object on which hot work is to be performed.

The permit shall be kept on file until completion of the hot work operations.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119.

Factsheet 11: Monitoring the Monitors

Monitoring results are only as good as the equipment being used and the training and experience of those using it. So be sure that:

1. Only experienced, trained workers use a combustible gas monitor.
2. Units have fully charged batteries.
3. The analyzer is intrinsically safe (explosion proof).
4. Units are calibrated on a regular basis and that calibration is checked daily.

And remember that:

1. Monitors will give false low readings if the sample vapor is very high in concentration. If the oxygen level is low, monitors will give false low readings of flammable vapors.
2. Liquids or steam drawn into the unit will give false readings and may damage the unit. Hydrogen will also affect readings.
3. Monitors do not give instantaneous readings. They require as long as 30 seconds to perform the analysis. If an auxiliary pump and tubing are used to sample a confined space or other area, allow at least two more seconds per foot of sample tubing for the sample to reach the monitor.
4. If the results of any analyzer are suspect in any way, retest with another unit immediately.
5. Some gases are heavy, some aren't. Be sure testing is done at several different levels.

Source: National Safety Council, *Accident Prevention Manual for Business and Industry*, 10th Edition, Itasca, IL: The National Safety Council, 1992.

Factsheet 12: Training and Procedures

The PSM Standard requires procedures and training for maintenance tasks. This is what it says:

1910.119(j)(2)

Written procedures.

The employer shall establish and implement written procedures to maintain the ongoing integrity of process equipment.

1910.119(j)(3)

Training for process maintenance activities.

The employer shall train each employee involved in maintaining the ongoing integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.

Operators performing maintenance activities are required to follow the Mechanical Integrity element of the PSM Standard.

Multiple elements of the PSM Standard may apply to a single task.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119.

Factsheet 13: PSM Standard Section (g) — Training

1. **Initial training**

   (i) Each employee presently involved in operating a process and each employee before being involved in operating a newly assigned process, shall be trained in an overview of the process and in the operating procedures as specified in paragraph (f) of this section.

   The training shall include emphasis on the specific safety and health hazards, emergency operations including shutdown and safe work practices applicable to the employee's job tasks.

   - **Refresher Training**

     Refresher training shall be provided at least every three years, and more often if necessary, to each employee involved in operating a process to assure that the employee understands and adheres to the current procedures of the process. The employer, in consultation with the employees involved in operating the process, shall determine the appropriate frequency of refresher training.

   - **Training Documentation**

     The employer shall ascertain that each employee involved in operating a process has received and understood the training required by the paragraph. The employer shall prepare a record which contains the identity of the employee, the date of the training and the means used to verify that the employee understood the training.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 14: Who Is "Involved in Operating the Process?"

When OSHA proposed this section of the Standard, there was a lot of debate about who should be covered.

There is still some controversy as to the training needs of managers and supervisors. Some companies contend that managers and supervisors only require training in supervision skills since they have completed college.

Others question how a college education prepares a person for a specific petro-chemical process. They further argue that a person could not possibly be able to instruct or give direction to workers if they do not have at least the same training, and that they should have more.

So OSHA gives us their definition:

> "To apply to only those employees, including managers and supervisors, who are actually involved in 'operating' the process."

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992, p. 6381.

Factsheet 15: Maintenance Personnel Must Receive Training Too!

There are also training requirements for maintenance workers listed within the Mechanical Integrity (j) portion of the Standard:

> "The employer shall train each employee involved in maintaining the ongoing integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job task in a safe manner."

This means that skills training is required along with an overview of the process.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 16: Even Contractors Have to Be Trained!

There are also requirements for contractors [see PSM Standard section (h) — contractors]:

> "The contract employer shall assure that each contract employee is trained in the work practices necessary to safely perform his/her job."

It is the responsibility of the employer to insure that the contractor is giving its employees training.

We have all heard of examples where contractors simply were not skilled or trained within the job they are assigned to perform. A complete history of the training and verification of the contractor's understanding of the training must be kept on file.

Note: The Employment Involvement section of the PSM Standard gives workers and union representatives the right to review this file.

29 CFR 1910.119(c)(3) states:

> "Employers shall provide to employees and their representatives access to process hazard analysis and to all other information required to be developed under this Standard."

More than a process safety overview is needed to fulfill this requirement. It requires a history to verify the skills necessary to be considered a machinist, electrician or any other crafts person.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Factsheet 17: The Myth of "Safety First"

Training for production is the number one reason that companies implement training programs.

According to a survey in which manufacturing firms were asked directly why they had decided to implement their programs:

Reasons Manufacturing Firms Implement Training Programs	
To reduce errors and waste.	54%
As a benefit to workers.	46%
Because a subsidy became available.	46%
Because of pressure from customers.	43%
Because it was needed as a result of changes in production.	40%
As a part of a transformation of corporate culture.	29%
Because it was needed as a result of new technology.	29%
Because it was required by customers.	29%
Because training became available.	26%
Because of changes in the available work force.	26%
To attract new workers.	23%
To attract new customers.	23%
To meet new health and safety requirements.	23%
To meet new certifications.	20%
To meet increased competition.	20%
Because of an agreement with labor.	20%
Because workers identified the need.	17%

Source: "Workplace Education for Hourly Workers," *Journal of Policy Analysis and Management*, Winter 1994.

Factsheet 18: Training for Production Is Not Enough: Health and Safety Must Be Included

As a result of an investigation by OSHA of an explosion at an oil refinery, the company was issued several citations. The citation for failure to properly train employees is as follows:

Citation:

The initial training program for employees involved in operating a process did not include emphasis on:

1. Specific safety and health hazards of the process;
2. Emergency operations including shutdown; and
3. Safe work practices.

The employer did not train all K-l technicians and shift supervisors on the potential hazards, equipment and system limitations and associated safeguards of the K-l polymerization unit.

In settlement of the training issue the company agreed to train each employee involved in the process in:

1. An overview of the process;
2. Operating procedures; and
3. Actions taken pursuant to:
    - Process Hazard Analysis; and
    - Incident Investigation Reports.

The training will emphasize the specific safety and health hazards of the process.

Source: http://ehstoday.com/standards/osha/ehs_imp_78976/.

Factsheet 19: Some Have Reasons for Not Training

Firms without education programs were asked to indicate the most important reasons for not having training programs.

Do not feel the need for such a program.	52%
Believe that the program would cost too much.	41%
Don’t have the personnel infrastructure to deal with it.	33%
Too busy to deal with training.	22%
Don’t know what skills their employees need or how to arrange for those skills to be taught.	40%
Philosophically opposed to such a program.	29%
Believe the turnover is too high to enable the firm to recoup its investment in the program.	29%

But the bottom line is. . . money!

Sources: Inspection: 301406500 — Phillips Petroleum Co., Phillips Citation, March 27, 2000, available at: https://www.osha.gov/pls/imis/establishment.inspection_detail?id=301406500 and http://www.mpri.lsu.edu/workshop/SACHE%20Text.pdf.

Task 3

Discuss the following questions in your groups. As you answer each question, note which factsheet(s) helped you arrive at your answer. After reading the factsheets, have your views changed? (Include all the factsheets you have reviewed in this activity.) Your scribe will record your answers to report back to the class.

1. **Who (job classifications) is the employer required to train on a process under the PSM Standard?**

   Factsheets that helped you arrive at your answer:

   After reading the factsheets, have your views changed? How?

2. **Who should be included in the discussion about how often to offer refresher training for a particular job?**

   Factsheets that helped you arrive at your answer:

   After reading the factsheets, have your views changed? How?

continued

Task 3 *(continued)*

3. **Are all operators, supervisors, maintenance workers and contractors at your workplace adequately trained on process specific safety?**

   If your answer to question 3 was "Yes," please explain.

   If your answer was "No," please describe what improvements are needed in your current training system to make it work properly.

   Factsheets that helped you arrive at your answer:

   After reading the factsheets, have your views changed? How?

4. **What would be appropriate training for Safe Work Practices? Pick one safe work practice at your site and explain how the training is conducted.**

   Factsheets that helped you arrive at your answer:

   After reading the factsheets, have your views changed? How?

Summary: Operating Procedures/Safe Work Practices, Hot Work Permits and Training

Procedures/Safe Work Practices

1. Operators must be trained on safe work practices and maintenance procedures if they apply to their expected (assigned) task.
2. All training should focus on health and safety skills, not just production skills.
3. Procedures are important tools to be used for operating a covered process.
4. Training on safe work practices is as important as training on operating procedures.

Training

1. The PSM Standard tries to ensure that all employees involved with the process are trained. This means operators, foremen and supervisors. If you do the work, tell someone how to do the work or decide what work is to be done, you must be trained.
2. All maintenance personnel must be trained. Direct-hire and contractors must be trained before they repair equipment.
3. Maintenance foremen and supervisors must be held to the same standard as operations foremen and supervisors. A foreman cannot oversee the rebuilding of a gas-fired turbine by a machinist if his or her training is for welding or accounting.
4. Training on new tasks is important and required by the Standard. You have the right to ask for training under the Employee Participation element.

Hot Work Permits

1. Hot work is any job that has a flame or produces a spark.
2. The hot work permit is an important tool in the hot work system, but it does not make unsafe work safe.
3. A permit must be issued before the hot work begins. The proper permit will record that safety requirements have been met and the results of the monitoring for combustibles (percent LEL).
4. The worker performing the hot work cannot do his job and watch the area too. At least one well-trained fire watch should be posted in each hot work area.
5. Any time you do hot work in a process area you take a risk. Work like this should only be a last resort. Remove the job to a safe site whenever possible. **Ask the question: Does the task being done really need to be done as hot work?**

Checklist Activity 11

1. Get a written copy of your employer's Hot Work Permit Program.
2. Talk with the membership to see if hot work is being performed without written hot work permits.
3. Get written copies of the Safe Work Practices at your site.
4. Review the written training plan for Safe Work Practices.
5. Get a copy of the written plan on how employees are involved in the development of procedures and safe work practices.
6. Know how to access maintenance procedures.
7. Audit maintenance and operating procedures for accuracy and to insure they are developed for all tasks requiring them.
8. Know how to access training records for operating procedures, safe work practices, maintenance procedures, etc.

Tony Mazzocchi Center Proficiency Assessment

Activity 11: Operating Procedures/Safe Work Practices, Hot Work Permits and Training

Learning Objectives:

46. **To understand the PSM elements of Operating Procedures/Safe Work Practices, Hot Work Permits and Training.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

47. **Operators must be trained on safe work practices and maintenance procedures if they apply to their expected (assigned) task.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

48. **The PSM Standard tries to ensure that all employees involved with the process are trained. This means operators, foremen and supervisors. If you do the work, tell someone how to do the work or decide what work is to be done, you must be trained**. How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

49. **The hot work permit is an important tool in the hot work system; but it does not make unsafe work safe.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

50. **Any time you do hot work in a process area you take a risk. Work like this should only be a last resort. Remove the job to a safe site whenever possible. Ask the question: Does the task being done really need to be done as hot work.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 12

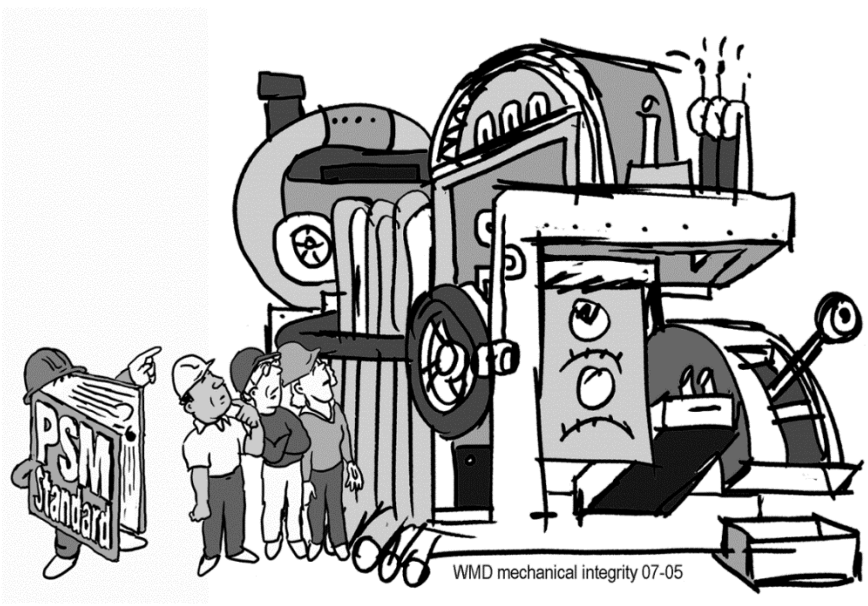
PSM Standard: Mechanical Integrity

Purposes

To familiarize the PS Rep with the OSHA performance-based requirements for a workplace Mechanical Integrity Program.

To examine the causes and solutions of "breakdown maintenance."

This Activity has two tasks.



Task 1

Scenario:

During the night shift on unit "A" at Oil Chem, the process operator, Debbie, noticed a severe vibration on E-101 "G" air-cooled exchanger. She radioed the control room and asked the Board Operator, Jim, to write a work order to get the bearings replaced.

Jim filled out the work order and gave it to his Foreman, Bob. Bob made a notation in the unit log book that the bearings were bad and forwarded the work order to the unit supervisor for approval. Bob and his crew were finishing up their night rotation and were starting their days off.

When Ernest, the Unit Supervisor, arrived on the day shift, he assigned the work order a priority "2" (complete within a week) because it was cool outside and he knew they could run without the exchanger. Besides, the maintenance crew was already busy repairing the centrifuge, which was a priority "1" (overtime authorized).

At 3:00 a.m. on the following day, the bearing failed on E-101 "G," causing such a vibration that a pressure gauge leaked. The leak caused a fire.

During the investigation that followed, it was found the vibration switch had failed to trip the fan off line. It had been wired wrong, probably since the time of installation.

Factsheet 1: Maintenance Myths Most Often Heard

Here are some commonly-used excuses for not following safe mechanical integrity practices and examples of the consequences of not doing so.

It's only temporary.

A leak developed on one of the six in-line reactors. All six were connected with 28-inch-diameter pipes and expansion bellows. The leaking reactor was bypassed with a 20-inch pipe with two elbows and the expansion bellows were left intact.

The pipe was not supported properly; it was resting on scaffolding. Because of the bellows it was free to rotate or "squirm" and in the process it failed, killing 28 people and destroying the plant.

It's ready to go.

A pump was being removed for repair. When the case bolts were being removed, the pump started spraying benzene and an explosion followed, killing one new employee and burning others. There were no blinds installed; they were relying on block valves to hold.

It's factory set; no need to test it.

In an automatic firefighting system, a small explosive charge cuts a rupture disc and releases the firefighting agent, Halon. The manufacturer said it was not necessary to test. To test would require the loss of the Halon, which was very expensive.

The buyer insisted on the test even with the added expense. The smoke detectors worked but when the explosive charge was activated, the rupture disc was not activated. The manufacturer was in error.

Factsheet 2: More Maintenance Myths

It's a diesel, so it's explosion proof.

Flammable hydrocarbon leaked during a maintenance operation. A diesel engine operating in the area began to race. The driver tried to stop it by isolating the fuel supply (the usual way to stop a diesel engine) but without success. The fuel was being sucked into the air intake. Finally a flashback occurred and the hydrocarbon ignited, killing two workers.

Go ahead and use this one, it'll work.

1. A carbon steel valve was painted which made it appear that it was stainless. It was used instead of using a stainless steel valve. It corroded rapidly.

2. A leak on a refinery pump was followed by a fire. It was due to incorrect hardness of the bolts used by the manufacturer.

3. Checks carried out on the materials delivered for a new ammonia plant showed that 5,480 items (1.8 percent of the total) were delivered in the wrong material.

4. The wrong electrodes had been used for 72 welds on the tubes of a fired heater.

I don't need an operator, I'm just going to look.

A maintenance foreman was asked to look at a faulty water cooling pump. He decided that, to prevent damage to the machine, it was essential to reduce its speed immediately. He did so, but did not tell any of the operators. The cooling water rate fell; the process was upset; and a leak developed on a cooler.

Don't worry, Charlie, it's on computer control.

In 1983, the Russians shot down a Korean Airlines aircraft which had strayed off course. It is believed to have been off course because the engineer entered wrong data (longitude) into the navigation system. There were 269 people killed.

Sources: Trevor Kletz, *Still Going Wrong!: Case Histories of Process Plant Disasters and How They Could Have Been Avoided*, Gulf Professional Publishing, 2003..

Factsheet 3: Work Order Backlog: No. 1 Warning Sign

Most companies have very good written preventive maintenance (PM) plans on equipment. But in reality, as the work orders pile up, they are unable to keep their PMs caught up. According to a spot survey of a typical plant employing approximately 100 maintenance employees, there was a backlog of 1,045 work orders.

To make matters worse, preventive maintenance work orders are usually treated as having a lower priority than most work orders. The problem is compounded by the fact that most companies do not employ enough maintenance workers to stay on top of the regular work orders, much less the PMs.

A huge backlog of work orders is a sign that the Mechanical Integrity (MI) program is not doing what it is intended to. This may be considered a violation of the performance-based PSM Standard.

Factsheet 4: If It Ain't Broke . . .

Many organizations consciously decide to Run to Failure (RTF). RTF is rarely less costly than preventing failure. An organization that manages using RTF twists the old cliché, "If it ain't broke, don't fix it." Unfortunately, this approach can lead to catastrophe.

"An ounce of prevention is worth a pound of cure" is a better maxim:

1. A ten dollar seal may wind up costing thousands of dollars, not to mention death and injury.
2. The normal rule of thumb is that corrective (breakdown) costs are four to five times more expensive than preventive costs.

Source: http://info.marshallinstitute.com/?Tag=Run+To+Failure.

Factsheet 5: Understaffing Leads to Problems: A Case Study

During testimony on the PSM Standard, one OCAW (now USW) member described some of the effects that the reduction of maintenance workers had at his plant.

Maintenance staff cut in half:

> "The staffing of the Mobil Beaumont refinery has steadily decreased in the past ten years. **The Beaumont refinery had over 2,000 hourly employees, of which 1,200 were permanent maintenance employees when I went to work there 20 years ago. We now have less than 600 maintenance workers."**

The effects don't hit you overnight:

> "Maintenance workforce reductions are not something that hit you overnight. The effects are gradual; but as time marches on, the reductions become more and more obvious."
>
> "Running maintenance today in both quality and quantity is much worse than 10–15 years ago. Pumps and compressors are not maintained. They cannot be properly maintained when the people are not there to do the work."

The potential for disaster is present:

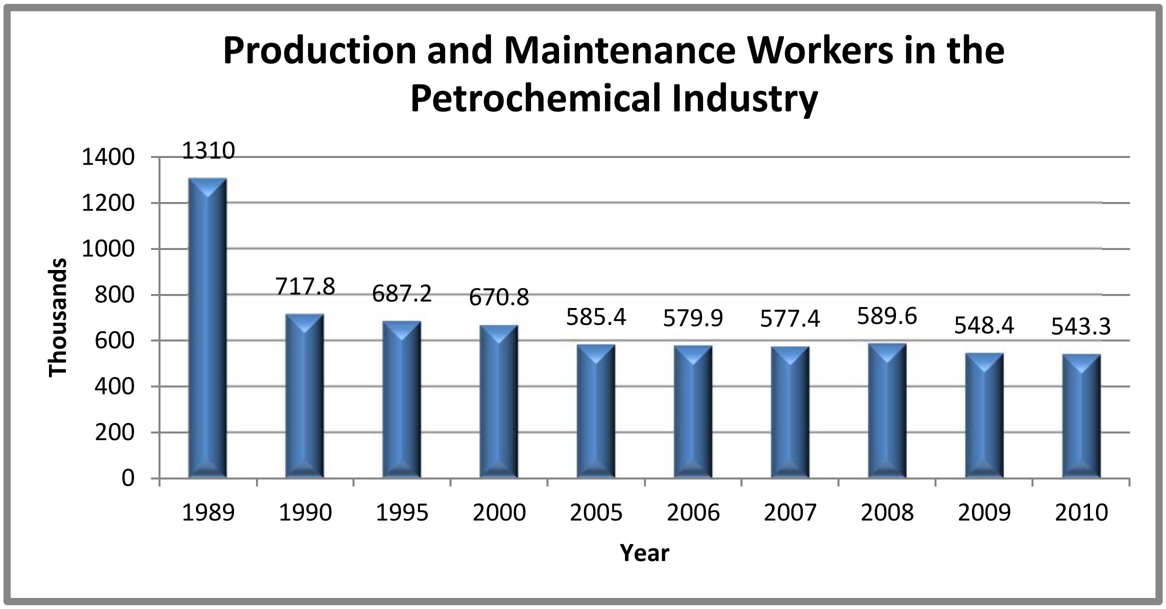
> "Leaks of all sorts: Oil, chemicals (which include toluene, ketone, etc.), are not addressed in a timely manner. **A limited amount of maintenance people are kept busy doing work necessary to maintain production; and the less important problems (in the company's judgment) are left unattended."**

Years after this 1991 testimony, the problem of understaffing and related extended working hours was highlighted by the U.S. Chemical Safety and Hazard Investigation Board (CSB) in their 2007 Investigation Report of the March 2005, BP refinery explosion and fire in Texas City. The incident occurred during the startup of an isomerization (ISOM) unit when a raffinate splitter tower was overfilled. Among the underlying factors the CSB identified that resulted in overfilling the tower was that "ISOM operators were likely fatigued from working 12-hour shifts for 29 or more consecutive days."

Source: U.S. Chemical Safety and Hazard Investigation Board, *Investigation Report: Refinery Explosion and Fire*, Report No. 2005-04-1-TX, March 2007.

Factsheet 6: Maintenance Downsizing

The number of production and maintenance workers in the petrochemical industry has been dropping since 1989.



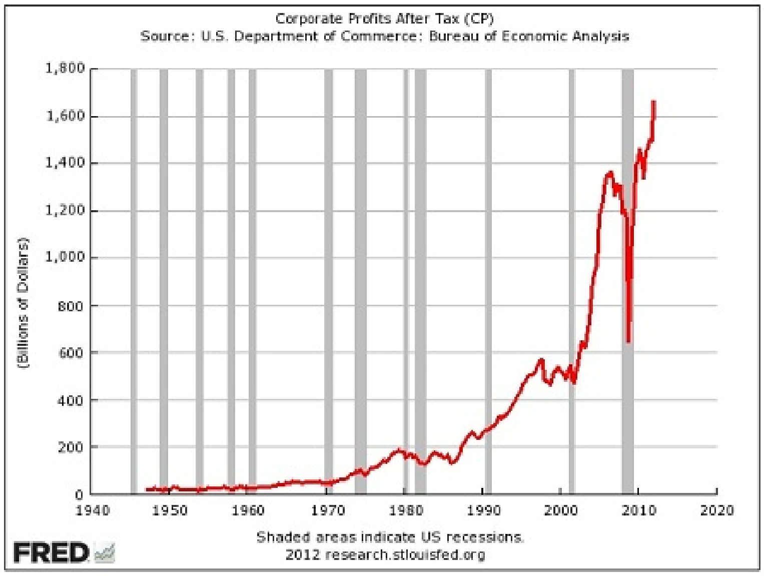
But, along with these workforce reductions came an increase in production.

Industrial Production Indexes
(2007 = 100)

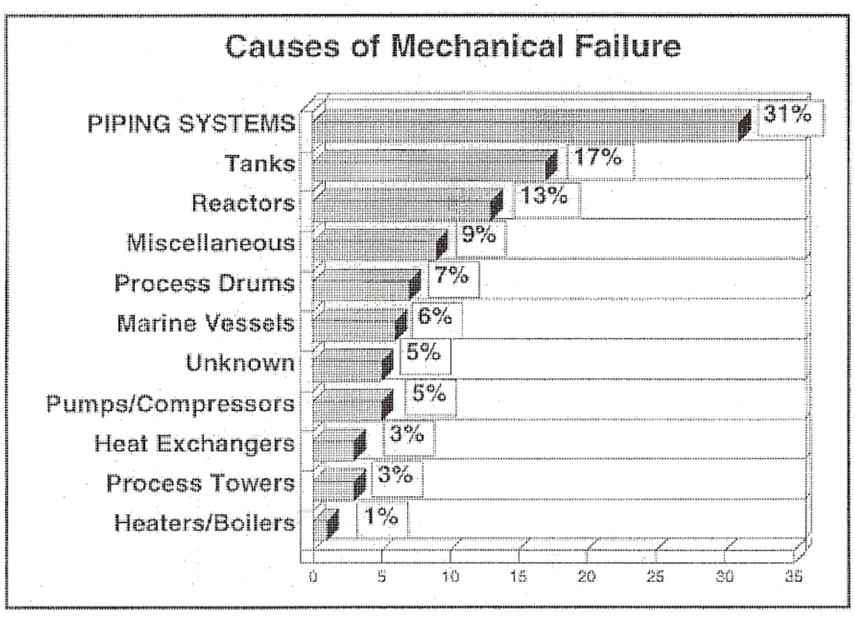
Year	Petroleum and Coal Products	Chemicals
1990	77.4	86.7
2000	95.6	105.3
2005	95.6	103.4
2006	97.3	107.9
2007	100	107.2
2008	95.6	110.3
2009	94.3	108.0
2010	96.5	110.3

Sources: U.S. Department of Labor, Handbook *of Employment and Earnings U.S. Labor Statistics*, ninth edition, Lanham, MD: Bernan Press, March 2008, updated based on data from data.bls.gov; and U.S. Census Bureau, *Statistical Abstract of the United States*: 2010.

While the results have included soaring corporate profits.



They have also included failed mechanical systems.



Sources: U.S. Department of Commerce, *Survey of Current Business*, June issues; and Garrison, W. E., PE, *Large Property Damage Losses in the Hydrocarbon-Chemical Industries: A Thirty-Year Review*, Twelfth Edition, Chicago: Marsh and McLennan Protection Consultants, and http://thinkprogress.org/economy/2012/06/01/493870/corporate-profits-skyrocket, accessed August 4, 2013.

Factsheet 7: Longer Time between Turnarounds Leads to Danger

Prior to the 1970s, the average length of time between turnarounds was one year. Now this period is much greater, with the duration between turnarounds sometimes as long as five years. This longer length of time means that some equipment, which can only be repaired when the unit is shut down, has to wait.

A typical result of long turnaround times is that process units are run under dangerous conditions that would not have been acceptable years ago. A true life example is told in the "calculated risks" story below:

The Calculated Risks:

> "A[n] . . . example of calculated risks occurred prior to a scheduled turnaround on the FCC. This fluid catalytic cracking unit had turnarounds put off time and again because corporate needed it to meet gasoline demands. The expansion joint . . . was found to have a hole in it. The company dealt with this by installing a camera on the expansion joint so the operator could monitor the hole. The unit should have been shut down. It would have been shut down ten years ago; however, a decision was made to continue running the unit despite the potential of very radical consequences."

A Growing Crisis

> "We see a growing crisis of safety in the oil sector," said Rafael Moure-Eraso, chair of the U.S. Chemical Safety Board, who spoke at the NOB conference. He cited the Gulf rig disaster as well as recent explosions and fires at onshore production, processing and refining facilities. Moure-Eraso said operators have told him that turnarounds that previously occurred every two to three years are happening now every four to five years. They have said that broken equipment is not immediately addressed and workers are told to "work around the problem."

USW Vice President, Gary Beevers, told reporters attending the conference that the oil industry runs its equipment until it breaks down. "It's all about money," he said. "The refiners run the units longer to sell as much product as possible." He said the industry needs to bring back shorter periods between turnarounds so equipment can be better maintained. The API told the media that refiners look at the hazards of delaying maintenance or turnarounds before taking any action. "You are dealing with hazardous materials and accidents unfortunately happen," an API spokesperson said. "We can't accept the attitude that upsets are bound to happen because of the hazardous nature of the refining process," Beevers said. "Just imagine if the nuclear industry had this attitude. Where would we be today?"

"If refiners paid greater attention to safety instead of production and reinvested more of their profits into their infrastructure instead of buying back their stock, there would be fewer preventable accidents," he added.

Source: "National Oil Bargaining Conference," *Oil Worker*, Issue 15, November 22, 2010.

Task 1 *(continued)*

Scenario restated:

During the night shift on unit "A" at Oil Chem, the process operator, Debbie, noticed a severe vibration on E-101 "G" air-cooled exchanger. She radioed the control room and asked the Board Operator, Jim, to write a work order to get the bearings replaced.

Jim filled out the work order and gave it to his Foreman, Bob.

Bob made a notation in the unit log book that the bearings were bad and forwarded the work order to the unit supervisor for approval. Bob and his crew were finishing up their night rotation and were starting their days off.

When Ernest, the Unit Supervisor, arrived on the day shift, he assigned the work order a priority "2" (complete within a week) because it was cool outside and he knew they could run without it. Besides, the maintenance crew was already busy repairing the centrifuge, which was a priority "1" (overtime authorized).

At 3:00 a.m. on the following day, the bearing failed on E-101 "G," causing such a vibration that a pressure gauge leaked. The leak caused a fire.

During the investigation that followed, it was found the vibration switch had failed to trip the fan off the line. It had been wired wrong, probably since the time of installation.

Task:

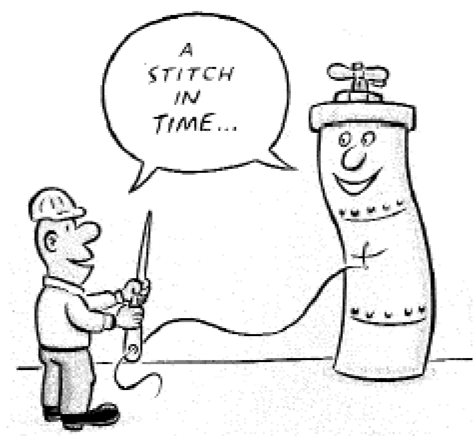
Using the Factsheet Reading Method for Factsheets 1 through 7 and the scenario, list actions the PS Rep may have taken prior to this event.

Factsheet 8: What the Standard Covers

The requirements of the Standard apply to six specific types of process equipment where failure is likely to be catastrophic.

These types of equipment, used in the handling of highly hazardous chemicals are:

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



Factsheet 9: Why Preventive Maintenance?

It's the Law!

OSHA: The recent OSHA law is fully enforceable and violators are subject to fines and jail time.

EPA: The Environmental Protection Agency has rules to cover preventive maintenance programs within its Risk Management Plan proposal.

If You Don't, It Costs $$$.

The BP Texas City refinery explosion and fire in March 2005 is a painful example of the cost of failing to perform preventive maintenance. This disaster happened in part because several instruments were out of service and the operators had no way of knowing that a critical unit was being overfilled with highly flammable liquids. Timely and proper maintenance might have saved the lives of 15 workers and prevented another 180 from being injured. It also might have saved BP from financial losses that have thus far totaled over $1.5 billion.

It Pays.

According to some corporate managers, there are some very positive benefits from Process Safety Management:

> "Process safety management is intended to help you recognize, understand and control all your process hazards. If you do that, you're going to understand and control your business; it runs better. . . it's more efficient and your quality's higher."

Sources: *Federal Register*, Vol. 58, No. 201, October 20, 1993; Ray Brandes, retired director of safety for ICI Americas; and U.S. Chemical Safety and Hazard Investigation Board, *Investigation Report: Refinery Explosion and Fire*, Report No. 2005-04-1-TX, March 2007.

Factsheet 10: A Look at the List

This list illustrates just a few examples of the human cost to both workers and the community caused by industry's failure to properly maintain process equipment.

Piping: (Internal Corrosion of Overhead Piping)

May 5, 1988 — An explosion and fire at a Shell Oil Refinery in Norco, Louisiana, killed seven OCAW (now USW) Local 4-750 workers and injured 22 others. Some 2,500 residents had to be evacuated from nearby areas.

Equipment Failure: (Air Fin Exchanger)

October 1992 — An explosion at the Texaco Refinery in Wilmington, California, injured 16 workers and required the evacuation of residents within a one-mile area when an air fin exchanger failed due to unmonitored corrosion.

Overfilled vessel: (Blowdown drum)

March 2005 — A blast at the BP Texas City refinery which killed 15 and injured 180 people followed budget cuts of 25 percent from 1998 to 2000 at the plant. A blow-down drum overfilled and alarms and gauges that were supposed to warn of the problem did not work properly.

Unit Rupture

July 21, 2011 — A Naphtha Hydrotreater Unit ruptured, causing an explosion and fire that fatally injured seven employees. As detailed in the TOP Report, examination of the damaged exchanger identified high temperature hydrogen attach (HTHA) as the cause of the failure. Weakened by the HTHA damage, the steel shell of the failed exchanger could not withstand operating pressures, resulting in the shell rupture and subsequent fire.

The HTHA damage to the carbon steel was visible in the laboratory samples under high magnification but could not be identified through normal visual inspection. Prior to the incident, specialized inspection for HTHA was not performed on the exchanger for an HTHA inspection in any of the five corrosion reviews conducted between 1990 and 2008.

continued

Factsheet 10: A Look at the List *(continued)*

Fire

August 7, 2012 — Around 6:30 p.m., a large fire erupted at the Chevron Refinery in Richmond, spewing a huge plume visible for miles. Authorities issued a shelter-in-place warning. A large number of people sought care for breathing problems at Doctors Medical Center in San Pablo and Kaiser Hospital in Richmond.

Contra Costa County Supervisor John Gioia said many people had gone to the hospitals with respiratory complaints and KRON TV said the emergency room was “packed” with people experiencing breathing problems, burning eyes and irritation of the mucous membranes.

Factsheet 11: But Surely All Employees Receive the Same Company Safety Training!

After the Phillips 66 Houston Chemical Complex explosion in 1989, which killed 23 workers and injured 232 others, OSHA commissioned a team of experts to study the use of contractor labor in the petrochemical industry. One of the main concerns of the study (called the John Gray Report) was to determine the extent and type of health and safety training that contract workers received.

The survey conducted for the John Gray Report showed that only 62 percent of contract workers reported that they received nine or more hours of company training in the last year, whereas 81 percent of the direct hires reported nine or more hours of training.

This finding led to the following comment in the report:

> ". . . the quality of the labor force in this industry is declining and the number of employees who are associated with higher accident rates (younger, less tenure, less education) is increasing. One implication of this is obvious: The need for increased education and training investments in this workforce is substantial."

Source: John Gray Institute, *Managing Workplace Safety and Health: The Case of Contract Labor in the U.S. Petrochemical Industry*, Lamar University System, July 1991, p. 77.

Factsheet 12: Training Is Inadequate

Another flaw in mechanical integrity programs is that most training is inadequately suited to the complexity and responsibilities required of the job.

Two common approaches are used to training in industry:

1. Some companies have hired consultants at great expense to set up a training program. They have written elaborate programs that assume employees know nothing and teach them every skill they feel should be known. (A 30-year machinist sent to school for four hours to learn how to read a rule.) This is a waste of money and very degrading to the employees.

2. Other companies refuse to spend anything on training so they show a 30-minute videotape followed by a short lecture and call you trained. The employees are left on their own to learn and it really shows.

3. Computer-Based Training: There are other problems associated with not having a human instructor. For example, some safety professionals like the Occupational Safety and Health Administration (OSHA) believe that employees must be given the opportunity to ask questions, which requires access to a qualified trainer. OSHA also believes that "hands-on" exercises are essential to provide trainees the chance to work with equipment and PPE. Computer-based training does not achieve these critical training goals.

   Further, CBT training does not allow for an opportunity for review and remediation, the absence of feedback and the inability for an employer to automatically determine what the worker has learned.

4. Shadowing/OJT — On-the-job training focuses on the acquisition of skills within the work environment, generally under normal working conditions. Through on-the-job training, workers acquire both general skills that they can transfer from one job to another and specific skills that are unique to a particular job. On-the-job training typically includes verbal and written instruction, demonstration and observation and hands-on practice and imitation. **In addition, the on-the-job training process involves one employee, usually a supervisor or an experienced employee, passing knowledge and skills on to a novice employee**.

   On-the-job training is the oldest form of training. Prior to the advent of off-site training classrooms, the only practical way of learning a job was working alongside an experienced worker in a particular trade or profession — as evinced by the practice of **apprenticeship** during the Middle Ages when master craftsmen passed on skills and knowledge to novices who worked alongside them.

   On-the-job training is still the predominant form of job training in the United States, particularly for non-managerial employees. Numerous studies indicate that it is the most effective form of job training.

   On-the-job training programs range from formal training with company supervisors to learning by watching. In this sense, the most formal types of on-the-job training are distinct from classroom training largely in that they take place within the firm. In the face of increased international competition and the more widespread use of computers in production processes, the implementation of more formal and sophisticated kinds of on-the-job training has become a critical issue for firms in the United States.

Source: Computer-Based Training: Useful or Useless? Camille Chappell, available at: http://www.aandasoftware.com/CBT/ComputerBasedTraining.htm; *Encyclopedia of Business*, 2nd Ed.

Factsheet 13: OSHA’s Elements for an MI Program

According to OSHA, the necessary elements of a good mechanical integrity (MI) program are to:

1. Establish and implement written procedures to maintain the integrity of process equipment.
2. Train employees and contractors involved in maintaining the integrity of equipment.
3. Perform periodic inspection and testing, following “recognized and generally accepted good engineering practices (RAGAGEP),” and document that inspections have been done.
4. Correct equipment deficiencies before further use or in a safe and timely manner.
5. Develop a quality assurance program to ensure that:
   - Equipment for new plants is suitable for use in the process, and is properly installed; and
   - All maintenance materials, spare parts and equipment are suitable for intended use.

Source: OSHA Process Safety Management Standard, 29 CFR 1910.119, 57 FR 6356, February 24, 1992.

Task 2

Using the Factsheet Reading Method for Factsheets 8 through 14, answer the following questions.

1. **List the ways in which mechanical integrity has improved or declined in your workplace.**

2. **List some of the ways that you think the PSM Standard could help resolve the mechanical integrity problems in your workplace.**

3. **As the PS Rep, how can you communicate with all workers in the facility about the identification of issues related to operating equipment?**

Summary: PSM Standard: Mechanical Integrity

1. Preventive maintenance programs should be established, funded and staffed to sufficient levels to avoid the need for “breakdown” maintenance.
2. Turnarounds should be held often enough to avoid “breakdown” maintenance. Units should stay down until scheduled repairs are completed.
3. All maintenance work should be performed by trained and experienced craftsmen.
4. Requirements for, and documentation of, contractor training should be equivalent to that of regular employees.
5. All maintenance work must be done using proper equipment, installation procedures, safety devices and according to applicable codes and standards.
6. The consequences of not having a good mechanical integrity program can be devastating.
7. Having a comprehensive written mechanical integrity program which is not followed is the equivalent to having no program at all.
8. If your workplace frequently experiences “breakdown maintenance,” your mechanical integrity program is not working.

Notes

Checklist Activity 12

1. Get a written copy of the Mechanical Integrity Program for your site.
2. Have an understanding of API codes and apply lessons learned from past incidents.
3. Know where records are kept and whom to contact for information. Have access to these records.
4. Understand the importance of inspection schedules and their frequency.
5. Keep track of what equipment has exceptions to the inspection schedules. (Will need help from members to know what equipment is being missed.)
6. Know how your site tracks action items.

Tony Mazzocchi Center Proficiency Assessment

Activity 12: PSM Standard: Mechanical Integrity

Learning Objectives:

51. **To familiarize the PS Rep with the OSHA performance-based requirements for a workplace Mechanical Integrity Program**. How much do you agree or disagree that **the training met this learning objective?**

O Strongly agree	O Agree	O Neither agree nor disagree	O Disagree	O Strongly disagree

52. **To examine the causes and solutions of "breakdown maintenance."** How much do you agree or disagree that **the training met this learning objective?**

O Strongly agree	O Agree	O Neither agree nor disagree	O Disagree	O Strongly disagree

53. **Preventive maintenance programs should be established, funded and staffed to sufficient levels to avoid the need for "breakdown" maintenance.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O Strongly agree	O Agree	O Neither agree nor disagree	O Disagree	O Strongly disagree

54. **All maintenance work must be done using proper equipment, installation procedures, safety devices and according to applicable codes and standards.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O Strongly agree	O Agree	O Neither agree nor disagree	O Disagree	O Strongly disagree

55. **Having a comprehensive written mechanical integrity program which is not followed is the equivalent of having no program at all.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O Strongly agree	O Agree	O Neither agree nor disagree	O Disagree	O Strongly disagree

Activity 13

Process Safety Management Skills

Purpose

To practice skills and requirements necessary to be successful as a Process Safety Representative.

This Activity has three tasks.

Task 1

In your groups, using the scenario and your personal experience, answer the following questions.

Scenario:

Norman came to work here immediately after being released from the service almost 30 years ago. This was a good job, with good pay and benefits.

"I've seen a lot of changes — some for the better, some for the worse. But the thing that scares me the most is that there seems to be more and more government regulation on our jobs."

"There are already plenty of regulations in our industry. So why do we need a Process Safety Management Standard? I think we have done a pretty good job running these plants, and the last thing we need is the government looking over our shoulders."

Task:

1. **List reasons we need a PSM Standard from a worker's perspective.**

2. **How would not having a PSM Standard affect the operating conditions at your facility?**

3. **Do you think the PSM Standard should be administered by the government?**

   Why?

4. Why should USW have to bargain on the PS Rep position?

5. List reasons we need the PS Representative position.

Task 2

Scenario:

During the last shutdown on the treating unit at Oil Chem, gravel and sediment were found in the pump upstream on the gas compressor. Engineers designed a temporary filter to be installed in the line to catch the debris.

Oil Chem management, after action by the Union Health and Safety Committee, finally issued an MOC on the pump. When you (the PS Rep) came into work that day, a copy of the MOC was laying on the table in the satellite building. All workers were asked to sign off stating they were trained and understood the new process. You received a call from a union member asking for your advice, as the PS Rep, on whether or not to sign.

Task:

You are the PS Rep. In your small group, respond to workers concerning Oil Chem's request to sign the MOC indicating that the workers have been trained on the procedure.

1. **How should you respond to management's request that workers indicate they have been trained on the new process?**

2. **Should you discuss the issue with the engineers? Why or why not?**

3. **Outline your next steps as related to this incident.**

Notes

Task 3

After reading the scenario below, have a group discussion and answer the following questions as if you were Bob (PS Rep).

Scenario:

Bob, the PS Rep at Oil Chem, attended a corporate conference during which a draft procedure for chemical reaction when using aging pipes was discussed and detailed. Sam, Frank and Alvin, mid-level members of management, also attended the conference.

Upon returning to the plant, Bob overheard Sam, Frank and Alvin discussing the draft procedure and how it will add additional time and cost to an already costly process. They decided to leave this information out of their report to upper level management.

The following month, the unit operators started the unit up using the existing procedure. After proceeding with the startup, one of the old lines begins to leak. The line ruptured and sprayed chemicals on one of the operators, giving him second degree burns on his arms, shoulders and chest.

Task:

1. **Did Oil Chem violate any PSM regulations? Explain.**

2. **Using a full sheet of chart paper (provided by your trainer), reproduce the chart below, filling in possible actions that you, as the PS Rep, could have taken at each of the four points in time. Post your sheet on the wall when directed by your trainer.**

   Note: Please include possible interaction with Sam, Frank, Alvin, operators on the unit, the local union and upper management in your actions.

	Possible Actions in This Situation
At the conference	
At the plant before overhearing Sam, Frank and Alvin's conversation	
At the plant after hearing the conversation not to implement the procedure	
After the incident	

Notes

Summary: Process Safety Management Skills

1. Process Safety Management skills are necessary to succeed as a PS Rep.

2. The successful PS Rep must possess a variety of skills; some of which must be present before entering the position and others that can be obtained once in the position.

3. The PS Rep should be capable of comfortably communicating with both the employee and the company representative. The PS Rep must first listen to make sure that he/she completely understands the issue at hand before making a decision on how to proceed. The successful PS Rep should always act on facts and not opinions or perceptions.

Checklist Activity 13

1. The PS Rep should continuously review and observe company processes and keep up to date on all operations to insure the safety and success of all.
2. The PS Rep should be able to fully understand all necessary information related to his/her work facility's MOC, PHA and PSSR processes.
3. The PS Rep should be capable of effectively communicating concerns to both Management and Union members.
4. The successful PS Rep should possess the ability to identify and begin to work on solutions to potential issues without being directed to do so.
5. The PS Rep should possess the ability to research websites of organizations like OSHA and the EPA for information on SDS, PHA and MOC.
6. The PS Rep should have a basic understanding of how to access the OSHA website and OSHA regulation 1910. Visit the OSHA website at: http://www.osha.gov/.
7. Each PS Rep will be assessed based on the individual Letter of Agreement.
8. The PS Rep is required to participate in many meetings with both union members and management. Information shared during these meeting will be critical to others not present in the meeting.
9. The PS Rep should research materials to stay current with Industry Best Practices.
10. **It is very important that the PS Rep is available to discuss and investigate concerns on the shift in which they occur.**

Tony Mazzocchi Center Proficiency Assessment

Activity 13: Process Safety Management Skills

Learning Objectives:

56. **To practice skills and requirements necessary to be successful as a Process Safety Representative.** How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

57. **Process Safety Management skills are necessary to succeed as a PS Rep.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

58. **The successful PS Rep must possess a variety of skills; some of which must be present before entering the position and others that can be obtained once in the position.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

59. **The PS Rep should be capable of comfortably communicating with both the employee and the company representative. The PS Rep must first listen to make sure that he/she completely understands the issue at hand before making a decision on how to proceed. The successful PS Rep should always react to facts and not to opinions or perceptions.** How much do you agree or disagree with the following statement? Understanding and applying this learning objective **will assist me in improving health and safety at my workplace.**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

Activity 14

What to Say “No” to

Purpose

To understand and apply some of your new knowledge as a PS Rep.

This Activity has two tasks.

Task 1

Based on what you have learned this week and looking back at Activity 3, choose the top three elements of the PSM Standard you would apply to each of the following situations.

Situation 1: (It is 6:00 p.m. on a Saturday.)

- Pipe is leaking.
- The company wants to put a clamp on to keep running, but need to get a clamp in the facility first.
- In the meantime, the company wants an operator to stand-by at the leak and monitor it to see if it gets bigger so he can either block in the line or notify the board operator to block in the line.

PSM Element	How It Applies
1.	
2.	
3.	

Situation 2: (It is 9:00 p.m. on a Tuesday.)

- Operator notices a leaking seal on a pump that is running product close to its auto ignition temperature.
- He calls the board operator to begin depressuring the unit as the charge/feed pump is leaking and the backup/spare has a work order tag hanging on it.
- Shift supervisor says to keep the unit running.
- They will find out what the problem is with the backup/spare pump to see if they can run it, and if they can't, they are to keep the unit running until he can get maintenance in to fix the backup/spare so they can use it.

PSM Element	How It Applies
1.	
2.	
3.	

Situation 3: (It is 11:00 p.m. on a Sunday night.)

- The depropanizer tower has an operating limit of 195 psi with a PRV relief pressure of 210 psi.
- Pressure increases rapidly in the tower when it operates at the upper limit of 195 psi.
- The bottom-feed heat controller operates at 90 percent open to keep the heat up even with the reflux operated at a minimum of 20 percent valve.
- The bottom-feed heat controller swings to 100 percent regularly causing the tower to over pressure and exercise the relief valve. This has been happening at least once or twice a shift (three or four times a day) for over a month.

PSM Element	How It Applies
1.	
2.	
3.	

Task 2

Scenario:

An airplane pilot is in his pre-flight check offs. Halfway through his check-off list, he calls one of the flight attendants to the cabin to finish the checklist for him. The flight attendant says she is not sure what needs to be done. He instructs her to just make sure she checks all the boxes.

Task:

How does this compare with using a probationary employee to do a PSSR?

Tony Mazzocchi Center Proficiency Assessment

Activity 14: What to Say "No" to

Learning Objectives:

60. To understand and apply some of your new knowledge as a PS Rep. How much do you agree or disagree that **the training met this learning objective?**

O	O	O	O	O
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

TONY MAZZOCCHI CENTER
FOR HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION
A PROJECT OF THE UNITED STEELWORKERS, THE COMMUNICATIONS WORKERS OF AMERICA AND THE LABOR INSTITUTE

Class Name ____________________
Date ____________________
Location ____________________

End of Class Evaluation Form

1. **Overall, how would you rate this training session?** (Check one)
   ☐ Excellent ☐ Good ☐ Fair ☐ Poor

   What about the training led you to rate it this way? ____________________

   ____

2. **Thinking about the materials used in the training, how would you rate them for being easy to understand?** (Check one)
   ☐ Excellent ☐ Good ☐ Fair ☐ Poor

   What about the materials led you to rate them this way? ____________________

   ____

3. **To what degree will you be able to apply what you learned in this training to your work?** (Check one)
   ☐ Will apply a lot ☐ Will apply somewhat ☐ Will not apply

   What about the training led you to rate it this way? ____________________

   ____

   ____

4. **What would make this training more effective?** ____________________

   ____

   ____

5. **Additional Comments:** ____________________

   ____

   ____

Tony Mazzocchi Center
Final Proficiency Assessment

Process Safety Representative Training

Trainee Name ____
Print

Trainee's ID No. ___ ___ ___ ___ **-** ___ ___ ___ ___ (The two-digit month and two-digit day of trainee's birth date and the last four numbers of the trainee's social security number. (For example, someone born September 22nd and whose last four digits of their social security number are 1234 would enter 0922-1234.)

Trainer Name ____
Print

By initialing below, I (the trainee), have assessed that I have successfully achieved the minimum levels of knowledge and skills communicated in activities in which I have participated.	
Activity	**Trainee's Initials**
Activity 1: Charting a Plan to Address Specific Hazards	
Activity 2: Process Safety Representative Introduction	
Activity 3: Knowledge of the Process Safety Management (PSM) Standard	
Activity 4: How Can We Apply the PSM Standard?	
Activity 5: How Is the PSM Standard Working?	
Activity 6: Union Activism and Personal Skills	
Activity 7: Communication and Interaction	
Activity 8: How to Use Tools to Eliminate/Mitigate Hazards	
Activity 9: Fatigue in the Workplace	
Activity 10: PSM Standard: Management of Change	
Activity 11: Operating Procedures/Safe Work Practices, Hot Work Permits and Training	
Activity 12: PSM Standard: Mechanical Integrity	
Activity 13: Process Safety Management Skills	
Activity 14: What to Say "No" to	

Number of Course Hours completed _____________________

Please turn page over to finish completing this form.

To be completed by the **Trainee:**

1. I, the trainee, agree that I have successfully completed the Process Safety Representative Training.

   Trainee signature ___________________________ Date: _________

2. I, the trainee, agree that the trainers have effectively facilitated the Process Safety Representative Training.

   Trainee signature __________________________ Date: _________

To be completed by the **Trainer:**

3. I, a member of the team of trainers, confirm that this trainee has successfully completed _____ **hours** of the Process Safety Representative Training.

   Trainer signature ____________________________ Date: __________

4. I, a member of the team of trainers, agree that our team has successfully facilitated the Process Safety Representative Training.

   Trainer signature ____________________________ Date: _________

Appendices:

OSHA PSM Standard 1910.119	A-2
Appendix C to §1910.119	A-20
USW Policy on Sexual Harassment	A-34
Tony Mazzocchi Center Worker-Trainers and Worker-Centered Training	A-35
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Sign-in Sheet	A-39
Certificate of Completion	A-41

OSHA PSM Standard 1910.119

- **Part Number:** 1910
- **Part Title:** Occupational Safety and Health Standards
- **Subpart:** H
- **Subpart Title:** Hazardous Materials
- **Standard Number:** 1910.119
- **Title:** Process safety management of highly hazardous chemicals.
- **Appendix:** A , B , C , D

Purpose. This section contains requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable or explosive chemicals. These releases may result in toxic, fire or explosion hazards.

1910.119(a)

Application.

1910.119(a)(1)

This section applies to the following:

1910.119(a)(1)(i)

A process which involves a chemical at or above the specified threshold quantities listed in Appendix A to this section;

1910.119(a)(1)(ii)

A process which involves a Category 1 flammable gas (as defined in 1910.1200(c) or a flammable liquid with a flashpoint below 100°F (37.8°C) on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more except for:

1910.119(a)(1)(ii)(A)

Hydrocarbon fuels used solely for workplace consumption as a fuel (e.g., propane used for comfort heating, gasoline for vehicle refueling), if such fuels are not a part of a process containing another highly hazardous chemical covered by this standard; and

1910.119(a)(1)(ii)(B)

Flammable liquids with a flashpoint below 100°F (37.8°C) stored in atmospheric tanks or transferred which are kept below their normal boiling point without benefit of chilling or refrigeration.

1910.119(a)(2)

This section does not apply to:

1910.119(a)(2)(i)

Retail facilities;

1910.119(a)(2)(ii)

Oil or gas well drilling or servicing operations; or

1910.119(a)(2)(iii)

Normally unoccupied remote facilities.

1910.119(b)

Definitions.

Atmospheric tank means a storage tank which has been designed to operate at pressures from atmospheric through 0.5 p.s.i.g. (pounds per square inch gauge, 3.45 Kpa).

Boiling point means the boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (p.s.i.a.) (760 mm.). For the purposes of this section, where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, the 10 percent point of a distillation performed in accordance with the Standard Method of Test for Distillation of Petroleum Products, ASTM D-86-62, which is incorporated by reference as specified in Sec. 1910.6, may be used as the boiling point of the liquid.

Catastrophic release means a major uncontrolled emission, fire or explosion, involving one or more highly hazardous chemicals, that presents serious danger to employees in the workplace.

Facility means the buildings, containers or equipment which contain a process.

Highly hazardous chemical means a substance possessing toxic, reactive, flammable or explosive properties and specified by paragraph (a)(1) of this section.

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

Normally unoccupied remote facility means a facility which is operated, maintained or serviced by employees who visit the facility only periodically to check its operation and to perform necessary operating or maintenance tasks. No employees are permanently stationed at the facility. Facilities meeting this definition are not contiguous with, and must be geographically remote from, all other buildings, processes or persons.

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

continued

OSHA PSM Standard 1910.119 *(continued)*

Replacement in kind means a replacement which satisfies the design specification.

Trade secret means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. *See* Appendix E to § 1910.1200 — Definition of a Trade Secret (which sets out the criteria to be used in evaluating trade secrets).

1910.119(c)

Employee participation.

1910.119(c)(1)

Employers shall develop a written plan of action regarding the implementation of the employee participation required by this paragraph.

1910.119(c)(2)

Employers shall consult with employees and their representatives on the conduct and development of process hazards analyses and on the development of the other elements of process safety management in this standard.

1910.119(c)(3)

Employers shall provide to employees and their representatives access to process hazard analyses and to all other information required to be developed under this standard.

1910.119(d)

Process safety information. In accordance with the schedule set forth in paragraph (e)(1) of this section, the employer shall complete a compilation of written process safety information before conducting any process hazard analysis required by the standard. The compilation of written process safety information is to enable the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals. This process safety information shall include information pertaining to the hazards of the highly hazardous chemicals used or produced by the process, information pertaining to the technology of the process and information pertaining to the equipment in the process.

1910.119(d)(1)

Information pertaining to the hazards of the highly hazardous chemicals in the process. This information shall consist of at least the following:

1910.119(d)(1)(i)

Toxicity information;

1910.119(d)(1)(ii)

Permissible exposure limits;

1910.119(d)(1)(iii)

Physical data;

1910.119(d)(1)(iv)

Reactivity data:

1910.119(d)(1)(v)

Corrosivity data;

1910.119(d)(1)(vi)

Thermal and chemical stability data; and

1910.119(d)(1)(vii)

Hazardous effects of inadvertent mixing of different materials that could foreseeably occur.

Note: Safety data sheets meeting the requirements of 29 CFR 1910.1200(g) may be used to comply with this requirement to the extent they contain the information required by this subparagraph.

1910.119(d)(2)

Information pertaining to the technology of the process.

1910.119(d)(2)(i)

Information concerning the technology of the process shall include at least the following:

1910.119(d)(2)(i)(A)

A block flow diagram or simplified process flow diagram (see Appendix B to this section);

1910.119(d)(2)(i)(B)

Process chemistry;

1910.119(d)(2)(i)(C)

Maximum intended inventory;

1910.119(d)(2)(i)(D)

Safe upper and lower limits for such items as temperatures, pressures, flows or compositions; and

1910.119(d)(2)(i)(E)

An evaluation of the consequences of deviations, including those affecting the safety and health of employees.

1910.119(d)(2)(ii)

Where the original technical information no longer exists, such information may be developed in conjunction with the process hazard analysis in sufficient detail to support the analysis.

1910.119(d)(3)

Information pertaining to the equipment in the process.

continued

OSHA PSM Standard 1910.119 *(continued)*

1910.119(d)(3)(i)

Information pertaining to the equipment in the process shall include:

1910.119(d)(3)(i)(A)

Materials of construction;

1910.119(d)(3)(i)(B)

Piping and instrument diagrams (P&ID's);

1910.119(d)(3)(i)(C)

Electrical classification;

1910.119(d)(3)(i)(D)

Relief system design and design basis;

1910.119(d)(3)(i)(E)

Ventilation system design;

1910.119(d)(3)(i)(F)

Design codes and standards employed;

1910.119(d)(3)(i)(G)

Material and energy balances for processes built after May 26, 1992; and

1910.119(d)(3)(i)(H)

Safety systems (e.g. interlocks, detection or suppression systems).

1910.119(d)(3)(ii)

The employer shall document that equipment complies with recognized and generally accepted good engineering practices.

1910.119(d)(3)(iii)

For existing equipment designed and constructed in accordance with codes, standards or practices that are no longer in general use, the employer shall determine and document that the equipment is designed, maintained, inspected, tested and operating in a safe manner.

1910.119(e)

Process hazard analysis.

1910.119(e)(1)

The employer shall perform an initial process hazard analysis (hazard evaluation) on processes covered by this standard. The process hazard analysis shall be appropriate to the complexity of the process and shall identify, evaluate and control the hazards involved in the process. Employers shall determine and document the priority order for conducting process hazard analyses based on a rationale which includes such considerations as extent of the process hazards, number of potentially affected employees, age of the process and operating history of the process. The process hazard analysis shall be conducted as soon as possible, but not later than the following schedule:

1910.119(e)(1)(i)

No less than 25 percent of the initial process hazards analyses shall be completed by May 26, 1994;

1910.119(e)(1)(ii)

No less than 50 percent of the initial process hazards analyses shall be completed by May 26, 1995;

1910.119(e)(1)(iii)

No less than 75 percent of the initial process hazards analyses shall be completed by May 26, 1996; and

1910.119(e)(1)(iv)

All initial process hazards analyses shall be completed by May 26, 1997.

1910.119(e)(1)(v)

Process hazards analyses completed after May 26, 1987 which meet the requirements of this paragraph are acceptable as initial process hazards analyses. These process hazard analyses shall be updated and revalidated, based on their completion date, in accordance with paragraph (e)(6) of this standard.

1910.119(e)(2)

The employer shall use one or more of the following methodologies that are appropriate to determine and evaluate the hazards of the process being analyzed.

1910.119(e)(2)(i)

What-If;

1910.119(e)(2)(ii)

Checklist;

1910.119(e)(2)(iii)

What-If/Checklist;

1910.119(e)(2)(iv)

Hazard and Operability Study (HAZOP);

continued

OSHA PSM Standard 1910.119 *(continued)*

1910.119(e)(2)(v)

Failure Mode and Effects Analysis (FMEA);

1910.119(e)(2)(vi)

Fault Tree Analysis; or

1910.119(e)(2)(vii)

An appropriate equivalent methodology.

1910.119(e)(3)

The process hazard analysis shall address:

1910.119(e)(3)(i)

The hazards of the process;

1910.119(e)(3)(ii)

The identification of any previous incident which had a likely potential for catastrophic consequences in the workplace;

1910.119(e)(3)(iii)

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.);

1910.119(e)(3)(iv)

Consequences of failure of engineering and administrative controls;

1910.119(e)(3)(v)

Facility siting;

1910.119(e)(3)(vi)

Human factors; and

1910.119(e)(3)(vii)

A qualitative evaluation of a range of the possible safety and health effects of failure of controls on employees in the workplace.

1910.119(e)(4)

The process hazard analysis shall be performed by a team with expertise in engineering and process operations, and the team shall include at least one employee who has experience and knowledge specific to the process being evaluated. Also, one member of the team must be knowledgeable in the specific process hazard analysis methodology being used.

1910.119(e)(5)

The employer shall establish a system to promptly address the team's findings and recommendations; assure that the recommendations are resolved in a timely manner and that the resolution is 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 or actions.

1910.119(e)(6)

At least every five (5) years after the completion of the initial process hazard analysis, the process hazard analysis shall be updated and revalidated by a team meeting the requirements in paragraph (e)(4) of this section, to assure that the process hazard analysis is consistent with the current process.

1910.119(e)(7)

Employers shall retain process hazards analyses and updates or revalidations for each process covered by this section, as well as the documented resolution of recommendations described in paragraph (e)(5) of this section for the life of the process.

1910.119(f)

Operating procedures.

1910.119(f)(1)

The employer shall develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information and shall address at least the following elements.

1910.119(f)(1)(i)

Steps for each operating phase:

1910.119(f)(1)(i)(A)

Initial startup;

1910.119(f)(1)(i)(B)

Normal operations;

1910.119(f)(1)(i)(C)

Temporary operations; and

1910.119(f)(1)(i)(D)

Emergency shutdown including the conditions under which emergency shutdown is required, and the assignment of shutdown responsibility to qualified operators to ensure that emergency shutdown is executed in a safe and timely manner.

continued

OSHA PSM Standard 1910.119 *(continued)*

1910.119(f)(1)(i)(E)

Emergency Operations;

1910.119(f)(1)(i)(F)

Normal shutdown; and

1910.119(f)(1)(i)(G)

Startup following a turnaround, or after an emergency shutdown.

1910.119(f)(1)(ii)

Operating limits:

1910.119(f)(1)(ii)(A)

Consequences of deviation; and

1910.119(f)(1)(ii)(B)

Steps required to correct or avoid deviation.

1910.119(f)(1)(iii)

Safety and health considerations:

1910.119(f)(1)(iii)(A)

Properties of, and hazards presented by, the chemicals used in the process;

1910.119(f)(1)(iii)(B)

Precautions necessary to prevent exposure, including engineering controls, administrative controls and personal protective equipment;

1910.119(f)(1)(iii)(C)

Control measures to be taken if physical contact or airborne exposure occurs;

1910.119(f)(1)(iii)(D)

Quality control for raw materials and control of hazardous chemical inventory levels; and

1910.119(f)(1)(iii)(E)

Any special or unique hazards.

1910.119(f)(1)(iv)

Safety systems and their functions.

1910.119(f)(2)

Operating procedures shall be readily accessible to employees who work in or maintain a process.

1910.119(f)(3)

The operating procedures shall be reviewed as often as necessary to assure that they reflect current operating practice, including changes that result from changes in process chemicals, technology and equipment and changes to facilities. The employer shall certify annually that these operating procedures are current and accurate.

1910.119(f)(4)

The employer shall develop and implement safe work practices to provide for the control of hazards during operations such as lockout/tagout; confined space entry; opening process equipment or piping; and control over entrance into a facility by maintenance, contractor, laboratory or other support personnel. These safe work practices shall apply to employees and contractor employees.

1910.119(g)

Training.

1910.119(g)(1)

Initial training.

1910.119(g)(1)(i)

Each employee presently involved in operating a process, and each employee before being involved in operating a newly assigned process, shall be trained in an overview of the process and in the operating procedures as specified in paragraph (f) of this section. The training shall include emphasis on the specific safety and health hazards, emergency operations including shutdown and safe work practices applicable to the employee's job tasks.

1910.119(g)(1)(ii)

In lieu of initial training for those employees already involved in operating a process on May 26, 1992, an employer may certify in writing that the employee has the required knowledge, skills and abilities to safely carry out the duties and responsibilities as specified in the operating procedures.

1910.119(g)(2)

Refresher training. Refresher training shall be provided at least every three years, and more often if necessary, to each employee involved in operating a process to assure that the employee understands and adheres to the current operating procedures of the process. The employer, in consultation with the employees involved in operating the process, shall determine the appropriate frequency of refresher training.

1910.119(g)(3)

Training documentation. The employer shall ascertain that each employee involved in operating a process has received and understood the training required by this paragraph. The employer shall prepare a record which contains the identity of the employee, the date of training and the means used to verify that the employee understood the training.

1910.119(h)

Contractors.

continued

OSHA PSM Standard 1910.119 *(continued)*

1910.119(h)(1)

Application. This paragraph applies to contractors performing maintenance or repair, turnaround, major renovation or specialty work on or adjacent to a covered process. It does not apply to contractors providing incidental services which do not influence process safety, such as janitorial work, food and drink services, laundry, delivery or other supply services.

1910.119(h)(2)

Employer responsibilities.

1910.119(h)(2)(i)

The employer, when selecting a contractor, shall obtain and evaluate information regarding the contract employer's safety performance and programs.

1910.119(h)(2)(ii)

The employer shall inform contract employers of the known potential fire, explosion or toxic release hazards related to the contractor's work and the process.

1910.119(h)(2)(iii)

The employer shall explain to contract employers the applicable provisions of the emergency action plan required by paragraph (n) of this section.

1910.119(h)(2)(iv)

The employer shall develop and implement safe work practices consistent with paragraph (f)(4) of this section, to control the entrance, presence and exit of contract employers and contract employees in covered process areas.

1910.119(h)(2)(v)

The employer shall periodically evaluate the performance of contract employers in fulfilling their obligations as specified in paragraph (h)(3) of this section.

1910.119(h)(2)(vi)

The employer shall maintain a contract employee injury and illness log related to the contractor's work in process areas.

1910.119(h)(3)

Contract employer responsibilities.

1910.119(h)(3)(i)

The contract employer shall assure that each contract employee is trained in the work practices necessary to safely perform his/her job.

1910.119(h)(3)(ii)

The contract employer shall assure that each contract employee is instructed in the known potential fire, explosion or toxic release hazards related to his/her job and the process and the applicable provisions of the emergency action plan.

1910.119(h)(3)(iii)

The contract employer shall document that each contract employee has received and understood the training required by this paragraph. The contract employer shall prepare a record which contains the identity of the contract employee, the date of training and the means used to verify that the employee understood the training.

1910.119(h)(3)(iv)

The contract employer shall assure that each contract employee follows the safety rules of the facility including the safe work practices required by paragraph (f)(4) of this section.

1910.119(h)(3)(v)

The contract employer shall advise the employer of any unique hazards presented by the contract employer's work, or of any hazards found by the contract employer's work.

1910.119(i)

Pre-startup safety review.

1910.119(i)(1)

The employer shall perform a pre-startup safety review for new facilities and for modified facilities when the modification is significant enough to require a change in the process safety information.

1910.119(i)(2)

The pre-startup safety review shall confirm that prior to the introduction of highly hazardous chemicals to a process:

1910.119(i)(2)(i)

Construction and equipment is in accordance with design specifications;

1910.119(i)(2)(ii)

Safety, operating, maintenance and emergency procedures are in place and are adequate; and

1910.119(i)(2)(iii)

For new facilities, a process hazard analysis has been performed and recommendations have been resolved or implemented before startup; and modified facilities meet the requirements contained in management of change, paragraph (l).

1910.119(i)(2)(iv)

Training of each employee involved in operating a process has been completed.

1910.119(j)

Mechanical integrity.

continued

OSHA PSM Standard 1910.119 *(continued)*

1910.119(j)(1)

Application. Paragraphs (j)(2) through (j)(6) of this section apply to the following process equipment:

1910.119(j)(1)(i)

Pressure vessels and storage tanks;

1910.119(j)(1)(ii)

Piping systems (including piping components such as valves);

1910.119(j)(1)(iii)

Relief and vent systems and devices;

1910.119(j)(1)(iv)

Emergency shutdown systems;

1910.119(j)(1)(v)

Controls (including monitoring devices and sensors, alarms and interlocks); and

1910.119(j)(1)(vi)

Pumps.

1910.119(j)(2)

Written procedures. The employer shall establish and implement written procedures to maintain the on-going integrity of process equipment.

1910.119(j)(3)

Training for process maintenance activities. The employer shall train each employee involved in maintaining the on-going integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.

1910.119(j)(4)

Inspection and testing.

1910.119(j)(4)(i)

Inspections and tests shall be performed on process equipment.

1910.119(j)(4)(ii)

Inspection and testing procedures shall follow recognized and generally accepted good engineering practices.

1910.119(j)(4)(iii)

The frequency of inspections and tests of process equipment shall be consistent with applicable manufacturers' recommendations and good engineering practices, and more frequently if determined to be necessary by prior operating experience.

1910.119(j)(4)(iv)

The employer shall document each inspection and test that has been performed on process equipment. The documentation shall identify 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.

1910.119(j)(5)

Equipment deficiencies. The employer shall correct deficiencies in equipment that are outside acceptable limits (defined by the process safety information in paragraph (d) of this section) before further use or in a safe and timely manner when necessary means are taken to assure safe operation.

1910.119(j)(6)

Quality assurance.

1910.119(j)(6)(i)

In the construction of new plants and equipment, the employer shall assure that equipment as it is fabricated is suitable for the process application for which they will be used.

1910.119(j)(6)(ii)

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

1910.119(j)(6)(iii)

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

1910.119(k)

Hot work permit.

1910.119(k)(1)

The employer shall issue a hot work permit for hot work operations conducted on or near a covered process.

continued

OSHA PSM Standard 1910.119 *(continued)*

1910.119(k)(2)

The permit shall document that the fire prevention and protection requirements in 29 CFR 1910.252(a) have been implemented prior to beginning the hot work operations; it shall indicate the date(s) authorized for hot work; and identify the object on which hot work is to be performed. The permit shall be kept on file until completion of the hot work operations.

1910.119(l)

Management of change.

1910.119(l)(1)

The employer shall establish and implement written procedures to manage changes (except for "replacements in kind") to process chemicals, technology, equipment and procedures; and changes to facilities that affect a covered process.

1910.119(l)(2)

The procedures shall assure that the following considerations are addressed prior to any change:

1910.119(l)(2)(i)

The technical basis for the proposed change;

1910.119(l)(2)(ii)

Impact of change on safety and health;

1910.119(l)(2)(iii)

Modifications to operating procedures;

1910.119(l)(2)(iv)

Necessary time period for the change; and

1910.119(l)(2)(v)

Authorization requirements for the proposed change.

1910.119(l)(3)

Employees involved in operating a process and maintenance and contract employees whose job tasks will be affected by a change in the process shall be informed of, and trained in, the change prior to start-up of the process or affected part of the process.

1910.119(l)(4)

If a change covered by this paragraph results in a change in the process safety information required by paragraph (d) of this section, such information shall be updated accordingly.

1910.119(l)(5)

If a change covered by this paragraph results in a change in the operating procedures or practices required by paragraph (f) of this section, such procedures or practices shall be updated accordingly.

1910.119(m)

Incident investigation.

1910.119(m)(1)

The employer shall investigate each incident which resulted in, or could reasonably have resulted in, a catastrophic release of highly hazardous chemical in the workplace.

1910.119(m)(2)

An incident investigation shall be initiated as promptly as possible, but not later than 48 hours following the incident.

1910.119(m)(3)

An incident investigation team shall be established and consist of at least one person knowledgeable in the process involved, including a contract employee if the incident involved work of the contractor, and other persons with appropriate knowledge and experience to thoroughly investigate and analyze the incident.

1910.119(m)(4)

A report shall be prepared at the conclusion of the investigation which includes at a minimum:

1910.119(m)(4)(i)

Date of incident;

1910.119(m)(4)(ii)

Date investigation began;

1910.119(m)(4)(iii)

A description of the incident;

1910.119(m)(4)(iv)

The factors that contributed to the incident; and

1910.119(m)(4)(v)

Any recommendations resulting from the investigation.

1910.119(m)(5)

The employer shall establish a system to promptly address and resolve the incident report findings and recommendations. Resolutions and corrective actions shall be documented.

1910.119(m)(6)

The report shall be reviewed with all affected personnel whose job tasks are relevant to the incident findings including contract employees where applicable.

continued

OSHA PSM Standard 1910.119 *(continued)*

1910.119(m)(7)

Incident investigation reports shall be retained for five years.

1910.119(n)

Emergency planning and response. The employer shall establish and implement an emergency action plan for the entire plant in accordance with the provisions of 29 CFR 1910.38. In addition, the emergency action plan shall include procedures for handling small releases. Employers covered under this standard may also be subject to the hazardous waste and emergency response provisions contained in 29 CFR 1910.120 (a), (p) and (q).

1910.119(o)

Compliance Audits.

1910.119(o)(1)

Employers shall certify that they have evaluated compliance with the provisions of this section at least every three years to verify that the procedures and practices developed under the standard are adequate and are being followed.

1910.119(o)(2)

The compliance audit shall be conducted by at least one person knowledgeable in the process.

1910.119(o)(3)

A report of the findings of the audit shall be developed.

1910.119(o)(4)

The employer shall promptly determine and document an appropriate response to each of the findings of the compliance audit, and document that deficiencies have been corrected.

1910.119(o)(5)

Employers shall retain the two (2) most recent compliance audit reports.

1910.119(p)

Trade secrets.

1910.119(p)(1)

Employers shall make all information necessary to comply with the section available to those persons responsible for compiling the process safety information [required by paragraph (d) of this section], those assisting in the development of the process hazard analysis [required by paragraph (e) of this section], those responsible for developing the operating procedures [required by paragraph (f) of this section] and those involved in incident investigations [required by paragraph (m) of this section], emergency planning and response [paragraph (n) of this section] and compliance audits [paragraph (o) of this section] without regard to possible trade secret status of such information.

1910.119(p)(2)

Nothing in this paragraph shall preclude the employer from requiring the persons to whom the information is made available under paragraph (p)(1) of this section to enter into confidentiality agreements not to disclose the information as set forth in 29 CFR 1910.1200.

1910.119(p)(3)

Subject to the rules and procedures set forth in 29 CFR 1910.1200(i)(1) through 1910.1200(i)(12), employees and their designated representatives shall have access to trade secret information contained within the process hazard analysis and other documents required to be developed by this standard.

[57 FR 23060, June 1, 1992; 61 FR 9227, March 7, 1996; 77 FR 17776, March 26, 2012; 78 FR 9313, Feb. 8, 2013]

Appendix C to §1910.119 -- Compliance Guidelines and Recommendations for Process Safety Management (Nonmandatory)

- **Part Number:** 1910
- **Part Title:** Occupational Safety and Health Standards
- **Subpart:** H
- **Subpart Title:** Hazardous Materials
- **Standard Number:** 1910.119 App C
- **Title:** Compliance Guidelines and Recommendations for Process Safety Management (Nonmandatory).

This appendix serves as a nonmandatory guideline to assist employers and employees in complying with the requirements of this section, as well as provides other helpful recommendations and information. Examples presented in this appendix are not the only means of achieving the performance goals in the standard. This appendix neither adds nor detracts from the requirements of the standard.

1. Introduction to Process Safety Management. The major objective of process safety management of highly hazardous chemicals is to prevent unwanted releases of hazardous chemicals especially into locations which could expose employees and others to serious hazards. An effective process safety management program requires a systematic approach to evaluating the whole process. Using this approach the process design, process technology, operational and maintenance activities and procedures, nonroutine activities and procedures, emergency preparedness plans and procedures, training programs and other elements which impact the process are all considered in the evaluation. The various lines of defense that have been incorporated into the design and operation of the process to prevent or mitigate the release of hazardous chemicals need to be evaluated and strengthened to assure their effectiveness at each level. Process safety management is the proactive identification, evaluation and mitigation or prevention of chemical releases that could occur as a result of failures in process, procedures or equipment.

The process safety management standard targets highly hazardous chemicals that have the potential to cause a catastrophic incident. This standard as a whole is to aid employers in their efforts to prevent or mitigate episodic chemical releases that could lead to a catastrophe in the workplace and possibly to the surrounding community. To control these types of hazards, employers need to develop the necessary expertise, experiences, judgment and proactive initiative within their workforce to properly implement and maintain an effective process safety management program as envisioned in the OSHA standard. This OSHA standard is required by the Clean Air Act Amendments as is the Environmental Protection Agency's Risk Management Plan. Employers, who merge the two sets of requirements into their process safety management program, will better assure full compliance with each as well as enhancing their relationship with the local community.

Source: https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9763, accessed January 10, 2014.

While OSHA believes process safety management will have a positive effect on the safety of employees in workplaces and also offers other potential benefits to employers (increased productivity), smaller businesses which may have limited resources available to them at this time, might consider alternative avenues of decreasing the risks associated with highly hazardous chemicals at their workplaces. One method which might be considered is the reduction in the inventory of the highly hazardous chemical. This reduction in inventory will result in a reduction of the risk or potential for a catastrophic incident. Also, employers including small employers may be able to establish more efficient inventory control by reducing the quantities of highly hazardous chemicals on site below the established threshold quantities. This reduction can be accomplished by ordering smaller shipments and maintaining the minimum inventory necessary for efficient and safe operation. When reduced inventory is not feasible, then the employer might consider dispersing inventory to several locations on site. Dispersing storage into locations where a release in one location will not cause a release in another location is a practical method to also reduce the risk or potential for catastrophic incidents.

2. Employee Involvement in Process Safety Management. Section 304 of the Clean Air Act Amendments states that employers are to consult with their employees and their representatives regarding the employers efforts in the development and implementation of the process safety management program elements and hazard assessments. Section 304 also requires employers to train and educate their employees and to inform affected employees of the findings from incident investigations required by the process safety management program. Many employers, under their safety and health programs, have already established means and methods to keep employees and their representatives informed about relevant safety and health issues and employers may be able to adapt these practices and procedures to meet their obligations under this standard. Employers who have not implemented an occupational safety and health program may wish to form a safety and health committee of employees and management representatives to help the employer meet the obligations specified by this standard. These committees can become a significant ally in helping the employer to implement and maintain an effective process safety management program for all employees.

3. 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 as required under paragraph (e); 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 safety data sheet (SDS) 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 of the type shown in Appendix B of this section 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.

continued

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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.

4. Process Hazard Analysis. A process hazard analysis (PHA), sometimes called a process hazard evaluation, is one of the most important elements of the process safety management program. A PHA is an organized and systematic effort to identify and analyze the significance of potential hazards associated with the processing or handling of highly hazardous chemicals. A PHA provides information which will assist employers and employees in making decisions for improving safety and reducing the consequences of unwanted or unplanned releases of hazardous chemicals. A PHA is directed toward analyzing potential causes and consequences of fires, explosions, releases of toxic or flammable chemicals and major spills of hazardous chemicals. The PHA focuses on equipment, instrumentation, utilities, human actions (routine and nonroutine) and external factors that might impact the process. These considerations assist in determining the hazards and potential failure points or failure modes in a process.

The team conducting the PHA need to understand the methodology that is going to be used. A PHA team can vary in size from two people to a number of people with varied operational and technical backgrounds. Some team members may only be a part of the team for a limited time. The team leader needs to be fully knowledgeable in the proper implementation of the PHA methodology that is to be used and should be impartial in the evaluation. The other full or part time team members need to provide the team with expertise in areas such as process technology, process design, operating procedures and practices, including how the work is actually performed, alarms, emergency procedures, instrumentation, maintenance procedures, both routine and nonroutine tasks, including how the tasks are authorized, procurement of parts and supplies, safety and health and any other relevant subject as the need dictates. At least one team member must be familiar with the process.

The ideal team will have an intimate knowledge of the standards, codes, specifications and regulations applicable to the process being studied. The selected team members need to be compatible and the team leader needs to be able to manage the team and the PHA study. The team needs to be able to work together while benefiting from the expertise of others on the team or outside the team, to resolve issues and to forge a consensus on the findings of the study and the recommendations.

The application of a PHA to a process may involve the use of different methodologies for various parts of the process. For example, a process involving a series of unit operations of varying sizes, complexities and ages may use different methodologies and team members for each operation. Then the conclusions can be integrated into one final study and evaluation. A more specific example is the use of a checklist PHA for a standard boiler or heat exchanger and the use of a Hazard and Operability PHA for the overall process. Also, for batch type processes like custom batch operations, a generic PHA of a representative batch may be used where there are only small changes of monomer or other ingredient ratios and the chemistry is documented for the full range and ratio of batch ingredients. Another process that might consider using a generic type of PHA is a gas plant. Often these plants are simply moved from site to site and therefore, a generic PHA may be used for these movable plants. Also, when an employer has several similar size gas plants and no sour gas is being processed at the site, then a generic PHA is feasible as long as the variations of the individual sites are accounted for in the PHA. Finally, when an employer has a large continuous process which has several control rooms for different portions of the process such as for a distillation tower and a blending operation, the employer may wish to do each segment separately and then integrate the final results.

Additionally, small businesses which are covered by this rule, will often have processes that have less storage volume, less capacity and less complicated than processes at a large facility. Therefore, OSHA would anticipate that the less complex methodologies would be used to meet the process hazard analysis criteria in the standard. These process hazard analyses can be done in less time and with a few people being involved. A less complex process generally means that less data, P&IDs and process information is needed to perform a process hazard analysis.

Many small businesses have processes that are not unique, such as cold storage lockers or water treatment facilities. Where employer associations have a number of members with such facilities, a generic PHA, evolved from a checklist or what-if questions, could be developed and used by each employer effectively to reflect his/her particular process; this would simplify compliance for them.

continued

Appendix C to §1910.119 *(continued)*

When the employer has a number of processes which require a PHA, the employer must set up a priority system of which PHAs to conduct first. A preliminary or gross hazard analysis may be useful in prioritizing the processes that the employer has determined are subject to coverage by the process safety management standard. Consideration should first be given to those processes with the potential of adversely affecting the largest number of employees. This prioritizing should consider the potential severity of a chemical release, the number of potentially affected employees, the operating history of the process such as the frequency of chemical releases, the age of the process and any other relevant factors. These factors would suggest a ranking order and would suggest either using a weighing factor system or a systematic ranking method. The use of a preliminary hazard analysis would assist an employer in determining which process should be of the highest priority and thereby the employer would obtain the greatest improvement in safety at the facility.

Detailed guidance on the content and application of process hazard analysis methodologies is available from the American Institute of Chemical Engineers' Center for Chemical Process Safety (see Appendix D).

5. Operating Procedures and Practices. 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. 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 in order 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 nonroutine 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.

6. 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 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 SDSs. However, additional training in subjects such as operating procedures and safety 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.

continued

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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.

Employers need to periodically evaluate their training programs to see if the necessary skills, knowledge, and routines are being properly understood and implemented by their trained employees. The means or methods for evaluating the training should be developed along with the training program goals and objectives. Training program evaluation will help employers to determine the amount of training their employees understood, and whether the desired results were obtained. If, after the evaluation, it appears that the trained employees are not at the level of knowledge and skill that was expected, the employer will need to revise the training program, provide retraining or provide more frequent refresher training sessions until the deficiency is resolved. Those who conducted the training and those who received the training should also be consulted as to how best to improve the training process. If there is a language barrier, the language known to the trainees should be used to reinforce the training messages and information.

Careful consideration must be given to assure that employees including maintenance and contract employees receive current and updated training. For example, if changes are made to a process, impacted employees must be trained in the changes and understand the effects of the changes on their job tasks (e.g., any new operating procedures pertinent to their tasks). Additionally, as already discussed the evaluation of the employee's absorption of training will certainly influence the need for training.

7. 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?

Maintaining a site injury and illness log for contractors is another method employers must use to track and maintain current knowledge of work activities involving contract employees working on or adjacent to covered processes. Injury and illness logs of both the employer's employees and contract employees allow an employer to have full knowledge of process injury and illness experience. This log will also contain information which will be of use to those auditing process safety management compliance and those involved in incident investigations.

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 nonroutine 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.

8. Pre-Startup Safety. 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. 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 nonroutine 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.

9. Mechanical Integrity. Employers will need to review their maintenance programs and schedules to see if there are areas where "breakdown" maintenance is used rather than an on-going mechanical integrity program. Equipment used to process, store or handle highly hazardous chemicals needs to be designed, constructed, installed and maintained to minimize the risk of releases of such chemicals. This requires that a mechanical integrity program be in place to assure the continued integrity of process equipment. Elements of a mechanical integrity program include the identification and categorization of equipment and instrumentation, inspections and tests, testing and inspection frequencies, development of maintenance procedures, training of maintenance personnel, the establishment of criteria for acceptable test results, documentation of test and inspection results and documentation of manufacturer recommendations as to meantime to failure for equipment and instrumentation.

The first line of defense an employer has available is to operate and maintain the process as designed, and to keep the chemicals contained. This line of defense is backed up by the next line of defense which is the controlled release of chemicals through venting to scrubbers or flares, or to surge or overflow tanks which are designed to receive such chemicals, etc. These lines of defense are the primary lines of defense or means to prevent unwanted releases. The secondary lines of defense would include fixed fire protection systems like sprinklers, water spray or deluge systems, monitor guns, etc., dikes, designed drainage systems and other systems which would control or mitigate hazardous chemicals once an unwanted release occurs. These primary and secondary lines of defense are what the mechanical integrity program needs to protect and strengthen these primary and secondary lines of defenses where appropriate.

continued

Appendix C to §1910.119 *(continued)*

The first step of an effective mechanical integrity program is to compile and categorize a list of process equipment and instrumentation for inclusion in the program. This list would include pressure vessels, storage tanks, process piping, relief and vent systems, fire protection system components, emergency shutdown systems and alarms and interlocks and pumps. For the categorization of instrumentation and the listed equipment the employer would prioritize which pieces of equipment require closer scrutiny than others. Meantime to failure of various instrumentation and equipment parts would be known from the manufacturers data or the employer's experience with the parts, which would then influence the inspection and testing frequency and associated procedures. Also, applicable codes and standards such as the National Board Inspection Code, or those from the American Society for Testing and Material, American Petroleum Institute, National Fire Protection Association, American National Standards Institute, American Society of Mechanical Engineers and other groups, provide information to help establish an effective testing and inspection frequency, as well as appropriate methodologies.

The applicable codes and standards provide criteria for external inspections for such items as foundation and supports, anchor bolts, concrete or steel supports, guy wires, nozzles and sprinklers, pipe hangers, grounding connections, protective coatings and insulation and external metal surfaces of piping and vessels, etc. These codes and standards also provide information on methodologies for internal inspection, and a frequency formula based on the corrosion rate of the materials of construction. Also, erosion both internal and external needs to be considered along with corrosion effects for piping and valves. Where the corrosion rate is not known, a maximum inspection frequency is recommended, and methods of developing the corrosion rate are available in the codes. Internal inspections need to cover items such as vessel shell, bottom and head; metallic linings; nonmetallic linings; thickness measurements for vessels and piping; inspection for erosion, corrosion, cracking and bulges; internal equipment like trays, baffles, sensors and screens for erosion, corrosion or cracking and other deficiencies. Some of these inspections may be performed by state or local government inspectors under state and local statutes. However, each employer needs to develop procedures to ensure that tests and inspections are conducted properly and that consistency is maintained even where different employees may be involved. Appropriate training is to be provided to maintenance personnel to ensure that they understand the preventive maintenance program procedures, safe practices and the proper use and application of special equipment or unique tools that may be required. This training is part of the overall training program called for in the standard.

A quality assurance system is needed to help ensure that the proper materials of construction are used, that fabrication and inspection procedures are proper and that installation procedures recognize field installation concerns. The quality assurance program is an essential part of the mechanical integrity program and will help to maintain the primary and secondary lines of defense that have been designed into the process to prevent unwanted chemical releases or those which control or mitigate a release. "As built" drawings, together with certifications of coded vessels and other equipment and materials of construction need to be verified and retained in the quality assurance documentation. Equipment installation jobs need to be properly inspected in the field for use of proper materials and procedures and to assure that qualified craftsmen are used to do the job. The use of appropriate gaskets, packing, bolts, valves, lubricants and welding rods need to be verified in the field. Also, procedures for installation of safety devices need to be verified, such as the torque on the bolts on ruptured disc installations, uniform torque on flange bolts, proper installation of pump seals, etc. If the quality of parts is a problem, it may be appropriate to conduct audits of the equipment supplier's facilities to better assure proper purchases of required equipment which is suitable for its intended service. Any changes in equipment that may become necessary will need to go through the management of change procedures.

10. Nonroutine Work Authorizations. Nonroutine 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 in order to provide closure for those that need to know the job is now completed and equipment can be returned to normal.

11. Managing Change. To properly manage changes to process chemicals, technology, equipment and facilities, one must define what is meant by change. In this process safety management standard, change includes all modifications to equipment, procedures, raw materials and processing conditions other than "replacement in kind." These changes need to be properly managed by identifying and reviewing them prior to implementation of the change. For example, the operating procedures contain the operating parameters (pressure limits, temperature ranges, flow rates, etc.) and the importance of operating within these limits. While the operator must have the flexibility to maintain safe operation within the established parameters, any operation outside of these parameters requires review and approval by a written management of change procedure.

Management of change covers such as changes in process technology and changes to equipment and instrumentation. Changes in process technology can result from changes in production rates, raw materials, experimentation, equipment unavailability, new equipment, new product development, change in catalyst and changes in operating conditions to improve yield or quality. Equipment changes include among others change in materials of construction, equipment specifications, piping pre-arrangements, experimental equipment, computer program revisions and changes in alarms and interlocks. Employers need to establish means and methods to detect both technical changes and mechanical changes.

Temporary changes have caused a number of catastrophes over the years, and employers need to establish ways to detect temporary changes as well as those that are permanent. It is important that a time limit for temporary changes be established and monitored since, without control, these changes may tend to become permanent. Temporary changes are subject to the management of change provisions. In addition, the management of change procedures are used to insure that the equipment and procedures are returned to their original or designed conditions at the end of the temporary change. Proper documentation and review of these changes is invaluable in assuring that the safety and health considerations are being incorporated into the operating procedures and the process.

continued

Appendix C to §1910.119 *(continued)*

Employers may wish to develop a form or clearance sheet to facilitate the processing of changes through the management of change procedures. A typical change form may include a description and the purpose of the change, the technical basis for the change, safety and health considerations, documentation of changes for the operating procedures, maintenance procedures, inspection and testing, P&IDs, electrical classification, training and communications, pre-startup inspection, duration if a temporary change, approvals and authorization. Where the impact of the change is minor and well understood, a check list reviewed by an authorized person with proper communication to others who are affected may be sufficient. However, for a more complex or significant design change, a hazard evaluation procedure with approvals by operations, maintenance and safety departments may be appropriate. Changes in documents such as P&IDs, raw materials, operating procedures, mechanical integrity programs, electrical classifications, etc., need to be noted so that these revisions can be made permanent when the drawings and procedure manuals are updated. Copies of process changes need to be kept in an accessible location to ensure that design changes are available to operating personnel as well as to PHA team members when a PHA is being done or one is being updated.

12. Investigation of Incidents. 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. The incidents for which OSHA expects employers to become aware and to investigate are the types of events which result in or could reasonably have resulted in a catastrophic release. 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.

13. Emergency Preparedness. Each employer must address what actions employees are to take when there is an unwanted release of highly hazardous chemicals. Emergency preparedness or the employer's tertiary (third) lines of defense are those that will be relied on along with the secondary lines of defense when the primary lines of defense, which are used to prevent an unwanted release, fail to stop the release. Employers will need to decide if they want employees to handle and stop small or minor incidental releases. Whether they wish to mobilize the available resources at the plant and have them brought to bear on a more significant release. Or whether employers want their employees to evacuate the danger area and promptly escape to a preplanned safe zone area, and allow the local community emergency response organizations to handle the release. Or whether the employer wants to use some combination of these actions. Employers will need to select how many different emergency preparedness or tertiary lines of defense they plan to have and then develop the necessary plans and procedures, and appropriately train employees in their emergency duties and responsibilities and then implement these lines of defense.

Employers, at a minimum, must have an emergency action plan which will facilitate the prompt evacuation of employees when an unwanted release of highly hazardous chemical. This means that the employer will have a plan that will be activated by an alarm system to alert employees when to evacuate and, that employees who are physically impaired, will have the necessary support and assistance to get them to the safe zone as well. The intent of these requirements is to alert and move employees to a safe zone quickly. Delaying alarms or confusing alarms are to be avoided. The use of process control centers or similar process buildings in the process area as safe areas is discouraged. Recent catastrophes have shown that a large life loss has occurred in these structures because of where they have been sited and because they are not necessarily designed to withstand over-pressures from shockwaves resulting from explosions in the process area.

Unwanted incidental releases of highly hazardous chemicals in the process area must be addressed by the employer as to what actions employees are to take. If the employer wants employees to evacuate the area, then the emergency action plan will be activated. For outdoor processes where wind direction is important for selecting the safe route to a refuge area, the employer should place a wind direction indicator such as a wind sock or pennant at the highest point that can be seen throughout the process area. Employees can move in the direction of cross wind to upwind to gain safe access to the refuge area by knowing the wind direction.

If the employer wants specific employees in the release area to control or stop the minor emergency or incidental release, these actions must be planned for in advance and procedures developed and implemented. Preplanning for handling incidental releases for minor emergencies in the process area needs to be done, appropriate equipment for the hazards must be provided, and training conducted for those employees who will perform the emergency work before they respond to handle an actual release. The employer's training program, including the Hazard Communication standard training is to address the training needs for employees who are expected to handle incidental or minor releases.

Preplanning for releases that are more serious than incidental releases is another important line of defense to be used by the employer. When a serious release of a highly hazardous chemical occurs, the employer through preplanning will have determined in advance what actions employees are to take. The evacuation of the immediate release area and other areas as necessary would be accomplished under the emergency action plan. If the employer wishes to use plant personnel such as a fire brigade, spill control team, a hazardous materials team or use employees to render aid to those in the immediate release area and control or mitigate the incident, these actions are covered by 1910.120, the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard. If outside assistance is necessary, such as through mutual aid agreements between employers or local government emergency response organizations, these emergency responders are also covered by HAZWOPER. The safety and health protections required for emergency responders are the responsibility of their employers and of the on-scene incident commander.

Responders may be working under very hazardous conditions and therefore the objective is to have them competently led by an on-scene incident commander and the commander's staff, properly equipped to do their assigned work safely, and fully trained to carry out their duties safely before they respond to an emergency. Drills, training exercises or simulations with the local community emergency response planners and responder organizations is one means to obtain better preparedness. This close cooperation and coordination between plant and local community emergency preparedness managers will also aid the employer in complying with the Environmental Protection Agency's Risk Management Plan criteria.

continued

One effective way for medium to large facilities to enhance coordination and communication during emergencies for on plant operations and with local community organizations is for employers to establish and equip an emergency control center. The emergency control center would be sited in a safe zone area so that it could be occupied throughout the duration of an emergency. The center would serve as the major communication link between the on-scene incident commander and plant or corporate management as well as with the local community officials. The communication equipment in the emergency control center should include a network to receive and transmit information by telephone, radio or other means. It is important to have a backup communication network in case of power failure or one communication means fails. The center should also be equipped with the plant layout and community maps, utility drawings including fire water, emergency lighting, appropriate reference materials such as a government agency notification list, company personnel phone list, SARA Title III reports and safety data sheets, emergency plans and procedures manual, a listing with the location of emergency response equipment, mutual aid information and access to meteorological or weather condition data and any dispersion modeling data.

14. 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 lead 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. Utilizing 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, followup 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 indepth 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.

[78 FR 9313, Feb. 8, 2013]

USW POLICY
on
SEXUAL HARASSMENT

The Steelworkers want to effectively educate all our members about the harm done to everyone when sexual harassment is tolerated in our workplaces. We also want to make sure we provide and maintain a harassment-free environment at all USW workplaces and activities.

We have passed tough anti-harassment policies for all USW Conferences and Conventions, and we have negotiated policies to protect our members. These are not just words. We take them seriously.

Cooperation, understanding and mutual respect must be the foundation of all interaction among trade unionists.

The USW will not tolerate and will not condone behavior by its employees, or by others doing business on our property, such as vendors, if that behavior is likely to undermine the dignity or self-esteem of any individual, or if it creates a hostile or offensive environment.

Sexual harassment is particularly demeaning and the following policy shall apply to allegations of such harassment.

SEXUAL HARASSMENT POLICY[1]

Sexual harassment is not a joke. It creates feelings of uneasiness, humiliation and discomfort. It is an expression of perceived power and superiority by the harasser over another person. There are two principles fundamental to the trade union movement: human rights and solidarity. Sexual harassment strikes at the heart of both.

Sexual harassment is illegal discrimination in both the United States and Canada. It is commonly defined as:

(1) unwanted sexual attention of a persistent or abusive nature, made by a person who knows or ought reasonably to know that such attention is unwanted; or

(2) implied or expressed promise of reward for complying with a sexually oriented request; or

(3) implied or expressed threat or reprisal, in the form either of actual reprisal or the denial of opportunity, for refusal to comply with a sexually oriented request;

(4) sexually oriented remarks and behavior which may reasonably be perceived to create a negative, intimidating, hostile or offensive environment.

Unwanted sexually directed behavior can include:

- assault
- physical abuse (touching, pinching, cornering)
- verbal abuse (propositions, lewd comments, sexual insults)
- visual abuse (display of pornographic material designed to embarrass or intimidate).

Some forms of harassment may not violate the law. For example, harassment allegations concerning an International employee and a Local Union member would normally not affect the member's employment or working environment. But such harassment does violate the basic principles of the union. The USW considers sexual harassment of any kind a serious offense. Complaints of harassment in the workplace and at USW activities will be investigated.[2]

This policy is based upon a desire to mediate resolutions of complaints in an amicable and non-adversarial manner. Because, in most cases, the individuals involved are both members of our union, emphasis will be placed on resolving complaints informally in the first instance. Where such resolution is not possible, a formal complaint can be processed. A substantiated complaint will result in appropriate action, up to and including termination of employment for USW employees. All complaints will be handled in a confidential manner and all formal complaints should be directed to the International President.

In addition to the contractual complaint and grievance provisions governing USW employees, the International has established a Committee on Sexual Harassment composed of representatives from the International, exempt employees, SRU, USW Local 3657 and OPEIU Local 343. This Committee will be responsible for developing an educational program on sexual harassment for all USW employees and for recommending procedures for responding to informal complaints under this policy.

The Committee will also provide for the investigation of any complaints referred to it by the International President.

Adopted this 17th day of June, 1992,by the USWA International Executive Board.

[1]This policy covers USW International employees in the United States and Canada. It does not apply to USW members generally since they are covered by policies established by their employers. However, USW members can request investigation of a claim of sexual harassment by a USW employee under this policy. The policy also does not cover Local Union officers and Local Union employees. However, Local Unions are encouraged to adopt similar policies. The policy does apply to the conduct of others doing business on USW property, such as vendors.

[2]This includes complaints about conduct by Local Union officers or members against other members where that conduct takes place at International USW Junctions. In such cases, the Local Union will be notified of the results of the investigation so that appropriate action can be taken by the Local Union.

AFL-CIO-CLC UNION USW LABEL 3657

United Steelworkers
Five Gateway Center
Pittsburgh, PA 15222

Tony Mazzocchi Center Worker-Trainers and Worker-Centered Training

USW International Union, with its long history of environmental safety and health activism, believes that workers are really the best resource for making our facilities safe and for protecting the community from harm. To put that belief into practice:

- The training is designed to be conducted by USW rank and file worker-trainers.
- Workers are the center of the learning process.
- Experience and knowledge of the workers in class is considered one of the most important resources for education in the class.

Trainers, acting as facilitators and using the current workbook as a resource and guide, lead the class through activities which refresh and reinforce topics dictated by the regulations.

Worker-Centered Training is based on Activities. An Activity can take from 30 minutes to an hour. Each Activity has a common basic structure:

1. **Small Group Tasks:** The workshop always operates with people working in groups at tables. (Round tables are preferable.) Each Activity has a task, or set of tasks, for the groups to work on. The idea is to work together, not to compete. Very often there is no one right answer. The tasks require that the groups use their experience to tackle problems and to make judgments on key issues. Part of the task often includes looking at factsheets and reading short handouts.
2. **Report-Back**: For each task, the group selects a scribe whose job it is to take notes on the small group discussion and report back to the workshop as a whole. During the report-back, the scribe informs the entire workshop about how his or her group tackled the particular problem. The trainer records these reports on large pads of paper in front of the workshop so that all can refer to it. After the scribe's report, the workshop is opened to general discussion about the problem at hand.
3. **Summary:** Here the trainer highlights the key points and brings up any problems and points that may have been overlooked in the report-back. Good summaries tend to be short and to the point.

Worker-centered training is based on the idea that every workshop is a place where learning is shared. Learning is not a one-way street, running from trainer to worker. Rather, worker-centered training is a structured procedure that allows us to share information. It is based on three learning exchanges:

- **Worker to worker;**
- **Worker to trainer; and**
- **Trainer to worker.**

Tony Mazzocchi Center Green Policy Statement

The environmental and health and safety movements were born together during the 1960s. The very first health and safety training programs in the country were called “Hazards in the Workplace Environment.” The TMC believes that the only difference between worker health and safety and the environment is the facility fence. Therefore, it is the policy of the TMC to integrate environmental concerns in all of our programs and in the ways in which we carry out our training.

The TMC strives to:

- Connect environmental and health and safety issues as much as possible in our training;
- Look for workplace solutions that improve the environment outside of our facilities;
- Work extensively to reduce the use of hazardous substances;
- Encourage our employers to reduce energy use and reduce the emission of greenhouse gases that cause global warming;
- Use recycled paper (at least 50 percent post-consumer content) when producing our training materials;
- Encourage workbook reuse and recycling;
- Promote the use of (union-made) non-chlorine paper products and environment-friendly toners and inks; and
- Conserve paper by reducing the length of our texts.

TONY MAZZOCCHI CENTER
FOR HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION
A PROJECT OF THE UNITED STEELWORKERS, THE COMMUNICATIONS WORKERS OF AMERICA AND THE LABOR INSTITUTE

Attendance Form

Please print clearly

Name: ________________________________ **Home Number:** ________________

Cell Phone #: _________________

Address: _____________________________ **Work Number:** _________________

_____________________________ **Email:** ________________________

_____________________________ **Union/Mgt.** ____________________

Employer: ____________________________ **District #** ____ **Local #** _________

Workplace Location: ____

Name of Class: ______________________________ **Completion Date:** __________

Instructors: ____

Would you like to be contacted at a later date to participate in an evaluation of this training's effectiveness? (Circle one)

Yes **No**

Would you like to participate in additional trainings and programs offered by the Union and the TMC? (Circle one)

Yes **No**

Your Signature: ____

SIGN-IN SHEET ***(PLEASE PRINT CLEARLY)***

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A PROJECT OF THE UNITED STEELWORKERS, THE COMMUNICATIONS WORKERS OF AMERICA AND THE LABOR INSTITUTE

Class Title: ______________________________ **Completion Date:** ____________

Location (City, State)/Facility: ____

Grant Program: ______________________ **Dist. & LU#:** ____________________

Instructors: 1) ___________________________ **2)** ___________________________

3) _______________________ **4)** ____________________ **5)** ___________________

	Name (print first and last)	Hourly	Management
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Course Certification and Certificate of Completion Validation Instructions for Worker-Trainers

In compliance with the NIEHS Minimum Criteria, please complete the following steps:

Upon completion of the course, the Lead Worker-Trainer will verify that the trainee has:

1. Completed the “Proficiency Assessment Instrument” at the end of each activity.
2. Completed and signed the “Final Proficiency Assessment Instrument” at the end of the workbook.
3. Entered their “Personal Identification Number” (the two digit month and two digit day of their birth date and the last four numbers of their social security number) in the space provided on the “Final Proficiency Assessment Instrument.” (For example, someone born September 22nd and whose last four digits of their social security number are 1234, would enter 0922-1234.)
4. Signed and dated the “Final Proficiency Assessment Instrument” in the space provided.

continued

Course Certification and Certificate of Completion Validation Instructions for Worker-Trainers *(continued)*

The Lead Worker-Trainer will then:

1. Instruct each trainee to remove the “Final Assessment Instrument” and “Course Certificate of Completion” (Certificate) from the back of the workbook.
2. Sign the “Final Proficiency Assessment Instrument” in the spaces provided in order to verify that the trainee has successfully completed the course.
3. Insert the number of hours of training under No. 3 on the “Final Proficiency Assessment Instrument.”
4. Complete Certificate for the trainee by:
   a. Printing the trainee’s name on the first blank line.
   b. Filling in the “TMC Training Site.”
   c. Filling in the date(s) of training.
   d. Filling in the trainee’s Personal Identification Number in the space provided.
5. Verify that the Personal Identification Number is the same on both the “Final Assessment Instrument” and the Certificate.
6. Execute the Certificate by signing his/her name above “USW TMC Worker-Trainer.”
7. Present the Certificate to the trainee.
8. Collect and send to Nashville all Proficiency Assessment Instruments for proper recording and registration.

All of the above steps must be completed in order to certify that the trainee has successfully completed the course.

TONY MAZZOCCHI CENTER

FOR HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION

A PROJECT OF THE UNITED STEELWORKERS, THE COMMUNICATIONS WORKERS OF AMERICA AND THE LABOR INSTITUTE

The Tony Mazzocchi Center for Health, Safety and Environmental Education

A project of the United Steelworkers, the Communications Workers of America and The Labor Institute

Five Gateway Center, Room 902, Pittsburgh, PA 15222

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Successfully completed ______ hours

NIEHS Certified Process Safety Representative Training Course

On Date: ________________ at the TMC Training Site in ____________________________

James S. Frederick
USW TMC Program Director

USW TMC Worker-Trainer

Personal ID Number: ____________________

The training programs provided by the Tony Mazzocchi Center are made possible in part by the following cooperative agreements: **National Institute for Environmental Health Sciences (NIEHS) Worker Education and Training Program (WETP)**, Worker Health and Safety Training Cooperative Agreement (5 U45 ESO6175) and HAZMAT Training at DOE Nuclear Weapons Complex Cooperative Agreement (5 U45 ESO9761)

Only valid if signed by a USW TMC Certified Worker-Trainer