

Managing a Process Safety Management Inspection

By

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I. Background

The Occupational Safety and Health Administration (OSHA) Process Safety Management (PSM) regulations (29 CFR §1910.119) have been in effect for almost three years. State level risk management programs, in New Jersey, California, and Delaware have been in effect for over six years. These regulations have had a profound impact on both the long-term planning, as well as the day-to-day operations of ammonia refrigeration facilities. Through hard work, planning, and the commitment of resources, many ammonia refrigeration facilities are beginning to realize the benefits of well developed PSM programs.

Well developed and implemented PSM programs offer the following benefits:

- operations with fewer unanticipated ammonia releases
- reduction in employee exposure to ammonia
- improvements in ability to detect and respond to ammonia releases
- reduction in unanticipated downtime of ammonia refrigeration equipment
- increased sensitivity to the hazards and installed safeguards for handling ammonia
- compliance with state/federal process safety regulation
- avoidance of fines, penalties, and negative exposure that results from non-compliance

This paper will discuss in greater detail some of these benefits, and in particular, the aspect of governmental inspections of ammonia refrigeration facilities.

Until promulgation of the U.S. Environmental Protection Agency's (USEPA) proposed Risk Management Programs (40 CFR §68), the OSHA PSM standard still serves as the most comprehensive list of process safety programs and procedures. The OSHA standard consists of the following 14 elements:

Employee participation	Hot Work permit
Process safety information	Management of change
Process hazard analysis	Incident investigation
Operating procedures	Emergency planning and Response
Training	Mechanical integrity
Contractors	Compliance audits
Pre-start-up safety review	Trade secrets

II. OSHA PSM Enforcement

Similar to the challenges industry faces regarding interpretation and implementation of PSM, OSHA is experiencing similar "start-up" difficulties regarding enforcement of the standard. Some of the more difficult challenges facing OSHA are listed as follows:

- consistent interpretation of the standard
- a shortage of trained and qualified inspectors
- a shortage of sufficient resources to conduct inspections
- complexity due to other state and proposed federal process safety regulations

Each of these items will be discussed below.

II.A Interpretation of the Standard

The PSM standard is written as a performance based regulation. This leaves the regulated community with significant latitude to interpreting the regulation and to developing an implementation approach suited to their particular situation. Conversely, it also leaves significant latitude for OSHA's Compliance Safety and Health Officers (CSHOs) to develop a different interpretation. This creates an obvious opportunity for conflict.

OSHA has attempted to provide guidance to both the regulated community and their CSHOs. The most informative guidance continues to be the information in the OSHA Instruction Compliance Directive. The first issue of the Directive (CPL 2-2.45A) was issued in late 1992. The Directive includes information regarding:

- OSHA's approach to conducting compliance inspections
- criteria for selecting facilities for inspections
- detailed PSM audit guidelines, including audit checklist
- clarifications and interpretations of the PSM standard

- list of references for compliance with the PSM standard
- guidelines for inspection preparation

An update of the Directive (CPL 2-2.45A CH-1) was issued on September 13, 1994. The updated Directive includes the information listed above, but has been updated to include technical clarifications regarding the inspection scheduling process, updated guidelines and audit questions regarding contractor safety, and most importantly, additional clarifications and interpretations regarding the standard.

Other PSM guidance available from OSHA includes:

- Process Safety Management, Occupational Safety and Health Administration, USDOL, OSHA 3132 (1993). This pamphlet includes a non-regulatory description of each of the PSM requirements, as well as a reprint of the PSM standard, including all of the appendices.
- Process Safety Management Guidelines for Compliance, Occupational Safety and Health Administration, USDOL, OSHA 3132 (1993). Contains general guidelines for developing a PSM program, organized by PSM element.
- OSHA PSM Citations. Summaries of PSM citations and copies of the actual citations are available from OSHA's Office of Management Data Systems and from OSHA's enforcement offices. A review of previously issued citations can provide valuable insight regarding OSHA's interpretation of the standard and particular areas inspectors may focus on.

For better or worse, the PSM audit guidelines and checklist contained in the Compliance Directive serves as OSHA's most complete tool in evaluating PSM compliance.

II.B Trained and Qualified Inspectors

Both OSHA and the regulated community recognize that special skills and experience are required for fair and effective enforcement and implementation of the PSM standard. Ideally, CSHOs should have an understanding of the processes they inspect, either from an operations or from a design viewpoint. Unfortunately, OSHA management does not have the latitude or the means to hire personnel with this level of process experience. Existing CSHOs offer significant experience in general plant operations and in interpretation of OSHA's existing safety standards, but they may lack the special knowledge required to address process safety issues.

To help address the situation, OSHA has offered advanced PSM training to select CSHOs. This training consisted of five weeks of instruction and workshops, including visits to covered industries. This training, for 40 CSHOs, is estimated to have cost approximately \$1.0M. A second round of training was completed in late 1994. This level of advanced training will undoubtedly help improve the skills of

CSHOs and achieve more consistency in regulatory interpretations, and improve understanding of PSM implementation in industry.

II.C Availability of Resources to Conduct Inspections

An estimated 25,000 facilities are covered by the PSM standard. OSHA estimates that a typical Program-Quality-Verification (PQV) process safety management inspection can take four to six months. Follow-up and final resolution to inspection findings can drag-on for years. Clearly, OSHA's current approach to PSM compliance is extremely resource intensive.

While key personnel within OSHA are assuming leadership positions regarding PSM, on the whole, OSHA has not undergone any specific hiring or organizational changes to address the PSM standard. This situation presents a two fold problem. It prevents OSHA from fully and effectively managing the PSM program, and thereby hinders the full benefits of PSM. It also sends mixed signals to the regulated community regarding OSHA's intentions in implementing PSM. This can manifest itself in difficulties plant or corporate safety managers experience in securing resources and commitment from upper management to fully implement PSM within their organizations.

II.D Complexity Regarding Other State/Federal Regulations

The states of New Jersey, California, Delaware, Nevada, and Louisiana have adopted PSM regulations. The USEPA has proposed comprehensive Risk Management Program regulations (40 CFR §68, January 19, 1993), which are expected to be finalized in the Spring of 1996. Some local agencies are even developing PSM regulations. For example, New York City has amended its Worker and Community Right-to-Know law to require facilities to develop Risk Management Programs, beginning in March 1995.

While other local or state regulations do not directly affect OSHA's PSM program, they do present considerable uncertainty and confusion among the regulated community. This can and does result in hesitation and lack of action among some companies, fearful of committing precious resources to what they perceive as a moving target.

II.E OSHA Inspection Results

OSHA has conducted an estimated 219 PSM related compliance inspections between May 1992 and September 1994. These inspections have resulted in a total of 1,226 citations, totaling in \$4.7M in assessed penalties. Table 1 includes a list of the OSHA citations organized according to the regulatory paragraph cited.

Half of all of the PSM citations issued were issued for alleged violations of only four of the 13 elements, namely operating procedures, training, contractor safety,

and mechanical integrity. Twenty percent of all PSM citations involved operating procedures. While not specifically included as a PSM element, a significant number of citations (18%) were attributed to emergency response issues and cited under 40 CFR §1910.120. The least number of citations were issued for alleged violations of compliance audits, hot work permit, and pre-startup safety review.

III. Impact Of PSM on Ammonia Refrigeration Facilities - Case Studies

Facilities that are seeking to determine the adequacy of their PSM programs have two primary sources of information from which to check: the results of actual process safety inspections, and a review of actual PSM citations issued. This summary is an evaluation of both sources of information. Note that in evaluating the results of actual process safety inspections, we considered not only federal OSHA PSM inspections, but also state level process safety inspections, for regulations such as New Jersey's Toxic Catastrophe Prevention Act (TCPA), Delaware's Risk Management Program (RMP), and California's Risk Management and Prevention Plan (RMPP).

The following PSM elements appear to draw a majority of attention during inspections:

- employee participation
- process hazard analysis
- operating procedures
- training
- mechanical integrity

This section will provide a summary discussion of key issues identified during process safety inspections, in each of the above listed categories.

III.A Employee Participation

Inspectors will first check to see that a written plan has been established which describes how the company intends to involve employees in the development and implementation of the PSM program. Although the regulation only explicitly states two areas where employees must be included (e.g. determining the frequency of refresher training and participation in the process hazard analysis), expectations are that the company will include employees in other aspects of the PSM program. For example, in the development of written operating procedures, incident investigations, management of change reviews, contractor safety, and auditing.

Another key aspect of employee participation is the accessibility of the PSM information to all concerned employees. The final check on implementation of this element will be made when inspectors interview employees and ask direct questions regarding their knowledge of process safety and the company's plans and programs.

III.B Process Hazard Analysis

The requirement for process hazard analysis (PHA) is often referred to as the cornerstone of the overall PSM program. The method, structure, content, and approach to conducting PHA studies varies widely. While inspectors typically do not question the details of a PHA worksheet such as cause description, consequence description, or worksheet format, they will focus on more general issues that are representative of the overall quality of the study. These issues include:

- skill and qualifications of the team leader
- team composition
- study organization (e.g. selection of hazard and operability (HAZOP) nodes or systems and subsystems)
- identification of appropriate causes of failures (e.g. equipment failure, human error, external events)
- evaluation of existing safety features and identification of study recommendations
- method for tracking resolution of study recommendations

Of course, the first issue is likely to address whether a study has been completed by the appropriate schedule. Many companies continue to believe that they can take advantage of the four year phase in of the PHA requirements. Because the majority of companies only operate one ammonia refrigeration system per site, the PHAs are required to be complete in May 1994.

III.C Operating Procedures

The requirements for operating procedures, along with mechanical integrity, provide the greatest opportunity for an inspector to find fault. Although the standard does not identify where written procedures are required, it does identify seven different operating phases that each procedure should address. The standard, in very broad terms, also identifies the required content of each procedure. Discrepancies arise in determining whether operating procedures appropriately address operating phases such as temporary operations, emergency shutdowns, and start-up after emergency shutdowns. Another common issue noted by inspectors is whether the procedures include operating limits, and description of consequences of deviating from established operating limits, and instructions on how to correct an operating deviation. In particular cases involving state level inspections, inspectors have focussed on stylistic issues such as format and text presentation.

III.D Training

While the training requirements are clear in that they require initial training, refresher training, and documentation, they do not provide any details on the extent of training, the duration of training, training content, or the method of documenting the employee's understanding of the training received. In addition to operator training, training requirements are also included under mechanical integrity, pre-startup safety review, management of change, and emergency planning and response. Common citations include failure to perform initial training, failure to train employees on emergency procedures, and failure to train employees on new or modified procedures.

Citations have been issued for failure to consult with employees on the frequency for refresher training. This is one of the few areas in the standard where employee participation is explicitly stated.

III.E Mechanical Integrity

The requirements for mechanical integrity are probably the most far reaching of all of the PSM elements. Inspectors frequently cite companies for violations with this PSM element. While violations have been issued for compliance deficiencies in all sections of this element, the two areas quite often noted along with some specific noted deficiencies are:

1. written procedures documenting maintenance plans for equipment
 - non-existent, or missing written procedures
 - incomplete or inadequate procedure documentation and/or implementation
2. equipment inspection and testing procedures, frequency and documentation
 - inspection/testing procedures inconsistent with the company's own internal documentation or inconsistent with manufacturer's recommendations
 - missing inspection or test record documentation
 - incomplete inspection or test record documentation such as missing results, name of person(s) conducting work, equipment identification number, etc.

In general, a company must properly evaluate all equipment in order to develop an effective maintenance program which complies with the provisions of this element. The program should cover all phases of the equipment's life from design, purchase and installation to routine inspections/testing and repair over its useful life to final removal. Once developed, the program must be properly documented, reviewed with all personnel involved, and followed as written.

IV Conclusions

With well over 300 specific requirements included in the PSM standard, and many more that could reasonably be included as a performance based standard, some would say it is very difficult to undergo a PSM inspection and not be issued a single citation. This paper has identified operating procedures, training, contractor safety, and mechanical integrity as the PSM elements with the largest number of citations issued. Additionally, employee participation and process hazard analysis are elements often cited as a particular interest to inspectors since they serve as the cornerstone of the program and are representative of how well PSM is communicated and understood by employees.

The PSM standard is clearly not a regulation with which a facility can quickly demonstrate compliance. Since it involves a balance of written programs and procedures, actual field implementation and documentation, and employee and management involvement, compliance can only be demonstrated over a long period of planning and implementation. Through effective planning, development, and follow-through, companies can not only develop a program that demonstrates compliance, but one that is also practical and useful in improving safety and operations.

Summary of PSM Inspections by PSM Element

PSM Element	Number of Citations
Employee participation	96
Process safety information	77
Process hazard analysis	75
Operating procedures	247
Training	113
Contractors	100
Pre-start-up safety review	7
Mechanical integrity	158
Hot work permit	15
Management of change	68
Incident investigation	27
Emergency planning and response	27
Compliance audits	0
CFR §1910.120 (emergency response requirements)	216
TOTAL	1,226