

NRC INSPECTION MANUAL

FCOB

INSPECTION PROCEDURE 88062

MAINTENANCE AND INSPECTION

PROGRAM APPLICABILITY: 2603

88062-01 INSPECTION OBJECTIVES

The intent of this inspection procedure is to ensure that equipment used to process, store, or handle highly hazardous materials is designed, constructed, installed, and maintained properly and according to applicable codes and standards, so that the risk of releasing such materials or affecting Special Nuclear Material (SNM), because of equipment failure is minimized.

01.01 To determine whether the licensee has a program in place to ensure that the facility's Maintenance and Inspection (M&I) needs are satisfied.

01.02 To determine whether the licensee has a list of all the safety related equipment, located onsite, that is used to process, store, or handle hazardous material that could contribute to a toxic release, fire, or explosion which, in turn, could affect operations with SNM at the facility. All equipment on this list should be included in the facility's M&I program.

01.03 To determine whether the licensee has developed (as part of the M&I program) Preventive Maintenance (PM) and Corrective Maintenance (CM) procedures and schedules and whether they are adequate and being followed. All safety related equipment identified in section 01.02 above should be included in these procedures and schedules.

01.04 To determine whether the licensee has a mechanism in place to ensure that deficiencies identified by the M&I program are brought to the attention of appropriate personnel and addressed in a timely manner.

01.05 To determine whether the results of tests, inspections, CM, and/or PM are used to modify the existing PM requirements, to ensure adequate reliability.

01.06 To determine whether the licensee has a system in place to ensure that both new equipment and spare parts meet design specifications.

NOTE: The facility may add new equipment because of changes in the process, technology, etc., or needed as an add-on to an existing facility.

01.07 To determine whether the licensee has an effective program in place to address interface activities, such as inter-departmental communications between maintenance and operations or radiological and industrial safety personnel. This program should identify the applicable safe work procedures and practices, such

as lockout/tagout, removing a component from service, process line breaks, radiation work permits, release from operations, equipment status control, return to service, and post-maintenance testing.

88062-02 INSPECTION REQUIREMENTS

02.01 Review the licensee's M&I program to ensure that the following have been adequately addressed:

- Methods for identifying components and equipment that need regular PM, inspections, and tests.
- Methods for identifying frequency and methods of PM, inspections, and tests.
- Procedures for a corrective maintenance program to handle unexpected repairs/breakdowns, etc.
- Training program for M&I personnel.
- Development of written maintenance, inspection, and testing procedures for each type of equipment included in the PM list.
- Documentation of all M&I activities.

02.02 To determine whether the safety related equipment PM list is current and includes or provides access to Process Safety Information (PSI) on each piece of equipment required to establish a strong M&I program. PSI includes materials of construction, applicable codes and standards, process descriptions, safe operating limits, etc.

02.03 Review the licensee's M&I program to determine whether the licensee has a mechanism in place to update the M&I program through the incorporation of management-approved recommendations coming out of the Nuclear Chemical Process Safety Program (NCPSP) inspection elements (Hazard Identification and Assessment (HIA) studies, incident investigation and audit programs) pertaining to M&I.

88062-03 INSPECTION GUIDANCE

General Guidance

The inspection should assess how adequately the M&I program addresses PM and inspection activities, for equipment in hazardous material service, that will minimize the risk of, and/ or mitigate the consequences of, equipment failure that could affect operations with SNM at the facility. This inspection does not address PM and inspection activities, for equipment in hazardous material service, that does not affect nuclear operations at the facility, although NRC does recognize that the licensee will probably have a common M&I program for the entire facility.

Specific Guidance

Specific guidance is provided for each of the inspection requirements listed in Section 88062-02, to help the inspector determine whether the licensee's M&I program is adequate.

- a. The method for identifying components and equipment that need PM and inspection should be appropriate, given the hazards identified, as well as the level of complexity of the chemical operations. It could be based on applicable codes, manufacturers' recommendations, recommended practices by professional/ trade organizations, company policy, etc.
- b. The method for determining PM, inspection, and testing schedules for equipment should be appropriate given the severity of potential hazards posed by each piece of equipment (depending on the service it is in). It could be based on applicable codes, manufacturers' recommendations, recommended practices by trade/professional organizations, company policy, or reliability requirements (see a.5, below).
- c. The training program for maintenance personnel should include at least general orientation and safety, hazards in process area(s) requiring maintenance, evacuation routes and other applicable emergency procedures, applicable codes and standards, and maintenance procedures. Training should be provided for any skills needed beyond the skill level of competent journeymen.
- d. Written PM and CM procedures should be available as part of the M&I program. The inspector should review the written procedures for content and clarity. Where applicable, these procedures should follow recognized industry standards, codes, and guidelines. These should be available when the procedure is outside the skills of competent journeymen.

The inspector should interview maintenance personnel to verify that they are familiar with the written procedures. If possible, a maintenance or inspection activity should be witnessed to ensure that written procedures are being properly implemented in the field, and all steps in the procedures are being carried out sequentially. The procedures should be reviewed to verify that they clearly address all the interface activities associated with the maintenance/repair/replacement of a component such as lockout/tagout, removing a component from service, process line breaks, radiation work permits, release from operations, equipment status control, return to service, and post-maintenance testing. Also, interfacing activities with the operations/production and safety/health physics personnel should be verified. Where applicable, safe work procedures, job hazard analysis, and/or chemical hazards should be referenced.

- e. Accurate records of all M&I activities, such as tests/inspections, breakdowns, equipment failure, repairs and replacement, should be available so that equipment reliability studies can be done. A computerized database is recommended. This would facilitate the use of available data for in-depth analyses (e.g., trending, tracking M&I activities, predictive maintenance activities, etc.).

Findings from the equipment reliability studies should be used to make adjustments in frequencies and maintenance practices. However, when the plant is small and simple, manual methods to determine equipment reliability will suffice.

03.02 The inspector should ensure that the safety related equipment PM list is up-to-date and includes all equipment and components that are currently part of the facility's preventive M&I program. As a minimum all process equipment, vessels, piping, relief and vent systems, detection and monitoring systems, emergency shutdown systems, controls, and electrical systems, in hazardous material service that have the potential to affect operations with SNM at the facility, should be included. Adherence to applicable codes, standards, and regulations should be reviewed.

03.03 The facility should have a mechanism in place to ensure that recommendations pertaining to M&I activities (from NCPSP inspection programs such as HIA, Incident Investigation, Audit programs, and results of equipment reliability studies) are incorporated into the M&I program. As a minimum the following should be addressed in updating the facility's M&I program:

- a. A tracking system to ensure that each recommendation is addressed on a timely basis. The inspector should cross-check with the features of the tracking system described in the HIA element.
- b. Findings from Incident Investigations or Audit programs that highlight deficiencies in the M&I program should be addressed in a timely manner, to ensure that chemical hazards at the facility are covered sufficiently. Check the level of management that reviews M&I program deficiencies. The inspector should cross-check with the Incident Investigation and Audit elements.
- c. Examples where M&I program activities might impact other elements of the NCPSP are:
 1. Trending data from reliability studies may be used to improve the M&I program (e.g., use equipment repair information to decide on a more frequent inspection program, or initiate management of change action if a piece of equipment fails repeatedly in a certain service, etc.).
 2. Where reliability determinations are related to operating procedures (e.g., cleaning pump strainers), the procedures may require revision based on operating experience. The inspector should cross-check that such recommendations have been incorporated.

88062-04 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.

88062-05 REFERENCES

Center for Chemical Process Safety, *Guidelines for the Technical Management of Chemical Process Safety*, American Institute of Chemical Engineers, New York, 1989, Chapter 8, Process and Equipment Integrity, pp. 85 - 97.

Center for Chemical Process Safety, *Plant Guidelines for Technical Management of Chemical Process Safety*, American Institute of Chemical Engineers, New York, 1992, Chapter 8, Process and Equipment Integrity, pp. 149 - 198.

OSHA, *Process Safety Management of Highly Hazardous Chemicals*, 29 CFR 1910.119 (j), "Mechanical Integrity."

EPA, *Risk Management Programs for Chemical Accidental Release Prevention*, 40 CFR Part 68, Section 68.32, "Prevention program - maintenance (mechanical integrity)."

Chemical Manufacturers Association, *Responsible Care®*, *Process Safety Code of Management Practices*, Washington, 1990, Practices 12 "Standards, Codes, and Regulations", 14 "Mechanical Integrity."

END

Appendix:

A. Typical Information in Equipment Maintenance/Test Records

Appendix A

TYPICAL INFORMATION IN EQUIPMENT MAINTENANCE/TEST RECORDS

The following list includes information typically included in equipment maintenance/ test records:

- a. Name of person(s) performing maintenance activity
- b. Name of person verifying quality of maintenance work performed
- c. Process section
- d. Service/ equipment description
- e. Description of location - provide isometric drawing number if available
- f. Identity of process fluids in equipment
- g. Manufacturer's name and equipment serial number
- h. Materials of construction
- i. Operating conditions (e.g., temperature, flow, pressure, etc.)
- j. Applicable codes and standards (e.g., ASME, API codes, etc.)
- k. Maintenance history:
 - 1. as received condition of equipment
 - 2. work done on equipment - including all inspections and tests, part replacements
 - 3. any changes in testing frequency recommended to operations
- l. Previous test/inspection and next test/inspection dates
- m. Testing, inspection, or preventive maintenance schedules
- n. Corrective maintenance performed on each piece of safety related equipment

END