North Carolina Department of Labor
Occupational Safety and Health Division

Raleigh, NC

Field Information System CPL 03-00-014

Subject: National Emphasis Program – PSM Covered Chemical Facilities

A. **Discussion.**

This instruction describes policies and procedures for a National Emphasis Program (NEP) to reduce or eliminate the workplace hazards associated with the catastrophic release of highly hazardous chemicals.

B. **Action.**

References to federal administrators or supervisors will mean the appropriate OSH Division management person. References to CPL 02-00-150, Field Operations Manual (FOM) will mean the NCDOL OSH Division FOM. Additionally, the OSH Division does not have a de minimis citation category.

The Dynamic Lists (#3) of Questions discussed in Appendix A are attached at the end of this document. The Dynamic Lists of Questions are not public information. These questions will be used for the NEP inspections. The CPL contains instructions on how and when these lists will be used and the specific questions which will be used from each list.

The NCDOL will request a random list of sites from the federal OSTAT and will conduct three inspections per year from this list. The inspections will be conducted by **PSM Team Members only**. CSHO's may also use the appropriate Dynamic List of Questions and the IMIS codes on any SST inspections or Food SEP inspections. Additionally, these may be used to assess PSM-covered processes on un-programmed inspections per the instructions in the CPL. A referral will be made to a PSM Team Member for all inspections not generated from the OSTAT site list.

C. **Effective Date.**

This CPL is effective on the date of signature. It will remain in effect until revised or canceled by the director or suspended by OSHA.

Signed on Original
Susan Haritos
Health Standards Officer

Signed on Original
Allen McNeely
Director

5/21/2012
Date of Signature

OSHA INSTRUCTION

U.S. DEPARTMENT OF LABOR — Occupational Safety and Health Administration

DIRECTIVE NUMBER: CPL 03-00-014	EFFECTIVE DATE: November 29, 2011

SUBJECT: PSM Covered Chemical Facilities National Emphasis Program

ABSTRACT

Purpose: This instruction describes policies and procedures for a National Emphasis Program (NEP) to reduce or eliminate the workplace hazards associated with the catastrophic release of highly hazardous chemicals.

Scope: This Instruction applies OSHA-wide. Both Programmed and Unprogrammed inspections will take place in all OSHA Regions.

References: See Paragraph III.

Cancellations: 10-05 (CPL 02), *PSM-Covered Chemical Facilities National Emphasis Program.*

State Impact: Notice of Intent and Adoption required. See paragraph VIII.

Action Offices: National, Regional, Area, and State Plan Offices

Originating Office: Directorate of Enforcement Programs (DEP).

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200 Constitution Avenue, NW, Room 3107
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By and Under the Authority of

David Michaels, PhD, MPH
Assistant Secretary

Executive Summary

This instruction provides guidance to Occupational Safety and Health Administration (OSHA) national, regional, and area offices for implementing and conducting an NEP to reduce or eliminate workplace hazards associated with the catastrophic release of highly hazardous chemicals. Both programmed and unprogrammed inspections associated with this NEP will begin immediately in all Regions.

Table of Contents

I. Purpose.

This instruction describes an OSHA National Emphasis Program (NEP) for inspecting facilities with highly hazardous chemicals (HHCs) in amounts at or greater than the threshold quantities listed in 29 CFR 1910.119. Programmed inspections[1] will be conducted in facilities that are known to OSHA as having a risk of catastrophic releases. Unprogrammed inspections[2] will take place in PSM-covered facilities as described in this Instruction. This NEP does not apply to Petroleum refineries (NAICS 32411).

II. Scope.

This notice applies OSHA-wide.

III. References.

A. Federal Register, Volume 57, Number 36, pages 6355 to 6417, (including Preamble) February 24, 1992, *Final Rule, Process Safety Management (PSM) of Highly Hazardous Chemicals, 29 CFR 1910.119; Explosives and Blasting Agents standard*, 29 CFR 1910.109.

B. CPL 02-02-045 – (formerly CPL 2-2.45A CH-1) - *Process Safety Management of Highly Hazardous Chemicals -- Compliance Guidelines and Enforcement Procedures*, September 13, 1994.

C. 29 CFR 1910.106, *Flammable and Combustible Liquids*

D. 29 CFR 1910.146, *Permit-Required Confined Spaces*

E. 29 CFR 1910.147, *The Control of Hazardous Energy (Lockout/Tagout)*

F. 29 CFR 1910, *Subpart I, Personal Protective Equipment*

G. 29 CFR 1910.307, *Hazardous (Classified) Locations*

H. OSHA Instruction CPL 02-00-148, *Field Operations Manual (FOM)*, November 9, 2009.

I. OSHA Instruction ADM 03-01-005, OSHA *Compliance Records*, August 3, 1998.

1 Programmed inspections are defined in *CPL 02-00-148 Field Operations Manual* as "inspections of worksites which have been scheduled based upon objective or neutral selection criteria."
2 Unprogrammed inspections are defined in *CPL 02-00-148 Field Operations Manual* as "inspections scheduled in response to alleged hazardous working conditions that have been identified at a specific worksite."

J. CPL 02-00-025 - CPL 2.25I - *Scheduling System for Programmed Inspections*, January 4, 1995.

K. OSHA Instruction CPL 02-01-037 (CPL 2-1.037), *Compliance Policy for Emergency Action Plans and Fire Prevention Plans*, July 9, 2002.

L. OSHA Notice 10-06 [(CPL 02)] *Site-Specific Targeting 2010*, August 18, 2010.

M. OSHA Instruction CPL 02-00-094 (CPL 2.94), *OSHA Response to Significant Events of Potentially Catastrophic Consequences*, July 22, 1991.

N. OSHA PSM Safety and Health Topics web page, www.osha.gov/SLTC/processsafetymanagement/index/html

O. *Accidental Release Prevention Requirements - Risk Management Programs Under the Clean Air Act*, U.S. Environmental Protection Agency's (EPA) standard, 40 CFR Part 68, Chemical Accident Prevention Provisions.

P. Chemical NEP Dynamic Lists, OSHA Intranet website

Q. OSHA Instruction CPL 03-00-010, Petroleum Refinery Process Safety Management National Emphasis Program, August 18, 2009.

IV. Cancellations.

This Instruction cancels OSHA 10-05 (CPL 02) PSM-Covered Chemical Facilities National Emphasis Program.

V. Significant Changes.

This Instruction expands the PSM-Covered Chemical Plants National Emphasis Program nationwide to all OSHA Regions and State Plans. Facility categories have been reduced from three in the pilot NEP to two: facilities likely to have ammonia used for refrigeration as the only Highly Hazardous Chemical (HHC) and all other facilities. The number of programmed inspections required per Area Office has been reduced. Significant industry and/or OSHA experience has been recognized for CSHO qualifications to conduct PSM inspections. A requirement to verify abatement of previous OSHA PSM citations has been added. Instructions for preparing targeting lists have been clarified, and program evaluation requirements have been reduced.

VI. Action Offices.

National, Regional, Area, and State Plan Offices.

VII. Application.

OSHA compliance officers shall follow the procedures contained in this notice when inspecting the facilities selected under this NEP. This NEP does not apply to facilities with a 32411 NAICS code. For facilities with a 32411 NAICS code, please refer to the Petroleum Refinery Process Safety Management NEP.

VIII. Federal Program Change. Notice of Intent and Adoption Required.

This instruction describes an NEP for inspecting facilities with PSM-covered processes. Because the seriousness and prevalence of the hazards addressed are nationwide, States are required to participate in this emphasis program. All such inspections and related compliance assistance activity should be coded CHEMNEP as directed in paragraph XI.H.

States are required to notify OSHA within 60 days whether the State's emphasis program will be identical to or different from the Federal program. If a State is already implementing an emphasis program in this area, or if it adopts a new initiative in response to this Federal program change, its implementing policies and procedures are expected to be at least as effective as those in this instruction.

If a State adopts or maintains an emphasis program on PSM-covered Chemical Facilities which differs from the Federal program, the State must identify the difference and may either post its different procedures on its State Plan's website and provide the link to OSHA, or provide an electronic copy to OSHA with information on how the public may obtain a copy. If the State's emphasis program is identical to the Federal program, it must provide the date of adoption to OSHA. State adoption must be accomplished within six months, with posting or submission of documentation within 60 days thereafter. OSHA will provide summary information on the State to this instruction on its website.

OSHA's Office of Statistical Analysis will work with the States to provide the data necessary to develop their own targeting lists according to the instruction in section XI.A. OSHA will make the dynamic list of questions available to the States. States must code any inspections (programmed or unprogrammed) and related compliance assistance activity conducted under this NEP as directed in Section XI.G. States using the procedures in this instruction are asked to provide the feedback set out in section XI.F to the Directorate of Enforcement Programs through their Regional Offices in order to assist OSHA in evaluating this program.

IX. Background.

OSHA promulgated the PSM standard in 1992 in response to a number of catastrophic incidents that occurred worldwide (See Process Safety Management of Highly Hazardous Chemicals, 29 CFR 1910.119). These incidents spurred broad recognition that releases of highly hazardous chemicals could lead to incidents that may occur relatively infrequently, but, due to their catastrophic nature, often result in multiple injuries and fatalities.

On September 13, 1994, OSHA issued Instruction CPL 02-02-045, Process Safety Management of Highly Hazardous Chemicals – Compliance Guidelines and Enforcement Procedures. This instruction established policies, procedures, clarifications, and compliance guidance for enforcement of the PSM standard. The instruction acknowledged that Program Quality Verification (PQV) inspections were resource intensive, and, therefore, OSHA would perform only a limited number each year. Consequently, very few PQV inspections have been conducted since Instruction CPL 02-02-045 was issued in 1994.

In July 2009, OSHA implemented a pilot NEP for PSM-covered chemical facilities. The pilot outlined a new approach for inspecting PSM-covered facilities that allowed for a greater number of inspections using better allocation of OSHA resources. Under the pilot, OSHA was able to increase the number of PSM facilities inspected with relatively limited resources.

Based on data collected and feedback from OSHA personnel, this Instruction outlines a slightly modified Chemical NEP that will be launched OSHA-wide.

X. Acronyms.

A. AAD – Assistant Area Director (OSHA)

B. AD – Area Director (OSHA)

C. AO – Area Office (OSHA)

D. CSHO – Compliance Safety and Health Officer

E. DEP – Directorate of Enforcement Programs (OSHA National Office)

F. DEA Directorate of Evaluation and Analysis (OSHA National Office)

G. EPA - U.S. Environmental Protection Agency

H. FOM – Field Operations Manual

I. HAZWOPER – Hazardous Waste Operations and Emergency Response

J. HHC – Highly Hazardous Chemical

K. LEL – Lower Explosive Limit

L. NAICS – North American Industrial Classification System

M. NEP – National Emphasis Program

N. NO – National Office (OSHA)

O. RA – Regional Administrator (OSHA)

P. RAGAGEP – Recognized and Generally Accepted Good Engineering Practices

Q. RMP – Risk Management Plans (U.S. EPA)

R. RO – Regional Office (OSHA)

XI. Program Procedures.

A. Programmed Inspection Site Selection.

1. Targeting Sources.

OSHA will use four sources for targeting:

a. U.S. Environmental Protection Agency's (EPA) Chemical Accident Prevention Provisions, Program 3 Risk Management Plans (RMP) [3],

b. Explosives manufacturing NAICS codes,

c. OSHA's IMIS database, and

d. OSHA Area Office knowledge of local facilities.

2. Facility Identification and Master List Generation.

a. OSHA's National Office will use the following procedure to create two National Chemical Targeting Lists:

- DEP will obtain a list of facilities that submitted EPA Program 3 RMP;

- DEA will provide DEP with a list of facilities identified in the IMIS or OIS databases as having being previously cited under PSM, sorted by NAICS Code;

3 Facilities covered by EPA's Risk Management Program are considered to be Program 3 if they are covered by OSHA's PSM 1910.119.

- DEA will provide DEP with a list of facilities with NAICS codes identified as explosives manufacturing;

- DEP will combine these lists and sort them into two lists: Category 1 – NAICS Codes for facilities likely to have ammonia used for refrigeration as the only HHC; Category 2 –NAICS Codes for facilities likely to have ammonia used for other than refrigeration, or HHCs other than ammonia.

These lists will be divided by OSHA Region and posted on the OSHA DEP Intranet website. The national list will be updated annually.

b. The Office of Statistics shall create a list of all known establishments with NAICS codes identical to those identified in the IMIS database as having received prior PSM citations sorted by Area Office jurisdiction. This list, the Potentially PSM-Covered Facilities List, will be posted on the DEP Intranet website. These facilities will not be automatically added to the targeting list, but used by the OSHA Regions to consider when adding facilities based on local knowledge.

c. Each OSHA Region shall prepare local Category 1 and 2 master lists of facilities. Based on their familiarity with local facilities, OSHA Regions shall:

- Add any facility that is not on the national list, are known by the Region to operate in their jurisdiction, and are known as likely to be PSM-covered.

  OSHA Regions should note that because EPA's RMP and OSHA's PSM cover different chemicals, the national list may be missing PSM covered facilities – particularly those that use flammable liquids. Therefore, OSHA Regions should consult the Potentially PSM-Covered Facilities List and add any listed facility that, based on local knowledge is likely to be PSM-covered.

- Delete any facility that is known to be out of business, documenting the basis for such determinations;

- Delete any facility that is an approved participant in OSHA's Voluntary Protection Program (VPP) or OSHA Consultation's Safety and Health Achievement Recognition Program (SHARP);

- Delete any facility that has already received an inspection under this NEP in the last two years or is a facility with NAICS code 32411 (petroleum refineries); and

- Delete any facility that has received a comprehensive PSM inspection within the last two years.

The OSHA Regions must update their master lists annually and maintain the lists for three years after the completion of all of the inspections conducted under this NEP. (See OSHA Instruction ADM 03-01-005, *OSHA Compliance Records*.)

Note: OSHA Regions may choose to have the lists created and maintained by the AO at their discretion.

3. Inspection Scheduling.

a. Programmed inspections will take place immediately in all regions.

b. Regions should each complete an average of 3-5 programmed inspections per AO per year using this NEP. In situations where an AO has fewer than three PSM-covered facilities in its jurisdiction, the Region should schedule more Chem NEP inspections in area offices with a greater number of PSM-covered facilities. Each Region shall randomly select inspection sites from its master lists.

c. In order to ensure that inspections are appropriately allocated across all hazardous processes, inspections should consist of approximately 75% from the Category 2 Master List and approximately 25% from the Category 1 Master List. In a Region where this is not possible due to the types of facilities in its jurisdiction, the mix of facilities may be adjusted as necessary.

B. SST and Unprogrammed Inspections (Applies to all OSHA Regions).

1. SST Inspections.

Some establishments may also be selected for inspection under the current Site-Specific Targeting (SST) Plan. CSHOs must use this NEP for the comprehensive inspection of the selected PSM-covered process(es) at the facility. CSHOs may, after consulting with the Area Director, expand the PSM portion of the inspection beyond this notice if they determine that PSM deficiencies may exist either outside of the selected unit or beyond the scope of the dynamic list questions.

2. Unprogrammed Inspections.

The following guidelines shall be used for all unprogrammed inspection activities related to PSM-covered processes nationwide:

a. Complaint or referral. If a formal complaint or referral is received relating to a PSM-covered process and it:

- *involves an application of the PSM standard* - the AD shall evaluate the complaint or referral item(s) in the usual manner (CPL 02-00-148 – Field Operations Manual) and conduct an inspection using this notice.

- *does not involve an application of the PSM standard (for example, there is a complaint about fall protection hazards in a PSM-covered process)* - the inspection or inquiry will normally be limited to the complaint and referral item(s)/subject(s) only. However, if the facility has not already been inspected, a concurrent inspection using this NEP may be conducted at the AD's discretion.

b. Accidents and Catastrophes. Responses to accidents and catastrophes in facilities that contain PSM-covered processes shall follow the guidelines contained in CPL 02-00-148 – Field Operations Manual and, where appropriate, in OSHA Instruction CPL 02-00-094, *OSHA Response to Significant Events of Potentially Catastrophic Consequences* in addition to this Notice's guidelines.

When an accident or catastrophe occurs in a facility that contains a PSM-covered process, and it:

- *involves an application of the PSM standard* – the inspection will include the accident investigation item(s)/subjects and a Chemical NEP inspection using this notice.

- *does not involve an application of the PSM standard* - the inspection will normally be limited to the accident investigation item(s)/subject(s) alone. However, if the facility has not already been inspected using this notice, a concurrent inspection using this NEP may be conducted at the AD's discretion.

C. Inspection Resources.

Appropriate levels of staff experience, training, and preparation are essential for compliance activities relating to the PSM standard. Inspections using this NEP may be conducted by either a single OSHA employee or a team. At least one member of the team or the OSHA employee must be qualified to Level 1 as described below. For inspections that fall into Category 1 – Facilities that use only ammonia for refrigeration, Level 1 requirements are specified under Ammonia Refrigeration Level 1.

Notes on training:

- OTI Course 3430 covers issues particular to the types of industries covered by this NEP. Given the wide variety of processes found in chemical processing industries, Level 1 personnel are strongly encouraged to attend Course 3430.

- Due to a significant change in course content, completion of Course 330 prior to Fiscal Year 1991 does not meet this requirement for Level 1 training.

1. Inspection Team Personnel.

   a. Inspections of Ammonia Refrigeration Processes Only - Level 1.

      OSHA personnel may be assigned as Level 1 team members under this notice for inspections of ammonia refrigeration facilities, if:

      - They have completed OSHA Training Institute's (OTI) Course 3300, *Safety and Health in the Chemical Processing Industries*, Course 3400, *Hazard Analysis in the Chemical Processing Industries*.
        and,

      - They have completed advanced training such as OTI Course 3410, *Advanced Process Safety Management*, OTI Course 3430, *Advanced PSM in the Chemical Industries*, or a specialized course on ammonia refrigeration.
        and,

      - They have prior experience including:

        – accident investigations in chemical, petrochemical or refinery plants involving fires, explosions, and/or toxic chemical releases, or,

        – previous chemical inspections involving process safety management evaluations, or

        – previous chemical industry employment, or

        – participation in a PSM inspection of an ammonia refrigeration facility.

b. Level 1. OSHA personnel may be assigned as Level 1 team members under this notice, if they meet the criteria for any of the following options.

- Option 1:

  – They have completed OSHA Training Institute's (OTI) Course 3300, *Safety and Health in the Chemical Processing Industries*, Course 3400, *Hazard Analysis in the Chemical Processing Industries*, and advanced training including either OTI Course 3430, *Advanced PSM in the Chemical Industries* or Course 3410, *Advanced Process Safety Management.*
  and,

  – They have prior experience (OSHA, other government agency, or industry) with chemical industry safety including: accident investigations in chemical, petrochemical or refinery plants involving fires, explosions, and/or toxic chemical releases,
  or,

  – They have previous (OSHA, other government agency, or industry) chemical inspection experience involving process safety management evaluations, or previous chemical industry employment involving process engineering, operations, safety, or maintenance.

- Option 2:

  – They have completed OSHA Training Institute's (OTI) Course 3430, *Advanced PSM in the Chemical Industries* or Course 3410, *Advanced Process Safety Management.*
  and,

  – They have 3 years experience working in a PSM-covered manufacturing facility (chemical, petrochemical, refining) in a process engineering, operations, safety, or maintenance position.

- Option 3

  – They have completed OSHA Training Institute's (OTI) Course 3430, *Advanced PSM in the Chemical Industries* or Course 3410, *Advanced Process Safety Management.*
  and,

- They have 7 years Federal or State OSHA experience.
  and,

- They have participated in greater than 20 PSM and/or chemical plant inspections where they were the team leader equivalent in at least two of these inspections.

c. Level 2. OSHA personnel may be assigned as inspection team members under this notice, if:

- Option 1:
  - They have completed OTI Course 3300, *Safety and Health in the Chemical Processing Industries* (including offerings of this course prior to fiscal year 1991) and OTI Course 3400 *Hazard Analysis in the Chemical Processing Industries.*
    and,

  - They have two years of OSHA inspection experience or the equivalent, such as State OSHA experience, EPA RMP experience, U.S. Chemical Safety Board experience.

- Option 2:
  - They have 3 years experience working in a PSM-covered manufacturing facility (chemical, petrochemical, refining) in a process engineering, operations, safety, or maintenance position.

- Option 3
  - 7 years of Federal or State OSHA experience.
    and,

  - They have participated in more than 20 PSM and/or chemical plant inspections where they were the team leader equivalent in at least two of these inspections.

d. Level 3.

OSHA personnel who do not have the training and experience to qualify as Level 1 or 2 may be assigned to an inspection team under this notice, in the following circumstances:

- Level 3 team members must be under the direction of a Level 1 or 2 team member.

- Level 3 team members experienced in evaluating other programmatic standards such as hazard communication, lockout/tagout, confined space entry, and respiratory protection programs may evaluate compliance with programmatic sections of the PSM standard.

- Level 3 team members may evaluate compliance with the following elements of the PSM standard:

  – (c) employee participation

  – (g) training

  – (h) contractors

  – (k) hot work permits

  – (m) incident investigation

  – (n) emergency planning and response

2. ROs will determine, document, and provide to DEP-Office of General Industry the PSM qualification level for each CSHO conducting PSM inspections based on the options listed above. DEP-Office of General Industry will keep this information in a central file. ROs will update this documentation annually for each CSHO whose PSM qualification level has changed in the previous year.

3. Utilization of Other OSHA Technical and Enforcement Resources.

   CSHOs and other inspection team members will fully utilize RO and NO (DEP, DSG, and DTSEM) technical and enforcement support resources when making decisions regarding compliance or noncompliance.

4. Utilization of OSHA Health Response Team (HRT).

   AOs may include technical experts from the HRT OSHA Salt Lake City Technical Center (SLTC) as circumstances warrant.

5. Industry Reference Material Availability.

   OSHA's PSM Safety and Health Topics web page lists documents that will be useful for PSM inspections in addition to the list of documents found in Appendix D of CPL 02-02-045. ROs should consult with their Regional PSM Coordinators to identify which industry documents are necessary to support their enforcement activities.

Each RO library must have industry reference documents accessible for CSHOs to use during the inspection. AO jurisdictions that conduct a large number of PSM inspections should have these industry reference documents in their own libraries. CSHOs may also access documents available online through OSHA's Technical Data Center.

D. Inspection Process.

1. NEP Inspection Process Different from PSM CPL PQV Process.

This NEP differs from the program-quality-verification (PQV) approach in PSM CPL 02-02-045. Inspections done using the PQV are broad and open-ended, while inspections using this notice rely on specific investigative questions. The investigative questions are designed to gather facts related to requirements of the PSM standard, and include guidance for reviewing documents, interviewing workers, and verifying full implementation.

2. Emphasis on Implementation over Documentation.

Based on inspection history at refineries and large chemical plants, OSHA has found that employers may have an extensive written process safety management program, but insufficient program implementation. Therefore, CSHOs should verify the implementation of PSM elements to ensure that the employer's actual program is consistent with their written program.

3. Dynamic List Questions.

CSHOs will select one or more units and use a dynamic list(s) of questions (referred to in this document as the dynamic list) to review PSM compliance.

a. DEP continuously develops dynamic lists in three categories: PSM General, Ammonia Refrigeration, and Chemical Processing. DEP will periodically issue new dynamic lists.

b. For inspection integrity purposes, OSHA will not publicly disclose the dynamic lists. The dynamic lists will only be posted on OSHA's DEP/PSM intranet website. CSHOs must download and use the dynamic list(s) listed as "Effective" at the time of the opening conference. For inspection preparation purposes, DEP will post the dynamic list(s) about 7 days before they become effective.

Example: The most recent dynamic list posted on the DEP intranet site has an "Effective Date" of August 17, 2010. The previous

dynamic list has an "Effective Date" of August 1, 2010. The inspection opening date is August 15, 2010. In this case, CSHOs will use the August 1 dynamic list for the inspection because the opening date of the inspection is before the "Effective Date" of the August 17th dynamic list.

Note: Please contact DEP if you have difficulty downloading the dynamic list.

c. CSHOs must evaluate compliance with each item on the dynamic list.

4. Expanding the Inspection.

If, during the compliance evaluation, CSHOs determine that PSM deficiencies may exist outside of the selected unit or dynamic list questions, the inspection may be expanded after consultation with the Area Director. CSHOs shall document the basis for this determination.

5. Inspect Both Host and Contract Employers.

CSHOs must inspect both the host employer and contract employers, if any.

6. Review Inspection History and Abatement.

CSHOs shall review the employer's history of OSHA inspections and any abatement verification submitted for citations resulting from those inspections.

E. Inspection Procedures.

1. Supplemented FOM Procedures.

The procedures given in OSHA Instruction CPL 02-00-148, *Field Operations Manual*, Chapter 3, shall be followed except as modified in the following sections.

2. Opening Conference.

Where possible, the facility safety and health director, process safety manager, or other person capable of explaining the company's process safety management program shall be asked to attend the opening conference.

The opening conference must include the following:

a. Verify PSM Applicability. CSHOs shall confirm that the facility has a

PSM-covered process.

- CSHOs shall request a list of the chemicals on site and their respective maximum intended inventories. CSHOs shall review the list of chemicals and quantities, and determine if there are HHCs listed in 1910.119 Appendix A or flammable liquids or gases at or above the specified threshold quantity. CSHOs may ask questions, conduct interviews, or conduct a walkaround to confirm the information on the list of chemicals and maximum intended inventories. If CSHOs determine that there are no HHCs, flammable liquids, or flammable gases present in sufficient quantities and the facility is not manufacturing explosives or pyrotechnics as defined in 1910.109, then, after updating the AO, they shall document the finding and end the inspection.

- CSHOs shall confirm that the facility is not a retail facility, oil or gas well drilling or servicing operation, or normally unoccupied remote facility (1910.119(a)(2)). If the facility is one of these types of establishments, CSHOs should document their findings and end the inspection.

- CSHOs shall determine if other exemptions apply. According to 1910.119(a)(ii), a process could be exempt if the employer can demonstrate that covered chemical(s) are:

  - 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 the standard, or

  - Flammable liquids stored in atmospheric tanks or transferred which are kept below their normal boiling point without the benefit of chilling or refrigeration.

  If management believes that the process is exempt, CSHOs shall ask the employer to provide documentation or other information that demonstrates why the process is exempt.

- CSHOs may ask questions, conduct interviews, or conduct a walkaround to confirm that the exemption applies. If, at this point, they determine that the facility is either not covered or covered but exempted, then, after updating the RO, they shall document their

finding and end the inspection.

b. During the opening conference, CSHOs shall familiarize themselves with the establishment's emergency response procedures and emergency alarms.

c. CSHOs shall also request that the management representative(s) provide them with an overview of the processes/units at the facility, including block flow and/or process flow diagrams indicating chemicals and processes involved.

d. To understand the basics of the employer's processes and the possible catastrophic scenarios that could occur, the team should ask the management representative to explain worst-case catastrophic release scenarios that might occur and what controls are in place to prevent them from happening.

e. During the opening meeting, CSHOs should determine the nature of the PSM-covered process.

If the process is:	Then use:
Ammonia Refrigeration Only	Ammonia Refrigeration dynamic list – the first 10 questions PSM General dynamic list– the first 5 questions
Storage Only	PSM General dynamic list – all questions
Chemical Processing and all other categories not listed above	Chemical Process dynamic list - the first 10 questions PSM General dynamic list – the first 5 questions

Each dynamic list contains approximately 10-15 primary and 5 secondary questions. CSHOs will choose the appropriate number of primary questions according to the table above. Questions that are deemed not appropriate should be replaced with secondary questions from the appropriate list. CSHOs should use the secondary list

questions in the order that they are listed.

3. Documentation to be Requested -- General and Process-Related.

CSHOs shall request access to the documents listed below.

Compliance Guidance: The list below is not intended to limit the type and number of documents to be requested. The OSHA inspection team may request additional documents as necessary.

Some requests require the employer to provide a list of information. The intent of first requesting a list versus complete documentation is to limit the amount of documents that the employer may have to produce.

The following list represents documents typically compiled by employers with PSM-covered processes at their facilities. The PSM standard requires the employer to maintain some, but not all, of these documents. Therefore, the employer may not have all of these documents. Documents specifically required by an OSHA standard or regulation are identified (*). Documents identified (##) are documents that will be requested after the Selected Unit is determined. In some cases, documentation may have been produced by a consultant or contractor.

a. OSHA 300 logs for the previous three years for the employer and the process related contractors*.

b. All contract employee injury and illness logs as required by 1910.119(h)(2)(vi)*.

c. A list of all PSM-covered process/units in the complex.

d. A list of all units and the maximum intended inventories* of all chemicals (in pounds) in each of the listed units.

Compliance Guidance: 1910.119(d)(2)(i)(C) requires the employer to have process safety information (PSI) for the maximum intended inventories of chemicals that are part of their PSM-covered processes.

e. A summary description of the facility's PSM program.

f. Unit process flow diagrams*.

g. Piping and instrumentation diagrams (P&IDs) including legends*##.

h. Unit Plot plans*.

i. Unit Electrical classification diagrams*##.

j. Process narrative descriptions*.

k. Descriptions of safety systems (e.g., interlocks, detection or suppression systems)*##.

l. Design codes and standards employed for process*## and equipment*## in the Selected Unit (s).

m. A list of all workers (i.e., hourly and supervisory) presently involved in operating the Selected Units(s) including names, job titles, work shifts, start date in the unit, and the name of the person(s) to whom they report (their supervisor)##.

n. The initial process hazard analysis*(PHA) and the most recent update/redo or revalidation* for the Selected Unit (s); this includes PHA reports*, PHA worksheets*, actions to address findings and recommendations promptly*, written schedules for actions to be completed*, and documentation of findings and recommendations*##.

Compliance Guidance: Any PHA performed after May 25, 1987 that meets the requirements of 1910.119(e) may be claimed by the employer as the initial PHA for compliance purposes, see 1910.119(e)(1)(v).

o. Safe upper and lower operating limits for the Selected Unit(s)*##.

p. A list by title and unit of each PSM incident report*; all PSM incident reports for the selected unit*##.

4. PSM Overview.

Prior to beginning the initial walkaround inspections, the team shall request an explanation of the company's PSM programs including, but not limited to:

a. A briefing on the PSM program components and how the facility implements them;

b. Identification by name and position of personnel responsible for implementing the standard's various elements;

c. A description of company records used to verify compliance with standards; and

d. A review of the written summary description of the PSM program.

5. Personal Protective Equipment (PPE) and Camera/Video Use.

In addition to normal inspection protective equipment, CSHOs conducting these inspections shall be provided with flame-retardant coveralls for protection from flash fires.

a. CSHOs shall wear flame-retardant coveralls in all areas of the plant where there is potential for flash fires and as may be required by company policy.

   Clothing made of hazardous synthetic fabrics may melt, causing severe burns, and should not be worn underneath flame-retardant coveralls. All garments worn under flame-retardant coveralls shall be made of 100% cotton or other non-synthetic fibers.

b. Prior to the initial walkaround inspections, CSHOs must review the employer's procedures for PPE selection and allowable electronic equipment in the Selected Unit (s) and/or areas of the facility CSHOs will be inspecting. CSHOs shall ensure that these procedures and the associated PPE selection have been prepared in accord with the PSM standard as well as 1910, Subpart I, *Personal Protective Equipment*. The facility-required PPE and flame-retardant coveralls (where flash fires are possible) are the baseline PPE requirements for CSHOs conducting walkaround inspections.

   - If the facility requires a respirator, or in a CSHO's judgment, a respirator should be worn, then each CSHO must receive proper training and qualification prior to using their respirator.

   - For electrically classified areas, CSHOs shall ensure that cameras (still or video) are intrinsically safe.

     Note: CSHOs may use non-intrinsically safe cameras equipped with a telephoto lens from outside classified areas and/or still cameras without batteries or a flash.

     If the employer allows the use of non-intrinsically safe cameras in hazardous (classified) locations, CSHOs may use this type of equipment when: (1) the employer issues a hot work permit for the use of the camera; and (2) continuous combustible gas metering, which has been calibrated prior to use, is provided in the areas where the camera will be used.

   - CSHOs must ensure that all electronic devices such as cell phones, PDAs, etc., are turned off.

6. Initial Walkaround.

After the opening conference, the inspection may begin with a brief initial walkaround inspection of those portions of the facility within the scope of the PSM standard. During the initial walkaround CSHOs should:

a. look for differences between what was presented in the PSM overview discussion and actual conditions;

b. gather information to aid in the selection of the process unit(s) to be inspected;

c. obtain a basic overview of the facility's operations;

d. observe potential hazards including, but not limited to, pipe work at risk of impact, corroded or leaking equipment, unit or control room siting and trailer location, relief devices and atmospheric vents that discharge to atmosphere, and ongoing construction and maintenance activities;

e. solicit input from workers and their representatives and contract employees concerning potential PSM program deficiencies.

Compliance Guidance: Additional walkaround activity will be necessary after the Selected Unit(s) is identified.

7. Selection of Unit.

The Team Leader shall select a PSM-covered process or processes to evaluate for compliance with the standard. For large continuous processes, the Team Leader may select a portion of the covered process, for example, a unit operation within the covered process. The selected process or portion thereof shall be referred to as the Selected Unit. CSHOs may select more than one unit if they feel it is necessary to get a representative sample of the facility's covered processes based on the size and complexity of the facility. The selection should be based on the factors listed below, and shall be documented in the case file:

a. Nature (e.g., risk of releasing flammables, high toxicity substances present, high operating pressures and temperatures) and quantity of chemicals involved;

b. Incident investigation reports, near-miss investigation reports, emergency shutdown records, and other history;

c. Lead operator's input;

d. Age of the process unit;

e. Factors observed during the walkaround;

f. Worker representative input;

g. Number of workers present;

h. Current hot work, equipment replacement, inspection, test and repair records, or other maintenance activities;

i. Compliance audit records, including open and pending items;

j. List of contractors.

Compliance Guidance: It is not intended that the unit selection be a resource-intensive activity. The criteria listed above are intended to be used as a guide. The Team Leader should attempt to identify the most hazardous process using these criteria; however, he/she can use discretion in choosing the Selected Unit.

8. Inspection of Contractors.

If the facility is using contractors in PSM covered operations:

All contractors (including subcontractors) working on or adjacent to the Selected Unit shall be inspected. CSHOs shall use the applicable questions in the dynamic list when evaluating contract employer compliance.

If there are no contractors working on or adjacent to the Selected Unit throughout the course of the inspection, the Team Leader will choose an additional PSM-covered process where contractors are known to be working and inspect those contractors.

9. Compliance Guidelines.

Guidelines for assessing and verifying compliance with PSM standard provisions are provided in the dynamic list. When conducting PSM compliance evaluations of the Selected Unit:

a. CSHOs must use the guidance given in the dynamic list. The dynamic list-based evaluation of this NEP is a mandatory gap analysis formatted in a series of questions to facilitate the evaluation of various requirements of the PSM standard. Instructions for using the dynamic list are provided in Appendix A.

b. Expanded Inspection. If, during the course of the evaluation, the Team Leader determines that deficiencies outside of the selected unit

or dynamic list questions may exist in the employer's PSM compliance, he/she shall consult with the Area Director (AD) and may expand the inspection to other units or areas. CSHOs shall document the basis for this determination and include the supportive documentation in the case file.

c. Hazardous Conditions or Violations Not Addressed by Dynamic List. CSHOs may recommend citations for hazardous conditions or violations of OSHA standards or the General Duty Clause found during the inspection regardless of whether they are specifically addressed in this Notice.

10. Review Inspection History and Abatement.

During the course of the inspection, the CSHO shall review abatement for all PSM citations issued within the previous 6 years to determine whether the hazard still exists. If a hazard exists, the CSHO shall determine whether there has been a failure to abate in accordance with CPL 02-00-148 – *FOM,* and issue a notice for failure to abate as appropriate.

In cases where a follow-up inspection has been completed since the abatement was in place, it is not necessary for the CSHO to review the abatement.

11. Citations.

Citations for violations shall be issued in accord with CPL 02-00-148 – *FOM*. The following additional directions shall be used for citations of PSM violations:

a. The requirements of the PSM standard are intended to eliminate or mitigate catastrophic releases of HHC. The provisions of the standard present closely interrelated requirements, emphasizing the application of management controls when addressing the risks associated with handling or working near HHC.

b. Any violation of the PSM standard is a condition that could kill or seriously harm workers.

c. Violations of the PSM standard shall **not** normally be classified as "other-than-serious".

F. Program Evaluation.

This NEP will be evaluated using data collected from case files and follow-up site visit reports submitted by each AO, through the Region, to the Office of General

Industry Enforcement (GIE) in the DEP. After one year, the NEP will be evaluated to determine the effectiveness of this Instruction. After three years, the NEP will be evaluated to determine its effectiveness in enforcing OSHA standards.

The AO will submit the information listed below through OSHAPedia on its respective Region's Chemical NEP Inspection Information Page. The Region should report this information at least every six months.

Information to be provided in the AO reports includes:

1. A list of the facilities inspected including:

    a. The facility category as defined in XI.A.2.a;

    b. The facility NAICS code, process type, and covered chemical and quantity, or reason for exemption from PSM coverage;

2. A list of all inspections (including employer name, address, and NAICS code) that were closed because there was no PSM-covered process.

3. A list of any dynamic list questions that were difficult for CSHOs to use or inappropriate, and an explanation of why this was the case.

G. Outreach.

The OSHA Training Institute, in conjunction with the DEP and the Office of Public Affairs, will develop chemical plant PSM information and training materials. This information will be made available to the ROs for distribution to the AOs and Consultation Program offices. Each AO and RO is encouraged to develop outreach programs that will support its enforcement efforts. Suggested outreach products and activities include the following:

1. Letters and news releases announcing the implementation of this Notice.

2. Seminars on chemical plant process safety topics tailored for specific audiences, such as employers, worker groups, local trade unions, apprentice programs, equipment manufacturers, and material suppliers.

3. Working with OSHA's cooperative program participants, including Voluntary Protection Programs, Strategic Partnership, and Alliance Program participants, to share success stories and technical information concerning effective means of controlling and reducing or eliminating potential catastrophic releases of HHCs.

H. IMIS and OIS Coding Instructions.

1. The instructions that follow are for inspections under this NEP.

2. All enforcement activities--inspections, complaints, accidents, referrals, and compliance assistance (OSHA 55)--conducted under this NEP must be coded with the NEP code “CHEMNEP” entered in the appropriate NEP field/item # on the respective forms.

    a. All inspections of contractors initiated as a result of a Programmed inspection of the host employer will be identified as Program Related.

    b. For IMIS, the OSHA Form 1 for the contractor must indicate “CHEMNEP” in block 25d and the Optional Information must indicate in Item 42: Type = N; ID = 01; and Value = (the OSHA Form 1 inspection number of the host employer).

3. All consultation activities (Forms 20, 30, and Form 66) conducted in response to this NEP must include “CHEMNEP” in the National Emphasis code field on the forms.

Appendix A

CSHO Instructions for the Dynamic Lists

Background and Description. CSHOs must use the appropriate Dynamic List as described in Section XI.D.3 of this notice. The Dynamic Lists are found on the DEP intranet website, and contain a series of dynamic questions which will be periodically changed while this NEP notice is active.

This list-based evaluation is a gap analysis formatted in a series of questions that have been developed to assess and verify the employer's PSM compliance with specific issues such as design, fabrication, installation, start-up, operation, maintenance, change, controls (engineering and administrative), safe work practices, contractor safety, etc., at the facility by examining a Selected Unit.

CSHO Instructions. The questions are designed to elicit "Yes", "No", or "N/A" for determination of PSM compliance by CSHOs. CSHOs shall mark

- "Yes" when the employer has met the requirements of the question,
- "No" when the employer does not meet the requirements of the question, or
- "N/A" if the question is not applicable.

A determination of "No" for any question may indicate noncompliance if the employer does not have an acceptable alternative in place. Therefore, any "No" shall normally result in a citation for a violation of the indicated provisions provided that the other *prima facie* elements (a hazard exists, an OSHA standard applies, employer knowledge of the hazard, and worker exposure to the hazard) of a violation are established. Each question lists one or more possible citations. However, CSHOs are not limited to this list. Based on the fact finding, other citations for violations may be more appropriate. CSHOs shall thoroughly document each "No" determination in the case file.

Because of the interrelationship of the PSM elements, CSHOs may find that under some circumstances more than one provision of the standard may be applicable. The following excerpt from CPL 02-02-045 demonstrates the interrelationship of the PSM elements:

> "Interrelationship of Elements.
>
> An essential part of verifying program implementation is to audit the flow of information and activities among the elements. When information in one element is changed or when action takes place in one element that affects other elements, CSHOs shall review a sample of the related elements to see if the appropriate changes and follow-up actions have taken place.
>
> The following example demonstrates the interrelationship among the elements:

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

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

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

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

Given the catastrophic nature of the hazards associated with PSM, the interrelationship of the PSM elements work together to help ensure that if the employer is deficient in one PSM element, the other elements, if complied with, prevent or mitigate a catastrophic incident. Consequently, the PSM standard uses a one hazard-several abatement approach to ensure that PSM-related hazards are adequately controlled.

Abatement requirements include:

- management system/program requirements – e.g., the employer must develop mechanical integrity program procedures that include piping inspection procedures, 1910.119(j)(2), and

- specific employer action/task abatement requirements - e.g., the employer must inspect the piping, 1910.119(j)(4).

Therefore, to assure that all the employer's process safety management systems/elements are being fully implemented, CSHOs should consider citing all applicable violations. Grouping these violations may be appropriate, see CPL 02-00-148, *FOM, Chapter 4 Section X.*

In some cases, CSHOs may determine that the answer to a question is "No" because the employer uses other means to comply with the specific standards. In this case, the employer

must demonstrate that its performance meets the requirements of the standard.

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List #3 - General PSM Primary and Secondary Questions

Primary Questions

1. Has the employer maintained the two most recent compliance audit reports for the selected unit(s)?

   Compliance Guidance: Request the two most recent compliance audit reports for the selected unit. Look at the audit reports submitted to make sure they qualify as a compliance audit under 1910.119(o). (did the audits verify implementation not just the "paper" program) If the audit reports were not retained then 1910.119(o)(5);

   If the audit reports are deficient, then (o)(1)

2. Have all accidents (incidents) that occurred in the past year had investigations initiated within 48 hours of the accident occurrence?

   Compliance Guidance: (request near miss reports in addition to the "PSM" incidents. Should any of the near misses been investigated under PSM requirements?) During employee interview, identify accidents that occur during off shifts and determine if an (incident) investigation started within 48 hours. 1910.119(m)(2)

   If accidents or near misses qualified as incidents and were not investigated. 1910.119(m)(1)

3. Did the employer issue hot work permits for hot work operations conducted on or near the selected unit(s)?

   Compliance Guidance: Randomly select up to 3 completed hot work permits (if hot work is underway or if permits are retained under facility procedures). Review the facility hot work program and interview maintenance and operations personnel, to determine if:

   - hot work permits are being issued when necessary,
   - that the fire prevention and protection requirements of 29 CFR 1910.252(a) have been documented prior to beginning hot work operations,
   - that the date(s) on which hot work is performed is documented, and
   - that permits are kept on file at least until completion of the hot work operations.

   Note that employers are not required to retain permits once hot work is complete - active permits may not be available for review if no hot work is being performed at the time of the inspection.
   1910.119(k)(1); (k)(2)
   1910.252(a)

4. Does the employer update and revalidate the PHAs for the selected unit(s) by a team meeting the requirements of (e)(4) at least every 5 years?

   Compliance Guidance: (e)(4) requires that the PHA be performed by a team with expertise in engineering and process operations, and 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 specified PHA methodology used.
   1910.119(e)(4)

5. Did the employer adequately document that controls used as safety interlocks or safety shutdowns comply with RAGAGEP?

COMPLIANCE GUIDANCE:

Definitions:

Basic Process Control System (BPCS): the system which controls that basic process, such as a DCS, by performing the regulatory, sequencing, process interlocking, and diagnostic functions. While it does have protective functions, the primary purpose of the BPCS is regulation of day-to-day process operation. This system may contain interlocks designed to reduce the opportunity for mis-operation (Maggioli and Stike 1990).

Interlock: a system that detects out-of-limit (abnormal) condition or improper sequences and either halts further action or starts with corrective action (Maggioli and Stike 1990). Interlocks and shutdowns may reside in the BPCS, or may be implemented in separate Programmable Logic Controllers (PLCs), relays, or other means.

Guidance:
From P&IDs in the Selected Unit(s) select 3 interlocks or safety shutdown systems and determine if the safety interlock/.shutdown systems complies with the codes, standards, and RAGAGEP the employer has documented they used in the design and configuration of the equipment. Example issues (primarily when consequences could be catastrophic) could include reliance purely on operator intervention for time-critical safety interlocks or shutdowns, single measurement based safety interlocks or shutdowns without adequate testing or failure detection, poorly designed, out-of-service, or uncalibrated sensors or final control elements, or inappropriately bypassed or muted safety interlocks, shutdowns, or alarms.

Example RAGAGEP:
CCPS, "Guidelines for Safe Automation of Chemical Processes", New York, 1993
CCPS, "Guidelines for Engineering Design for Process Safety", New York, 1993 (Chapter 9)

Possible citations:
(d)(3)(i)(F) - if the employer did not document the codes or standards it employs for safety interlocks or safety shutdown systems.

(d)(3)(i)(H) - if the employer did not document safety systems, such as interlocks and shutdowns.

(d)(3)(ii) - if the employer did not document that controls, including interlocks and shutdowns, were in compliance with RAGAGEP.

(d)(3)(iii) - if the employer did not determine and document the existing controls, including interlocks and shutdowns which were designed and constructed in accordance with codes, standards, or practices that are no longer in general use, were designed, maintained, inspected and operating in a safe manner.

(e)(3)(iv) - if the PHA did not consider the consequences of failure of the engineering and administrative controls, such as interlocks and shutdowns.

6. Does the potential exist for inadvertent mixing of chemicals? If so, does the PSI pertaining to the hazards of the HHCs in the process, include the hazardous effects of inadvertent mixing of different materials?

Compliance Guidance: Inadvertent mixing can occur in many settings; through loading of bulk materials into the wrong storage tank; by the storage of totes or drums in a common area where spills can occur; in drains serving multiple locations; accidental mis-loading into mixers or reactors; or the use of inappropriate cleaning methods (such as using caustic to clean a PSM covered aluminum vessel).

MSDS's are acceptable sources of documentation of the hazards of inadvertent mixing IF they include the required information - often they do not.

It is good practice to maintain a compatibility matrix for covered processes, and this is an acceptable means of documenting potential mixing hazards.

If inadvertent mixing hazards exist they should be documented and addressed in the PHA. Appropriate controls should be in place to reduce the likelihood of hazardous inadvertent mixing, such as segregation of materials, key locks, different hose connector designs, signage, training, etc. (d)(1)(vii)

(e)(3)(i) or (iv) - if possible inadvertent mixing not addressed in the PHA

Appropriate sections of (f) and (g) - if procedures fail to address the hazard or if employees are not trained on the procedures.

7. Has the employer established and implemented an emergency action plan for the entire plant in accordance with the provisions of 29 CFR 1910.38(a), including procedures for handling small releases?

Compliance Guidance: Review the site emergency action plan and interview relevant employees.

Does the employer effectively differentiate between small releases that can be safely handled by employees and those releases requiring the use of outside resources? If the employer claims to not respond to emergencies and to rely on outside responders, such as local fire departments, has the employer adequately communicated with such responders? Has the employer established procedures or practices requiring or assuming employee actions that would subject the site to the requirements of 1910.120(a), (p), and (q)? (n)

1910.38(a)

1910.120(a), (p), (q)

8. Has the employer compiled information pertaining to relief system design and design basis?

Compliance Guidance:
The employer must document both the design (the equipment and physical configuration of the relief system, including relief devices and associated piping, instrumentation, and effluent treatment equipment, such as knock-out drums, scrubbers, and flares) and the design basis (which includes the selection and evaluation of relief scenarios, selection of the type of relief and effluent handling devices to use, and the selection of appropriate sizing methodologies).

The design is often documented in relief device data sheets, isometric drawings, and similar configuration-specific documents. The design basis is usually documented in reports and may include extensive hand or computer based calculations and summary tables comparing various overpressure scenarios.

For a randomly selected sample of at least 5 relief systems, determine the following:

- Are relief system design and design basis documents readily available and retrievable for a randomly selected sample of relief systems?
- Do relief design and design basis documents adequately document the relief systems? For example, API 521, 4.4 has a useful list of minimum recommended information for documenting relief system design and design basis.
- Is relief system inlet and discharge piping adequately documented by dimensioned isometric drawings or by detailed descriptions and lists of piping components? (This information is needed to calculate inlet pressure drop and outlet back pressure and is often missing.)
- Example RAGAGEP for relief systems documentation could include API Standard 520 Parts I and II, Sizing, Selection, and Installation of Pressure-relieving Devices in Refineries; API Standard 521 Pressure-relieving and Depressuring Systems; CCPS Guidelines for Pressure Relief and Effluent Handling Systems; DIERS Emergency Relief System Design Using DIERS Technology; ASME B&PV Code Appendix M and UG 125-140.

Region and National Office technical support is available for complex relief system issues. (d)(3)(i)(D)

9. Do operating procedures address the elements required by paragraph (f)?

Compliance Guidance: Review a random sampling of 5 operating procedures for the covered process and determine if all of the elements required in (f)(1)are adequately addressed, including:

- (f)(1)(i) Steps for operating phases; initial startup, normal operations, temporary operations, emergency shutdown including the conditions under which emergency shutdown is required and the assignment of shutdown responsibility to qualified operators often not included)
- (f)(1)(ii) Consequences of Deviation and steps required to correct or avoid deviation (a separate CoD document, including actions to take, is acceptable IF it is readily accessible to operators).
- (f)(1)(iii) Safety and health considerations, including chemical properties & hazards, precautions to prevent exposure including controls & PPE, control measures following exposure, quality control for raw materials, and control of HHC inventories.
- (f)(1)(iv) Safety systems and their functions (f)(1)(i-iv)

10. Are inspections and tests performed, in accordance with RAGAGEP, at appropriate frequencies, and documented?

Compliance Guidance:
Review inspection documents for 3-5 pieces of each type of equipment included in (j)(1) to determine if inspections and tests (I&T) have been performed in accordance with the selected RAGAGEP.

Consider citing:

- (j)(4)(i) if I&T have not been performed,
- (j)(4)(ii) if I&T have not been performed per RAGAGEP,
- (j)(4)(iii) If I&T not performed at intervals consistent with manufactures' recommendations and good engineering practices, or I&T intervals not adjusted as

required by experience, e.g., relief valves found non-operational or fouled not inspected more frequently,

- (j)(4)(iv) if I&T documentation does not contain the information required (date, name, equipment identifier, I&T description & results) Example RAGAGEP could include API 510, API 570, API 653, API 580, NBIC (National Board Inspection Code) (j)(4)(i) - if I&T not performed
- (j)(4)(ii) - if I&T not in accordance with RAGAGEP
- (j)(4)(iii) - if I&T intervals not appropriate or adjusted when needed
- (j)(4)(iv) - if I&T not properly documented

Other possible elements could include:

- (j)(2) - if employer has not established and implemented written procedures for inspection, testing, evaluation, and repair of process equipment
- (j)(5) - if employer fails to correct deficiencies identified by I&T activities.

Secondary Questions

1. Are fill-in operators appropriately trained before being assigned to operate a process?

   Compliance Guidance: Check employee schedules during employee vacation periods, absences for illness, and holidays if the facility runs 24/7 to determine who was working for regularly assigned operators.
   Determine what training the employer requires for operators to work in specific positions (such as A Operator etc). Cross check the fill in operator's training records to determine if the operator was qualified prior to the assignment.
   Check the training records of new or non-regularity scheduled employees to determine if their training was complete prior to assignment. 1910.119(g)(1)

2. Has the employer assured that Inspection and Test (I&T) results are reviewed by competent personnel, rejectable indications (e.g., thin spots, cracks, out-of-calibration instruments, poorly functioning relief valves) are evaluated, and equipment deficiencies are documented and corrected before further use or in a safe and timely manner when necessary means are taken to assure safe operation?

   Compliance Guidance: Review inspection documents for 3-5 pieces of each type of equipment included in (j)(1) to determine if rejectable indications have been appropriately reviewed and evaluated and deficiencies corrected.

   Repairs must follow appropriate RAGAGEP or good engineering practices.

   Inspection intervals must be reviewed and adjusted appropriately based on I&T results.

   Example RAGAGEP could include API 653, API 579, ASME B&PV Code, ASME 31.X series. (j)(5)

   Consider citing under (l) - if MOC not used for implementing "necessary means" for continued safe operation.

   Consider citing (j)(4)(iii) - if I&T is not performed more frequently when previous experience indicates that this is necessary, e.g., if piping inspection intervals are not shortened as retirement thickness is approached.

3. Does the employer review operating procedures as often as necessary and annually certify that the operating procedures are current and accurate?

   Compliance Guidance: (f) requires that procedures be certified annually (in writing and with signature), and the review process needs to support this certification.

   MOC (l) requires that modification to operating procedures be addressed prior to any covered changes. (f)(3)

   (l)(2)(iii) - if procedures not updated as part of MOC

4. Does the employer update and revalidate the PHAs for the selected unit(s) at least every 5 years?

   Compliance Guidance: Determine the completion dates for all PHA's performed in the selected unit(s). Evidence of a proper PHA revalidation includes, but is not limited to, consideration of incidents (check 5 incidents) that have occurred, MOCs (check 5-10 MOCs) that have been performed since the previous PHA, and that all required elements of the PHA have been considered (e.g., hazards, consequences of failures, facility siting, human factors, and evaluation of a range of safety and health effects)?

   Available reference: CCPS, Revalidating Process Hazard Analyses, 2001. 1910.119(e)(6)

5. Does the employer assure that maintenance materials, spare parts, and equipment are suitable for the process application for which they will be used?

   Compliance Guidance: Control over spare parts can be critical for many processes. Review the spare parts system for the selected process, including interviews with maintenance personnel.

   Does the employer adequately separate and label process specific materials and parts such as gaskets, fittings, flexible hoses, valves, and O-rings?

   Are incoming materials checked to ensure that the bill of lading matches the order specifications?

   Is restocking of unused maintenance parts such as gaskets adequately controlled (e.g., are parts appropriately labeled and is restocking performed in a controlled manner)?

   Is access to parts and materials adequately controlled to prevent the installation of incorrect materials in the process? On night shifts, weekends and holidays? (j)(6)(iii)

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List #3 - Chemical Processing Primary and Secondary Questions

Primary Questions

1. Are there written procedures for controlling situations where safety mechanisms (operational controls, interlocks, etc.) might be overridden?

   Compliance Guidance: Request policies and/or procedures for overriding or by-passing equipment at the facility. 1910.119(f)(1); (j)(2); (d)(2)(i)(E); (f)(1)(ii)(A); (e)(1);(e)(3)(iii); (e)(3)(iv); (l)(1)

   If operators and/or instrument technicians override or by-pass equipment in the Selected Unit(s), is it done per the established procedure?

   Compliance Guidance: Interview process operators and instrument technicians to determine if equipment related to the Selected Unit(s) is by-passed or overridden.

   If operators or instrument technicians do override or by-pass equipment, request the equipment by-pass procedure used by the employer. 1910.119(f)(1); (j)(2)

   If employer established an MOC for the by-pass, ensure that the MOC met the requirements of 1910.119(l).

2. Does the PSI include definable criteria (acceptable limits) for continued service/removal from service criteria for rotating equipment (pumps, compressors and turbines)?

   Compliance Guidance: To determine if the PSI includes information on definable criteria (acceptable limits) for continued service/removal from service criteria for rotating equipment, evaluate the employer's mechanical integrity program procedures, manufacturers' recommendations, and other pertinent PSI for rotating equipment. 1910.119(d)

3. Are all pressure vessels protected by a relief device designed for overpressure protection scenarios as defined by a RAGAGEP?

   Compliance Guidance: Request a list of all pressure vessels in the selected unit (This list is not specifically required by the standard, but most employers will be willing to provide it in order to facilitate a quicker inspection). During the walk-around, CSHOs should check that pressure vessels observed in the unit are on the list.

   Select 5-10 pressures vessels in the selected unit. Request PSI for all relief devices associated with these vessels (1910.119(d)(3)(i)(D)). CCPS, Guidelines for Engineering Design for Process Safety (1993), an example RAGAGEP states, "The designer of overpressure protections systems must consider all scenarios that constitute a hazard under the prevailing conditions and evaluate them in terms of the pressure generated and/or the rates at which the fluids must be relieved. The scenarios under consideration may cause a release from a single piece of equipment or from multiple failures, and the probability of occurrence of multiple events leading to relief should be considered in the design. The "(following)" scenarios leading to overpressure are discussed...:

   - Fire
   - Blocked outlet

- Operational failure
- Equipment failure
- Process upset, including runaway reaction

Review the design basis documented in the PSI for evidence that these scenarios were considered during design. (d)(3)(ii) - If the relief device design does not follow RAGAGEP

(d)(3)(i)(D) - If the relief device design or design basis is not documented

(d)(3)(i)(F) - If the design code or standard employed for the relief design is not documented.

Other example RAGAGEPs could include API 520, API 521, ISO 4126, and CCPS Guidelines for Pressure Relief and Effluent Handling Systems.

4. Did the PHA include an analysis of utility systems and their effect on the potential release of an HHC?

Compliance Guidance: PSM coverage of utilities is discussed in a January 31, 2008 Letter to Howard J. Feldman, "...It is OSHA's long-standing position that utility systems are part of the PSM-covered process when employers use them to control/prevent and mitigate catastrophic releases of HHC.

A process is defined in 29 CFR 1910.119(b) as any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or a combination of these activities (emphasis added). In the preamble to the final rule, OSHA noted, specifically, that the standard, as written, reflects the intent of the Clean Air Act Amendments, which requires the standard to be designed to protect employees from hazards associated with accidental releases of highly hazardous chemicals in the workplace. 57 FR 6356, 6372 (February 24, 1992). As such, the proper safe functioning of all aspects of a process, whether they contain HHC or not, are important for the prevention and mitigation of catastrophic releases of HHC, due to their direct involvement in the overall functioning of the process." (e)(3)(i)

5. Did the employer adequately document that controls used as safety interlock systems (SIS) comply with RAGAGEP?

Compliance Guidance: CCPS, "Guidelines for Engineering Design for Process Safety" defines the following:

Basic Process Control System (BPCS): the system which controls that basic process, such as a DCS, by performing the regulatory, sequencing, process interlocking, and diagnostic functions. While it does have protective functions, the primary purpose of the BPCS is regulation of day-to-day process operation. This system may contain interlocks designed to reduce the opportunity for mis-operation (Maggioli and Stike 1990). Interlock: a system that detects out-of-limit (abnormal) condition or improper sequences and either halts further action or starts with corrective action (Maggioli and Stike 1990). Safety Interlock System (SIS): same as Interlock, except a failure to control an out-of-limit condition can cause personnel injury, property damage or unacceptable environmental contamination; a system that can be separate from the BPCS or can be integrated and redundant with the BPCS. The SIS monitors the process for prescribed abnormal conditions and takes action to alleviate or mitigate the condition. This system is sometimes called the Emergency Shutdown System. From the operating procedures and the PHA, select 5 controls that are functioning as SIS and request PSI for these controls. Example RAGAGEP's for SIS include

ANSI/ISA 84.01-1996, "Application of Safety Instrumented Systems for the Process Industries". Additional information on ANSI/ISA 84.01-1996 can be found in the March 23, 2000 OSHA Letter to Lois Ferson. Additional information regarding SIS can be found in CCPS, "Guidelines for Safe Automation of Chemical Processes". (d)(3)(i)(H) - if the employer did not document safety systems

(d)(3)(ii) - if the employer did not document that controls were in compliance with RAGAGEP

(d)(3)(iii) - if the employer did not determine and document the existing controls were designed, maintained, inspected and operating in a safe manner

(e)(3)(iv) - if the PHA did not consider the consequences of failure of the engineering and administrative controls

6. Did the PHA address human factors? Is there evidence that the methods used to analyze human factors identify error-likely situations?

Compliance Guidance: During the selected unit walk around and employee interviews, look for the following error-likely situations. If CSHOs observe any of these error-likely situations, determine whether they were identified during the PHA, and whether the safeguards listed have significantly reduced the hazard:

Is there a procedure for shift turnover and do operators follow it? Inadequate shift turnover was causally linked to both the 1998 Piper Alpha Explosion and the 2005 BP Texas City Explosion. Interview operators and shift supervisors to determine how exchange information during a turnaround. If there is a procedure, is it followed?

CCPS, "Guidelines for Safe Process Operations and Maintenance", an example RAGAGEP, recommends that the following be communicated during shift change.

The status of the plant, covering all aspects of operations and maintenance, should be communicated to the incoming shift. These include:

- Current state of the unit, temporary operations, existing abnormal situations, maintenance in progress.
- All process upsets or excursions that occurred during the departing shift should be discusses.
- Any corrective action taken should be described.
- Communication should occur about maintenance work permits in progress.
- The maintenance work team should transfer accountability about the work to the incoming maintenance work team.
- Maintenance needs that should be addressed by the incoming shift should be communicated.
- Any safety interlocks out of service, the reason for their being out of service, and the maintenance status of the interlocks should be addressed. Also, a description of any special measures needed because the safety interlocks are out of service should be given.
- Any incidents or events that occurred during the shift should be communicated.
- Any problems with instrumentation, controls, or utilities should be communicated.

Has the employer considered what may happen if an employee does not respond to a critical alarm?

Review operating procedures and the P&IDs for the selected unit. Select 5 alarms that appear critical to safety. Interview operators to determine what may happen if an operator does not

respond to one of these alarms.

Has the employer conducted emergency drills? Drills help employees to understand that hazards are real, and condition them to respond in an appropriate way. CCPS, "Guidelines for Technical Planning for On-site Emergencies", an example RAGAGEP, recommends that employers conduct a full scale emergency drill at least annually for each process.

Do operators have a reliable and convenient way to communicate with each other?

The CSB identified inability to communicate as a factor in the 2004 Formosa Illiopolis Explosion - operators did not carry radios, and had no way to communicate with others who had critical process information. With no easy way to check relevant information, the operator made the wrong decision about the status of a reactor.

Are there any controls in place to prevent an operator from making a data entry error?

Interview control operator and determine what would happen if the operator made a data entry error, for example, entering 100% valve output instead of 10%. (e)(3)(vi)

7. Does the employer ensure that employees and/or contractors performing MI inspections and tests have the procedures, training, and experience needed to perform their work?

Compliance Guidance Determine if the employer has written procedures for qualifying personnel for I&T activities and specific non-destructive examination (NDE) procedures for the NDE methods used at the facility.

Employer or contractor personnel performing inspections and tests must be capable of performing their assigned tasks. Review the employer's mechanical integrity training and qualification program, including the records of 3-5 personnel with primary inspection and test responsibilities (if available) to determine if they have meet the RAGAGEP requirements for education, training, and experience.

Conduct follow-up interviews as appropriate to determine if the education, training, and experience of I&T personnel at the facility is consistent with RAGAGEP.

If contractors are utilized for some or all I&T at the facility, determine of the employer requests documentation of I&T personnel qualifications. If not, consider follow-up with the contractor to determine if their personnel are appropriately qualified for the visual inspections, non-destructive examinations, and testing they perform at the employer's facility.

Example RAGAGEP could include ASNT SNT-TC-1A (j)(2) - if written procedures for qualification of I&T personnel and for NDE methods not established and implemented. For piping inspections where the employer selects API 570 as their RAGAGEP, or vessel inspections where the employer selects API 510 as their RAGAGEP, the qualification requirements of these documents would apply.

(j)(3) - if training of personnel conducting I&T activities is not adequate

8. Has the employer compiled information pertaining to ventilation system design?

Compliance Guidance: Select 2-3 indoor areas where HHCs are processed and request ventilation system design information for the area. Also request the electrical classification diagram for the area.

During the walk around, be alert for local ventilation systems, such as wall mounted fans, elephant trunks, or slot "hoods" possibly used to control flammable vapors or operator exposure to HHC vapors or fumes. Are the ventilation systems operable and operating? Has the employer documented inspections of the ventilation equipment and tests to assure that design air flows are being achieved?

Through interviews, determine if and when ventilation is reduced or turned off.

Consider a citation if the area is electrically classified or there is potential employee exposure, but ventilation system design documentation is missing or inadequate.

Example RAGAGEP could include NFPA 497, Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas, 2004 Edition; and Industrial Ventilation: A Manual of Recommended Practice, 25th Edition, ACGIH (d)(3)(i)(E) - Other possible citations could include (d)(3)(i)(C) if electrical classification information is not documented; NFPA 496 standard for Purged Positive pressure Enclosures if these are used in lieu of explosion proof components and wiring.

(f)(1)(iii)(B) - if operating procedures or practices inappropriately reduce or turn off ventilation;

(e)(3)(i) or (iv) - if lack of adequate ventilation was not addressed in the PHA;

(j)(2), (j)(4), or (j)(5) - if ventilation systems are not tested, inspected, or maintained to operate within their design limits.

9. Does the employer perform inspections and tests (I&T) on relief and vent systems and associated devices?

Compliance Guidance: Are reliefs and vent systems periodically inspected and tested to ensure that they are functional?

Does the employer conduct periodic external visual examinations documenting that:

- The proper device is in place?
- The installation is correct?
- ID tag is in place and legible?
- Block valves are in the correct position and tamper seals or chain locks are in place as documented in the PSI?
- There is no leakage evident?
- Discharge is to a safe location?
- Bolting is in good condition?
- External surfaces in good condition (not fouled or corroded)?
- Relief valves are checked for leakage and vibration after known operation?
- Device condition is documented by an acceptable means, such as dated, filled out, and signed check lists?
- Relief valve bonnet vents are in the appropriate condition (open for bellows valves, sealed for conventional valves)?
- Rupture discs are free of corrosion and fouling?
- Unacceptable conditions are described and forwarded to responsible personnel for corrective action?

Does the employer perform periodic functional testing documenting that:

- Inlet and outlet piping, including flanges and bolting, is in good condition, adequately supported, and not corroded or fouled (relief valves are very sensitive to inlet and outlet piping fouling, as it dramatically increases inlet and outlet pressure drops, adversely affecting relief valve stability and capacity)?
- The device is in good condition when removed, and is not fouled or corroded?
- The functionality and set point of valves is determined and documented prior to reconditioning?
- Replacement valves placed into are replacement-in-kind or are subject to MOC review under paragraph (l) of 1910.119?
- Rupture discs are periodically replaced rather than run to failure and their condition documented at the time of replacement for signs of fouling, corrosion, leakage, or other unacceptable conditions?
- Unacceptable conditions are described and forwarded to responsible personnel for corrective action, including adjustment of I &T frequencies as needed based on operating experience and I&T findings?

I &T reports must include the date of the inspection or test, the name of the person performing the I &T, the serial number or other identifier of the equipment being inspected or tested, and the I&T results.

Example RAGAGEP could include API 576 Inspection of Pressure Relieving Devices; NBIC NB-23 National Board Inspection Code (Appendix E), API 520 Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries; CCPS Guidelines for Pressure Relief and Effluent Handling Systems

(j)(4)(i) - if I&T is not performed

(j)(4)(ii) - if I&T not in accordance with RAGAGEP

(j)(4)(iii) - if I&T frequencies not in accordance with (IAW) manufacturer's recommendations and good engineering practices, or if I&T is not performed more frequently if operating experience shows this to be necessary

(j)(4)(iv) - if I&T not adequately documented

10. Does the PSI include a list of maintenance valves (e.g., isolation valve upstream and/or downstream from a relief valve, isolation valves which could affect other safety critical equipment which are required to be CAR sealed or locked open to assure critical equipment is available during operations?

Compliance Guidance: An example RAGAGEP related to car seals/mechanical locking devices is API 521, "Guide for Pressure-Relieving and Depressuring System", (1997) states, "If closure of an outlet block valve can result in overpressure, a pressure relief device is required unless administrative procedures to control valve closure, such as car seals or locks, are in place."

An example RAGAGEP for intervening stop valves (maintenance valves) on relief lines is the ASME "Boiler and Pressure Vessel Code (BPVC), Division 1", Section UG-135(d) and Appendix M. An example RAGAGEP for isolation/maintenance valves in relief discharge piping is "API Recommended Practice 520, Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries, Part II - Installation"; 5th Ed. (2003). Section 5.6 states that, "Isolation valves located in the discharge piping system shall be in accordance with the guidelines provided in Section 6."

Section 6 then makes reference to the requirements of the ASME BPVC UG-135(b) and Appendix M requirements for isolation valves in relief lines. Section 6 also requires that:

- valves have the capability of being locked or car sealed open;
- administrative controls shall be in place that will prohibit the inappropriate closing of isolation valves;
- administrative controls for the opening and closing of the isolation valves be done by an authorized person;
- an updated list be kept of all isolation valves located in pressure-relief system piping which could isolate pressure-relief valves;
- documentation of the required position and reason for the lock or seal must be provided; and
- periodic inspections of isolation valves located in pressure-relief system piping should be made to verify the position of isolation valves and the condition of the locking or sealing device.

CCPS, "Guidelines for Hazard Evaluation Procedures", 2nd Ed. (1992), an example RAGAGEP for conducting PHA's, contains a list of supplemental questions for hazard evaluations (a.k.a. PHAs) to help identify potential hazards (Appendix B). There is a question on this list (A.8., pg. 405) related to the control of isolation/maintenance valves in relief discharge. 1910.119(d)(3)(ii)

Secondary Questions

1. If the employer's process includes chemical reactions, have they fully compiled and documented reactivity data?

   Compliance Guidance: Request selected unit PSI related to technology of the process (1910.119(d)(2)) and reactivity data (1910.119(d)(1)(iv)). Review the data to ensure that the employer has documented the reactivity hazards.

   CCPS, "Essential Practices for Managing Chemical Reactivity Hazards" (2003), an example RAGAGEP, states, "To adequately manage chemical reactivity hazards, you must:

   - Know if you have the potential for uncontrolled reaction(s) to take place within your facility.
   - Know how such reactions might be initiated (e.g., heat, contamination, inadvertent mixing, impact, friction, electrical short, lightning).
   - Know how to recognize when an uncontrolled reaction is taking place.
   - Know what the consequences would be if such a reaction took place (e.g., toxic gas release, fire, explosion).
   - Know what safeguards are (or need to be) in place to prevent uncontrolled reactions from taking place, including how to avoid them altogether (inherently safer design/operations) and how to control them within safe limits (automatic controls, procedures, etc.).
   - Know how to respond properly if an uncontrolled reaction takes place (including operator actions, emergency response plans, community alerting plans, etc.)."
     (d)(1)(iv)

2. Does the employer have PSI for rotating equipment (pumps and compressors) specifying basic information such as metallurgy, horsepower, suction and discharge pressure, inlet and outlet piping sizes, type of fluid raring, deadhead pressure, etc.?

Compliance Guidance: Identify one product pump and one product compressor in the Selected Unit(s). Obtain the PSI for this equipment and determine if the PSI is adequate.

Note: If there are no product compressors in the Selected Unit(s), choose two product pumps to evaluate for adequate PSI. Start by requesting the "equipment files" for the specific pumps and/or compressors. An example RAGAGEP for process equipment files is CCPS "Guidelines for Mechanical Integrity Systems" (2006); Table 4-1, "Typical Equipment File Information for Selected Types of Equipment", lists typical information found in equipment files for rotating equipment

"Design and Construction information
Equipment specification
Materials of construction
Seal configuration and data
Service history
Fluids handled
Type of lubricant
Operating parameters
Temperature/pressure excursions
Failures and repair history
Vendor-supplied information
Equipment manuals
Manufacturer's data report (e.g., API 610 form)
Performance testing data (e.g., pump curves)
Recommended spare parts list
As-built drawing"
1910.119(d); (d)(3)(ii); (d)(3)(i)(A)

3. Did the employer document the design codes and standards for emergency relief effluent handling systems, and did they document compliance with RAGAGEP?

Compliance Guidance: CCPS, "Guidelines for Pressure Relief and Effluent Handling Systems", an example RAGAGEP, states that the following should be considered when designing systems to handle effluent from emergency relief systems:

"Maximum quantity that may be released to the atmosphere safely, or maximum safe ground-level concentration, based on Toxic or other health effects that might result from exposure to materials discharged. Consider possible exposure of plant personnel, people in nearby communities or using public transportation and waterways, and passers-by outside the plant fence line. Potential for fire and explosion which might result from discharge of flammable materials. Potential for creating a public nuisance by causing odors, corrosion, or deposition of solid or liquid residues on neighboring communities. Possible harm to the environment. State of the effluent: gas, liquid, multiphase vapor-liquid, or vapor-liquid-solid. Materials that can form stable foams or that have high viscosity are difficult to handle in the equipment usually employed in pressure relief systems. Weather conditions, including: prevailing wind directions, frequencies, and velocities; and summer and winter temperature extremes. Plant layout, including locations of areas of high personnel concentrations such as offices, laboratories, shops, and control rooms. Also, the location and flow direction of storm water drainage and sewer systems (liquids dumped into these systems during an emergency could create a hazard if directed toward areas where people might be exposed). Overall geography and topography, including locations of mountains, hills, nearby buildings, highways and roads, residential communities, schools, health care facilities, airports, railroads, and potential ignition sources. Chemical and physical properties of materials involved, particularly any tendency to freeze, foul, or plug process equipment and piping. Capital and continuing operating costs. Size of the facility and constraints imposed by

available space." The same reference also states, "The process technologies and equipment ultimately selected must meet the requirements of all credible release scenarios. Consider the full range of. All credible scenarios (not just the design basis scenario for the relief device) in evaluating the range of conditions and vapor-liquid flows the system must handle..."

For the pressure vessels selected in question 1 from this list request PSI for equipment used to collect effluent from pressure relief systems associated with these pressure vessels.

(d)(2)(i)(E) - if the employer did not document an evaluation of the consequences of deviations, including those affecting the safety and health of employees

(d)(3)(i)(D) - if the employer did not document that relief system design and design basis

(d)(3)(i)(F) - if the employer did not document the design codes and standards employed for relief valves

(d)(3)(ii) - if the employer did not document that equipment complies with RAGAGEP

(d)(3)(iii) - if the employer did not determine and document that existing relief valves were designed, maintained, inspected, tested, and operating in a safe manner

4. Are process vessels operated within limits specified by the RAGAGEP documented in the PSI?

Compliance Guidance: Select 5 different pressure vessels from within the selected unit. Request PSI, inspection and test procedures, and inspection and test records for these vessels.

CCPS, "Guidelines for Mechanical Integrity Systems", Table 9-13 contains examples of inspection and testing activities for pressure vessels including references to API 510, an example RAGAGEP.

Review the inspection and test procedure, ensure that the most recent testing and inspection for the five vessels follows RAGAGEP, and ensure that the vessels are not operating outside the RAGAGEP specified in the PSI.

(j)(5) - if vessels are operated outside acceptable limits set in RAGAGEP specified in PSI
(j)(4)(i) - if inspections and testing has not completed
(j)(4)(ii) - if inspection and test procedures are not consistent with RAGAGEP
(j)(4)(iii) - if the frequency of inspection and test is not consistent with RAGAGEP
(j)(4)(iv) - if inspection and test is not properly documented

5. Do piping inspection procedures address the calibration of non-destructive test equipment prior to conducting inspections?

Compliance Guidance: One example RAGAGEP, API 570 (Second Edition), Piping Inspection Code states in 4.3.1 that piping inspection systems and procedures shall include, "Controls necessary so that all inspection measurement and test equipment are properly maintained and calibrated". 190.119(j)(2); (j)(4)(ii)

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List #3 - Ammonia Refrigeration Primary and Secondary Questions

Primary Questions

1. Select at least one ammonia pump and one ammonia compressor. Has the employer established and implemented written mechanical integrity (MI) program procedures for the inspection, testing and preventative maintenance (ITPM) for each selected pump and compressor?

   Compliance Guidance: The ITPM program procedure must provide adequate detail/instruction for the user to both ensure the user's personnel safety while performing the procedure and the mechanical integrity of the equipment/process that is subject to the procedure. (j)(2). IIAR Bulletin #110 - 1993, Guidelines for Start-up, Inspection and Maintenance of Ammonia Mechanical Refrigerating Systems provides an example RAGAGEP for examining compressors 6.3 and 6.5 for pumps.

2. If ITPM program procedures exist for the compressors and pumps isted in Question #1, then do they include the frequency of ITPM activities?

   Also, do these procedures address when the frequency of inspections need to be increased (e.g. evidence of mechanical degradation, excessive vibration, etc.)?

   Compliance Guidance: If the ITPM program procedures do not address when the frequency of inspections need to be increased, then the employer must be able to demonstrate proactively how they manage this situation when and if it arises.

   Do the last 5 ITPM activities for the selected ammonia pump(s) and compressor(s) meet the inspection frequency listed in their associated MI program procedure?

   Compliance Guidance: Request documentation which shows the last 5 ITPM activities for the selected ammonia pump(s) and compressor(s) and from these documents determine if the ITPM activities meet the frequencies listed in their associated MI ITPM program procedures.

   If the requested documents do not provide enough information to determine if the ITPM activities are being conducted per their listed frequencies, additional ITPM activity documents may need to be requested. (j)(2) - if the MI program procedure does not list the inspection frequencies for the selected pump(s) and compressor(s).

   (j)(2) - if the MI program procedure does not establish criteria to determine when ITPM activity frequency must increase.

   (j)(4)(iii) - if the pump(s) or compressor(s) are not inspected per the frequency established in their associated MI ITPM program procedure(s).

   (j)(4)(iv) - if each inspection and test document does not include all the information required: date, name of the inspector/tester, equipment identifier, description of the inspection/test, and the results of the inspection/test.

3. Does the process safety information include the maximum intended inventory of the process/Selected Unit(s)?

Compliance Guidance: Determine how the employer established the maximum intended inventory of the process, e.g., 1) calculation based on the design of the process (i.e. volume of equipment and operating parameters); 2) determining the total quantity of ammonia charged to the system from tank trucks and cylinders, and then subtracting any ammonia losses which have occurred due to leaks and purges; or 3) determining the amount of ammonia contained in the vessels and piping after the system hase been pumped-down.

If the employer determines the maximum intended inventory by calculation, is the calculation reasonable? If the process has vessels that can exceed the assumptions used in the calculations, are there controls to limit the amount of ammonia to that assumed in the calculation? For example, if the maximum intended inventory is based on a calculation that assumes the high pressure receiver contains a maximum amount of liquid ammonia equal to 40% of its volume, are there level controls/instrumentation that limit the amount of ammonia in the vessel?

(d)(2)(i)(C) if the PSI does not include the maximum intended inventory of the process;

(e)(3)(i) if the PHA does not address the hazard of exceeding the high volume/level limit established for specified equipment;

(e)(3)(iii) if the PHA does not address the engineering and/or administrative controls used to assure that the volume/level in specific equipment does not exceed specified limits (e.g. the PHA does not include information on level control instrumentation to assure that the liquid level in the high pressure receiver does not exceed 40% of its volume as established by the employer's PSI;

(e)(3)(iv) if the PHA does not address the consequence of failure of engineering and/or administrative controls used to control the volume/level established for specific equipment; and/or

(f)(1)(i) if the operating procedures do not include operating limits for equipment in the process.

4. Is there a documented design for the emergency and normal ventilation systems for the machine room(s) associated with the Selected Unit(s)?

Compliance Guidance: The emergency ventilation design must include the design basis for the equipment system including the design event which lists the maximum rate that the ventilation system must exhaust (e.g., cubic feet per minute (cfm)). (d)(3)(i)(E)

5. Are ammonia machine rooms ventilated to the outside?

Compliance Guidance: An example RAGAGEP related to exhausting/ventilation of ammonia from machine rooms is ANSI/ASHRAE Standard 15, Safety Standard for Refrigeration System - 2004, Section 8.11., "Machinery rooms shall be vented to the outdoors, utilizing mechanical ventilation..." (d)(3)(ii) - if the employer did not document that their machine room's mechanical ventilation system complied with RAGAGEP when the ventilation discharged to an unsafe location - indoors.

(e)(1) - if the PHA did not identify, evaluate or control the hazard of an ammonia release from ammonia refrigeration equipment inside a machine room when the ventilation was not designed to discharged to a safe location - outdoors.

(e)(3)(i) - if the PHA did not address the hazards of venting ammonia releases indoors.

6. Do the employer's MI program procedures address how the employer will inspect insulated ammonia vessels and piping?

Compliance Guidance: The information provided by the employer' MI program procedure must be of sufficient detail to provide the employers' inspectors (including contract inspectors)instruction on how to conduct inspections and tests of insulated equipment to assure their mechanical integrity.

The mechanical integrity procedure for insulated ammonia vessels and piping would not be sufficient if it simply references or incorporates an industry document,(e.g., IIAR Bulletin #110 - 1993, Guidelines for Start-up, Inspection and Maintenance of Ammonia Mechanical Refrigerating Systems), and it does not contain specific employer procedural steps or instructions to assure the mechanical integrity of the equipment. (j)(2)

7. Are all ammonia relief valves discharged to a safe location?

Compliance Guidance: ANSI/ASHRAE 15-2004 Section 9.7.8 requires pressure relief discharges be directed 15 feet above ground, 20 feet from a window, ventilation, or building entry, into a water bath with 1 gallon of water for each pound of ammonia, or another system approved by the AHJ.

Additionally the discharge shall be terminated such that ammonia will not spray directly on personnel and debris shall not enter the piping. If water baths are used, they must be protected from freezing. 1910.119(d)(3)(ii); (d)(3)(iii); (e)(3)(v).

8. Does the employer have detailed procedures for each oil drain point in the ammonia refrigeration system?

Compliance Guidance: ANSI/IIAR 2-2008, Section 14.2.1 states, "Detailed operating procedures suitable for each drain point shall be provided for oil draining operations. Safety and personal protective equipment shall be provided during the walkthrough, make note of up to 5 oil drain locations. Request oil draining procedures for each of these locations. Review the procedures to ensure that they are suitable for each individual drain point. Interview operators to determine if procedures accurately represent practices. 1910.119(f)(1)(B) if procedures don't exist or are not accurate;

(f)(1)(iii) if procedures don't have safety and health considerations;

(g)(1) or (g)(2) if operators are not adequately trained on the Procedures.

9. Does the employer take appropriate remedial action when rust is found on piping and associated components during an inspection?

Compliance Guidance: IIAR Bulletin 110, Section 6.7.1 states, "All uninsulated piping and associated components such as flanges and supports shall be inspected annually for any damage to or deterioration of the piping or its protective finish; take remedial action where necessary. Areas affected by slight corrosion should be cleaned off and appropriately treated before re-installing the protective finish. Deeper pitting or loss of metal, where considered by subjective assessment to be greater than 10% of original wall thickness should be checked accurately by using techniques such as ultrasonic measurements..."

Request a copy of inspection and test procedures for piping and components. Interview employees to determine where rust is commonly found. Examine maintenance records to verify

proper treatment. Interview employees to determine how rust has been handled in the past. Is there any definition" or guidelines established by the employer for "slight corrosion?" 1910.119(j)(2) if procedures are inadequate;

(j)(4) if inspection procedures are not consistent with RAGAGEP;

(j)(5) if inadequate remedial actions were taken.

10. Does the employer replace or inspect pressure relief valves on a regular schedule, at least every five years?

Compliance Guidance: IIAR Bulletin 109, Section 4.9.7 states, "Pressure relief valves discharging to atmosphere should be replaced or inspected, cleaned and tested every five years of service." U.S. EPA Accident Prevention and Response Manual for Anhydrous NH3 Refrigeration System Operators states that PRVs should be replaced on a regular schedule, at least every 5 years. Bulletin 110 section 6.6.3 Revised provides for the following: Pressure relief devices shall be replaced or recertified in accordance with one of these three options:

a. Every five (5) years from the date of installation. IIAR originally recommended (in 1978) that pressure relief valves be replaced every five years from the date of installation. This recommendation represents good engineering practice considering the design and performance of pressure relief devices; or
b. An alternative to the prescriptive replacement interval, i.e., five years, can be developed based on documented in-service relief valve life for specific applications using industry accepted good practices of relief valve evaluation; or
c. The manufacturer's recommendations on replacement frequency of pressure relief devices shall be followed.
Exception: Relief devices discharging into another part of the closed-loop refrigeration system are not subject to the relief valve replacement practices.

Request PSI for 5 PRVs. Ensure that all were replaced in the previous 5 years. Request a copy of PRV maintenance procedures. Ensure that the procedure lists the PRV replacement frequency and follows a RAGAGEP. 1910.119(j)(2) - if there are no or inadequate procedures for PRV maintenance;

(j)(4) - if PRV procedures don't follow RAGAGEP;

(j)(5) - if PRVs were not changed at their designated frequency

Secondary Questions

1. Does the employer follow manufacturer's recommendations for lubricating motors and drivers in ammonia service?

Compliance Guidance: IIAR Bulletin 110, Section 6.9 cautions that lubrication requirements may differ for different pieces of equipment. Both over and under greasing can be harmful.

Select up to five motors or drivers, and request the maintenance procedures and PSI. Ensure the lubrication requirements are consistent with manufacturer’s recommendations. 1910.119(j)(2) if there are no procedures.

2. Does the refrigeration machine room contain an ammonia detector that is set at or below 300 ppm if there is no continuous ventilation, or at or below 1000 ppm if the room is equipped with a

continuous ventilation system?

Compliance Guidance: EPA's Accident Prevention and Response Manual for Anhydrous Ammonia Refrigeration System Operators, March 2006, states that ammonia detectors in engine rooms should be set at or below 300 ppm (IDLH) to be protective. IIAR Bulletin 111 section 3.5.1 states, "The typical recommended actuation level for emergency ventilation is 150 ppm (50% of the IDLS)."

ANSI/IIAR - 2, 2008 section 8.12 states that when mechanical ventilation systems are used, ammonia detectors shall alarm at 1000 ppm.

3. Are there stop valves located between a pressure relief device and the part of the system being protected by the relief device?

Compliance Guidance: ANSI/ASHRAE 15-2004, Section 9.4.6, states, "Stop valves shall not be located between a pressure relief device and parts of the system protected thereby. A three way valve, used in conjunction with the dual relief requirements of 9.7.2.3, is not considered a stop valve."

Select five relief devices, check the P&ID and the physical installation to determine if stop valves are installed. 1910.119(d)(3)(ii); (d)(3)(iii)

4. Were operators provided initial training and refresher training at least every three years or more frequently if necessary for the procedure?

Compliance Guidance: Select three operating procedures for evaluation. This is required directly by PSM reg text.

(g)(1)(i) - if initial training on the procedure has not been provided.

(g)(2) - if refresher training on the procedure has not been provided.

5. Are the ammonia refrigeration machine rooms absent of boilers and other open flame producing equipment, including open flame space heaters? In addition, does the machine room only contain equipment with surface temperatures less than 800°F?

Compliance Guidance: The premise of these questions are to control the siting of potential ignition sources inside the machine room, as it is recognized that the risk of an ammonia release inside the machine room is higher due to the siting of the types and quantities of equipment normally found in these rooms.

An example RAGAGEP related to siting the listed ignition sources inside ammonia refrigeration machine room is ANSI/ASHRAE Standard 15 - 2004, Safety Standard for Refrigeration Systems, Section 8.12(a), "There shall be no flame producing device or continuously operating hot surface over 800°F (427°C) permanently installed in the room." (e)(3)(i) - the PHA did not identify the hazard of posed by equipment that produces flames or has surface temperatures in excess of 800°F.

(e)(3)(v) - the PHA did not address the siting of ignition sources inside the machine room.

6. Are all pipes piercing the interior walls, ceilings, or floor of ammonia machine rooms tightly sealed to the walls, ceiling, or floors through which they pass?

Compliance Guidance: An example RAGAGEP for sealing penetrations in machine rooms includes ANSI/ASHRAE Standard 15 - 2004, Safety Standard for Refrigeration Systems, Section 8.12(f) - Machinery Room Special Requirements. All pipes piercing the interior walls, ceiling, or floor of such rooms shall be tightly sealed to the walls, ceiling or floor through which they pass. (d)(3)(ii) - if the employer did not document that it complied with RAGAGEP in that ammonia piping was not properly sealed to prevent ammonia releases from migrating from machine room to the remainder of the facility.

7. Does PSI documentation indicate that the identifying/marking/labeling of ammonia refrigeration piping and system components complies with recognized and generally accepted good engineering practices (RAGAGEP)?

Compliance Guidance: From the ammonia refrigeration system P&IDs, identify 5 different piping and system components then during a walk around determine if these components are identified/marked/labeled.

Additionally, if a CSHO observed during a walk around that ammonia refrigeration system piping or system components are not identified/marked/labeled, these too could be addressed by the CSHO.

Example RAGAGEPs for identifying/marking/labeling of ammonia refrigeration piping and system components are Guidelines for Identification of Ammonia Refrigeration Piping and System Components, Bulletin #114, September 1991, International Institute of Ammonia Refrigeration (IIAR) and ANSI A13.1, Scheme for Identification of Piping Systems, 2007.

Per IIAR, Section 3.1 states that piping systems include piping, fittings, hand valves, control valves, and other devices mounted in the refrigeration lines. Section 3.2 states that system components include compressors and compressor units, receivers, thermosyphon vessels, recirculators, intercoolers, accumulators, transfer vessels, heat exchangers, oil pots and any other components in the refrigeration system that are not piping.

When piping components are not identified/marked/labeled IIAR, Bulletin #114, Section 4.1 requires, "Piping markers shall be designed to identify (i.e. ammonia), the physical state of the refrigerant, the relative pressure level of the refrigerant and the direction of flow."

When ammonia refrigerant equipment/systems components are not identified/marked/labeled IIAR, Bulletin #114, Section 4.2 requires, "Component markers will bear the name of the equipment they identify, e.g., RECEIVER, ACCUMULATOR, RECIRCULATOR, etc. In addition, component markers will be provided with pressure level designations". (d)(3)(ii) - if there is no marking of ammonia piping or equipment/systems, the employer cannot document they complied with RAGAGEP such as IIAR, Bulletin #114.

(e)(3)(i) - the PHA did not address the hazard of not marking piping or equipment/systems.

(e)(3)(vi) - the PHA did not address human factors as they relate to marking of ammonia piping or equipment/system components For instance, identification/marking/labeling can provide vital information to emergency response personnel. Alternatively, the lack of adequate

identification/marking/labeling can result in employees mistakenly opening equipment during maintenance operations which are not de-energized, etc.