

NRC INSPECTION MANUAL

FCOB

INSPECTION PROCEDURE 88056

PROCESS SAFETY INFORMATION

PROGRAM APPLICABILITY: 2603

88056-01 INSPECTION OBJECTIVES

01.01 To determine whether the facility has in place a functional management system to support the development and maintenance of Process Safety Information (PSI).

01.02 To determine whether the facility has sufficient general plant information available to identify potential hazardous areas/units where detailed Hazard Identification and Assessments (HIA) are required.

01.03 To determine whether the facility has available detailed information related to process equipment, technology, and hazards for those areas/units identified as potentially hazardous.

01.04 To verify that information pertaining to the physical and chemical hazards of materials used in the process are adequately described.

01.05 To verify that process technology information is compiled.

01.06 To verify that safety related equipment information is complete.

01.07 To verify that safe operating limits for process parameters exist.

88056-02 INSPECTION REQUIREMENTS

02.01 Review the licensee's PSI development process to determine whether the licensee has a procedure, or other known means, for preparing, checking, reviewing, and maintaining PSI. The inspector should ensure that PSI is readily accessible to all those who need it to perform their tasks in a safe and efficient manner.

02.02 Review the licensee's general plant level PSI to determine whether the information available is sufficient to identify potential hazardous areas/units where detailed hazard assessments are required.

02.03 Review the licensee's detailed unit level PSI to determine whether the information available is sufficient to perform an HIA, and to support the development of other elements of the Nuclear Chemical Process Safety Program (NCPSP).

General Guidance

The inspection should be directed at assessing the sufficiency of the licensee's PSI program in providing a strong foundation for the NCPSP at the facility. Process safety information needs to be accurate, complete, and current, to establish a strong NCPSP at the facility.

The primary evaluation of the facility's PSI will be conducted by the inspector, to verify that the PSI is documented adequately and is appropriate, given the specific equipment and processes.

Specific Guidance

Specific guidance is provided for each of the inspection requirements listed in Section 88056-02, to help the inspector determine whether the licensee's program is adequate.

03.01 The PSI management system should address, as a minimum, the following:

- a. A procedure (or means) for preparing, checking, reviewing and updating PSI. The inspector should verify that this procedure is being followed.
- b. A means for ensuring that employees have access to PSI necessary for performing their job tasks. The inspector should spot-check with employees (e.g., ask an operator where Material Safety Data Sheets (MSDS's) are located).
- c. The facility should have a PSI document control system that ensures that the content is accurate and current. There should be a system for ensuring that the PSI being used in the implementation of other NCPSP elements is current. In addition, the PSI document control system should ensure that relevant PSI is readily available for needed use (e.g. pump seal specifications should be readily available to stores, and material compatibility/incompatibility information should be readily available to purchasing personnel).
- d. Changes to the facility or process, such as new equipment or process technology changes, should trigger updates in the PSI, so that the PSI is a living document that reflects current operating conditions.
- e. Cross-referencing and indexing of information and sources for ease of retrieval and revision.

03.02 The general plant-level PSI required to correctly identify potentially hazardous areas/units of the facility include accurate, up-to-date information on the following:

- a. Inventory list - of materials consumed, generated as intermediates, products, byproducts or waste streams, catalysts, etc., along with their maximum intended (design) inventories. A material compatibility chart should be prepared for these materials, to assess the hazardous effects of inadvertent mixing. MSDS should be available for all potentially hazardous chemicals, products, byproducts, waste materials, etc., on site.

The following are some of the different types of information that should be included in the MSDS:

- Identification information (e.g., CAS number, chemical formula)
- Physical property information (e.g., molecular weight, density, vapor pressure, etc.)
- Thermodynamic information (e.g., latent heat, heat capacity, etc.)
- Information on potential for fire, explosion (including dust explosion), reactivity (e.g., flammability limits, flash point, etc.)
- Health hazards, including symptoms, first-aid
- Toxicity information, such as LC₅₀, LD₅₀, etc.
- Exposure guidelines such as threshold limit values, ERPG-2, -3 values, or other indicators of safe exposure limits
- Regulatory status data (e.g., Occupational Safety and Health Administration (OSHA), 29 CFR 1910.119, U.S. Environmental Protection Agency (EPA), 40 CFR Part 68 threshold limit values.)

Normally, vendors provide the MSDS for each chemical they supply. If the licensee prepares MSDS in-house, then a toxicologist should review the MSDS for accuracy and content.

- b. Plot plan - showing the location and quantity of these materials.
- c. Block flow diagrams - which represent conceptual designs and flows.
- d. Simplified process flow diagrams - which show major process steps, along with a general process description.
- e. Process chemistry - equations for primary, secondary and unintended side reactions; nature of reactions (i.e., exothermic, endothermic).
- f. Any special design features or unique material properties that might necessitate special precautions (e.g., processing of radioactive or pyrophoric material).
- g. Utility system drawings - such as water lines, steam, condensate, fire water, air, instrument air, power lines, etc.
- h. Reports from completed HIA, Incident Investigations, and audits - to identify potential hazards.

03.03 A detailed PSI should be available, before conducting an HIA, for those specific areas/units of the facility where the potential for chemical hazards that could affect operations with special nuclear material has been identified. Information listed below should be current.

- a. Equipment list and specifications - check against requirements of Maintenance and Inspection procedures. (Specifications, sizing assumptions, calculations, and materials of construction should be available for vessels/tanks (including foundations or supports and appurtenances)). This information should also be available for motors (for pumps, agitators, compressors, etc.), supports, couplings, seals, seal flushes, and lubrication systems.
- b. Piping list and specifications - specifications, sizing assumptions, calculations, and materials of construction should be available for process piping systems, including pipes, fittings, supports, expansion and flexible joints, flanges, gaskets, and bolt torque.
- c. Instrument list and specifications - specifications, sizing assumptions, calculations, and materials of construction should be available for process control systems, including sensors, transmitters, receivers, indicators and controllers, alarms and interlocks, etc.
- d. Process Piping & Instrumentation Diagrams (P&IDs) with temperatures, pressures, and flows should be available for all processes, utilities, safety systems, and fire systems. The inspector should verify that P&IDs are current by checking if recent modifications/changes to the process are reflected in the P&IDs.
- e. Safety system specifications and design - relief system (including flares, scrubbers, knockout pots, vents, and connections to and from them) information should include set points, materials of construction, sizing assumptions, and calculations. This information should also be available for emergency shutdown systems and spill containment systems such as dikes, etc.
- f. Safe operating limits should be described for process parameters such as pressure, temperature, composition, flow, etc.
- g. Vendor data for package units (e.g., heaters/boilers, HVAC systems, furnaces, etc.). Any relevant design codes for equipment, vessels, piping, structural, relief, and other systems should be included.
- h. For facilities with computerized control systems, information on hardware and software should be available. Software

changes to computerized control systems should be documented. Computer control and logic diagrams should be available.

- i. Applicable sections of accepted industry codes, standards, and practices for design, fabrication, installation, operation, maintenance, and inspection of process equipment should be readily available onsite. The licensee should regularly update information on industry codes, standards, and practices. If equipment design violates current codes/standards, either through old age or by intention, the licensee should have documentation available to demonstrate its fitness for intended use.

88056-04 RESOURCE ESTIMATE

An inspection performed using this inspection procedure is estimated to require 8 hours of inspector resources. This estimate is only for the direct inspection effort and does not include preparation for and documentation of the inspection.

88056-05 REFERENCES

Center for Chemical Process Safety, *Guidelines for the Technical Management of Chemical Process Safety*, American Institute of Chemical Engineers, New York, 1989, Chapter 4, pp. 29 - 44.

Chemical Manufacturers Association, *Process Safety Code of Management Practices*, Washington, DC, 1990 (Practices 7 and 8).

Occupational Safety and Health Administration, *Process Safety Management of Highly Hazardous Chemicals*, 29 CFR 1910.119(d), "Process Safety Information".

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