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## INSPECTION PROCEDURE 88025

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### MAINTENANCE AND SURVEILLANCE OF SAFETY CONTROLS

PROGRAM APPLICABILITY: 2600

#### 88025-01 INSPECTION OBJECTIVE

The objectives of this procedure are to determine whether:

01.01 Maintenance and surveillance activities for items relied on for safety (IROFS) and other safety controls are adequate to assure that IROFS and controls are available and reliable to perform their safety function when needed, and for Part 70 licensees, to comply with the performance requirements of 10 CFR 70.61;

01.02 Effective corrective actions are taken when a safety control (and IROFS for Part 70 licensees) fails or has degraded; and

01.03 Maintenance and surveillance activities are in accordance with license or certificate requirements.

#### 88025-02 INSPECTION REQUIREMENTS

NOTE: The inspection requirements of this procedure are those tasks that must be performed to complete the inspection. Inspection planning is a key element of performing a thorough and meaningful inspection. Inspection plans must be developed and approved prior to the start of the inspection and must consider the safety significance of the items to be inspected. Deviation from the approved inspection plan must be discussed with the inspection supervisor as soon as practicable. Guidance on inspection planning can be found in Manual Chapter 2600, "Fuel Cycle Facility Operational Safety and Safeguards Inspection Program."

02.01 Maintenance Implementation. For selected maintenance activities, review the selected action, including observation of ongoing activities where possible.

- a. Work control procedures. Determine whether work control procedures were adequately implemented to assure adequate review and approval of proposed work, including a maintenance work order.
- b. Pre-job planning. Determine the adequacy of pre-job planning where required by the license or certificate.
- c. Work package. Determine the adequacy of work packages (work request, maintenance procedure, tag-out, etc.) prepared for maintenance activities and whether licensee or certificate holder procedures were followed.
- d. Maintenance observations. Determine whether maintenance work activities on selected systems and processes are conducted according with the licensee or certificate holder's requirements and procedures.

- e. Post-maintenance testing. Determine whether appropriate post-maintenance testing and calibrations, as specified by license or certificate requirements (integrated safety analyses (ISAs), licensee or certificate holder procedures, etc.), are performed prior to returning the component or system to operational status.
- f. Completed work package. Determine whether requirements for reviewing the completed maintenance activities by maintenance, engineering, or operations supervision are being adequately met prior to returning equipment to service.

02.02 Surveillance and Calibration Testing Implementation. For the surveillance testing activities selected in Section 02.01 above, review the selected test and/or calibrations, including observation of ongoing activities where possible.

- a. Surveillance. Determine whether surveillance tests are conducted according to the procedures and at the required frequency.
- b. Calibrations. Determine whether calibrations are conducted according to the frequency, requirements, and procedures.
- c. Criticality Alarm Monitoring Systems. Determine whether the criticality safety monitoring system is tested and calibrated as required by license or certificate requirements.

02.03 Maintenance Problem Identification and Resolution. Determine whether the licensee or certificate holder is identifying safety control or IROFS maintenance or surveillance problems at an appropriate threshold and entering them into the corrective action program. Determine, for selected licensee or certificate holder identified items, whether effective corrective actions have been taken.

## 88025-03 INSPECTION GUIDANCE

**NOTE FOR SELECTION OF MAINTENANCE ACTIVITIES:** In preparation for the inspection, the inspector should discuss with the project inspector any safety equipment availability or reliability problems (such as recurring failures or failures resulting in reportable events) the licensee or certificate holder has been experiencing. Select from this list the controls for the more risk-significant operations to review during the inspection. In addition, once on site, the inspector should initially determine what maintenance and surveillance activities of safety controls or IROFS are scheduled to be performed by the licensee or certificate holder during the period of the inspection. From this, the inspector should select a sample maintenance and surveillance activities for risk-significant operations to observe during the inspection. The inspector should use the ISA Summary or other safety analysis to determine the risk-significant operations. Inform a licensee representative that you would like to be kept informed of any change in the schedule of these maintenance or surveillance activities to assure that an inspector observes them.

### 03.01 Maintenance Implementation.

- a. Work control procedures. Work control procedures usually require the use of a "work order" or similar document. Administrative control procedures should define the review and approval sequence for this document and require that maintenance activities on safety controls or IROFS, or in the proximity of critical or vital equipment, be performed under the work order system. Work orders might include the following elements:
  - 1. Identification of work activity,
  - 2. Work group(s) involved,

3. Foreman in charge,
4. Ignition source controls,
5. Fire watch requirements,
6. Special work controls,
7. Maintenance supervision approval signature,
8. Operating staff review signature, and
9. Operations supervision approval signature.

Troubleshooting. Licensee or certificate holders might be required to have procedures for controlling troubleshooting activities such as removing and returning equipment to service, use of lifted leads and jumpers, and post activity testing. Although a licensee or certificate holder could have a procedure that addresses the general plan of the troubleshooting activity, it is not always necessary that all of the steps performed as part of a troubleshooting activity be defined in a step-by-step procedure. However, documentation of troubleshooting activities for safety controls or IROFS should provide evidence that the activity was performed properly.

Also ensure that the licensee or certificate holder is not using troubleshooting to circumvent the requirements of the standing maintenance procedures and policies, nor is troubleshooting being used as means to implement a work-around for a problem instead of repairing it.

- b. Pre-job planning. For complex corrective maintenance activities, recurring failures, or failures resulting in reportable events, evaluate the adequacy of pre-job planning by reviewing available records or questioning responsible licensee personnel to determine if the licensee performed the following pre-job planning activities:

1. Reviewed plant machinery history or industry operating data for similar equipment failures.
2. Reviewed vendor technical manuals and incorporate appropriate vendor recommendations into maintenance procedures.
3. Obtained engineering support, when needed, to address complex maintenance issues.
4. Prepared written procedures, where necessary, to perform complex maintenance activities.
5. Reviewed post-maintenance and/or post-modification system test alignments and control for exiting those alignments.
6. Used formal root-cause analysis methods, as necessary, to identify the causes of maintenance failures.
7. Identified special skills or qualifications, special tools and equipment, or spare parts needed to perform the maintenance activity.
8. Assessed the total equipment out of service to determine the overall effect on safety of performing the planned maintenance activity.

- c. Work package. Determine if the work package (work request, maintenance

procedure, tag-out, etc.) prepared for the maintenance activity addressed the elements listed below that are required by licensee's or certificate holder's procedure. (Note that all the below elements might not be required in each licensee's or certificate holder's program.)

1. The procedure conforms to the licensee or certificate holder's administrative requirements for format, approval, and control.
2. The procedure addresses 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.
3. Inspection hold points, independent verification points, or appropriate peer reviews are identified in the procedure or in a documented plan and are appropriate for the activity.
4. Supplementary reference materials, such as drawings and technical manuals, are adequate, controlled, and up to date.
5. The work activities are described in a level of detail that is commensurate with the complexity of the maintenance activity. Skills normally possessed by qualified maintenance personnel may not require detailed step-by-step procedures for simple tasks.
6. Consideration is given to cleanliness requirements and personnel hazards such as chemical, radiological, temperature, pressure, and electrical hazards.
7. Provisions for fire protection and security are included. Work involving welding, open flame, or other ignition sources, should require: (1) special authorization; (2) a special survey or evaluation of the proposed work area to identify nearby flammable material, vital cable runs, critical process equipment, etc.; and (3) a fire watch. If the maintenance activity is to be performed in the proximity of flammable material, vital cable runs, etc., the fire watch should have the capability of communicating with the appropriate organization (process control area, fire brigade). The individual performing the fire watch should know what actions to take in the event of a problem.
8. Instructions and quality control checks are included to verify that environmentally qualified (EQ) equipment is properly protected against moisture intrusion when reassembled and that proper EQ material, especially elastomers, have been installed.
9. Provisions for control of equipment, including lifted leads, jumpers, bypasses, and mechanical blocks are included.
10. Interfacing activities with the operations/production and safety/health physics personnel are verified. Where applicable, safe work procedures, job hazard analysis, and/or radiological, nuclear criticality safety (NCS), or chemical hazards should be referenced.
11. Provisions for obtaining formal approval from operations are included, as well as methods for notifying operations when affected systems are removed from service, ready to be restored to normal service, or if problems are encountered.

12. Provisions for material, parts, and tool accountability to ensure loose items are not inadvertently left inside equipment after the work is complete.
  13. Provisions for procedure or standard task prerequisites, such as scaffold engineering evaluations and requests, breach of fire/air/radiation barriers, and radiation protection requirements, are included.
  14. Replacement parts for a given job will be properly controlled and identified for its end-use.
- d. Maintenance Observations. For the maintenance activities selected, determine whether:
1. Maintenance personnel assigned understand the scope of the task and are familiar with the procedures.
  2. Up-to-date written procedures are being implemented in the field and that steps in the procedures are carried out sequentially, unless otherwise specified.
  3. Applicable parts of items 02.02.c. are satisfied for the work in progress.
  4. The maintenance personnel are qualified for their respective tasks.
  5. Supervisory oversight of the work is adequate.
  6. Quality Control (QC) personnel assigned are knowledgeable of the task.
  7. Apparent cause of failure appears to be addressed by appropriate corrective action, including measures to prevent recurrence.
  8. Appropriate health physics support is available.
- e. Post-maintenance testing (PMT). Procedure contents should normally include testing provisions following maintenance. Written procedures should be available for performing maintenance, calibration, and surveillance requirements for safety controls, including where applicable, nuclear criticality safety (NCS) control systems and IROFS identified in the ISAs. There should be records to confirm that the work was performed. For each testing activity selected, identify the affected systems and/or components and review the following:
1. The applicable licensing-basis and/or design-basis documents to identify the safety functions of the affected systems and/or components.
  2. The associated maintenance activity to identify the safety functions that may have been affected by that activity.
  3. The licensee's or certificate holder's test procedure to determine whether the procedure adequately tests the safety functions affected by the maintenance activity. Determine whether the acceptance criteria in the procedure is consistent with information in the applicable licensing-basis and/or design-basis documents. Determine whether the procedure has been properly reviewed and approved.
  4. Either witness the test and/or review the test data, to determine whether:
    - (a) The performance of the affected systems and/or components satisfy the procedure's acceptance criteria.

- (b) The effects of testing on the plant have been adequately addressed.
- (c) The measuring and test equipment (M&TE) is calibrated and is within its current calibration cycle.
- (d) The M&TE is within its required range and accuracy.
- (e) The applicable prerequisites described in the test procedure are satisfied.
- (f) The affected systems or components are removed from service in accordance with approved procedures.
- (g) The test is performed in accordance with the test procedure and other applicable procedures.
- (h) Any lifted leads or jumpers, both electrical and pneumatic, are controlled and restored.
- (i) The test data/results are accurate, complete, and valid.
- (j) The test equipment is removed after testing.
- (k) After completion of testing, equipment is returned to the positions/status required to maintain the system operable in accordance with the current operating mode using approved procedures.
- (l) Any problems noted during testing are appropriately documented.

Note: Licensee or certificate holder PMT is often conducted by performing a related, existing surveillance procedure for operability determination. Inspectors should assure that the testing performed not only provides a snapshot of the safety controls' or IROFS' operability, but actually evaluates the adequacy of the maintenance or repairs to the controls being tested.

Note: As a minimum, perform a review of the completed test procedure and the recorded data. However, where possible, the inspector should also attend the pre-job briefing, witness the test when it is performed, and attend any post-test critiques, as applicable.

- f. Completed work package. Determine whether the maintenance activities are reviewed by maintenance, engineering, or operations supervision upon completion prior to returning equipment to service.

### 03.02 Surveillance and Calibration Testing Implementation.

- a. Surveillance. The license or certificate, licensee or certificate holder procedures, or the ISA will specify which safety controls require periodic surveillance tests. The risk-significance of particular IROFS and NCS controls is specified in the ISA. For Part 70 licensees, these surveillance tests and calibrations are to verify that IROFS are available and reliable to perform their function when needed.

Procedures should be developed, reviewed, and approved under the licensee's or certificate holder's procedural control system. The procedures should specify:

- 1. Prerequisites and preparation for the test.

2. Functional tests of instruments in conducting the surveillance test.
3. Acceptance criteria.
4. Operational checks to be made before returning equipment to service.
5. Deficiency reports documented for failures.

Examine those procedures related to the tests selected for observation. Determine whether surveillance tests required by the license or certificate are conducted using properly approved procedures.

Examine the technical content of procedures for the selected surveillances to determine that satisfactory tests will be conducted. The objective is to determine whether the procedure will satisfy the applicable license or certificate requirement or will demonstrate that IROFS are available and reliable. The surveillance requirement and the bases of the license or certificate requirements, or description in the safety analysis report or the application, should be used to aid in this determination. Examine the procedure and check-off sheets to determine if valve lineup, or other similar requirements, are correct for the test activity and the return of the component or system to service.

Determine whether, for tests selected above, that test results conform with license or certificate requirements, and that test results have been reviewed and approved by appropriate supervision. The test results should be reviewed and approved by someone other than the person performing the test or the person directing the test.

Other significant surveillance test attributes for consideration include the following:

1. Preconditioning does not occur.
2. Effect of testing on the plant has been adequately addressed by control room and/or engineering personnel.
3. Acceptance criteria is clear and demonstrates operational readiness and is consistent with the supporting design calculations and other licensing documents.
4. Measuring and test equipment range and accuracy are consistent with the application and has current calibration. Verify the plant equipment calibration is correct, accurate, properly documented, and the calibration frequency is in accordance with licensee or certificate holder procedures and commitments.
5. Test is performed in sequence and in accordance with written procedure.
6. Jumpers installed or leads lifted during testing are properly controlled.
7. Test data is complete, verified, and meets procedure requirements.
8. Test frequency was adequate to demonstrate operability (meets license or procedure requirements), and reliability.
9. Test equipment is removed after testing.
10. After completion of testing, equipment is returned to the positions/status required for the performance of its safety function.



11. For test results that do not meet the acceptance criteria, results of an adequate operability determination are acceptable.
12. For selected safety related instrumentation and control surveillance test verify that reference setting data has been accurately incorporated to the test procedure.

b. Calibrations.

Determine whether calibrations are performed at the required frequency for safety controls and IROFS.

During the review of calibration procedures and calibration records determine whether provisions are included to acknowledge that applicable license or certificate requirements for limiting conditions for operation are in effect. Determine whether the service status of the system was in conformance with the applicable limiting conditions of operation specified in license or certificate requirements.

Examine the technical content of procedures for the selected calibrations to determine that satisfactory calibration of monitoring components will result. In the review of procedures, look at a sample of stepwise instructions to determine if the following considerations have been included:

1. Appropriate signal compensations are included,
2. Point of signal insertion is specified,
3. Calibrations are appropriate to the range and use of equipment.

Determine whether procedures used to calibrate the monitoring component selected contain:

1. Review and approval requirements of license/certificate conditions,
2. Acceptance values for trip settings that conform to license/certificate requirements,
3. Detailed stepwise instructions, and
4. Deficiency reports documented for out-of-tolerances.

The objective is to determine whether the procedure will satisfy applicable license or certificate requirements. The surveillance requirements and the bases of the license or certificate requirements, or description in the safety analysis report or the application, should be used to aid in this determination. Examine the procedure and check-off sheets to determine if valve lineup, or other similar requirements, appear correct for the calibration activity and the return of the component to service.

During the review of raw data calibration records, determine whether "as-found-settings" are also recorded. Determine whether trip points of components selected conform to applicable license/certificate requirements.

Review the qualifications of individuals having responsibility for performing calibrations against the licensee or certificate holder requirements and the company policy regarding personnel qualification requirements.

For gauges, instruments, or other measuring/testing devices used as primary



standards in the calibration of plant equipment, determine whether:

1. Calibration frequency was met and accuracy verified as prescribed by internal procedures or license/certificate requirements,
  2. Accuracy is traceable to the National Bureau of Standards or other independent testing organization,
  3. Storage and control of the selected devices is proper.
  4. Information tagged on the testing equipment conforms to that in calibration records.
  5. The M&TE was in calibration at the time of use.
  6. The M&TE is calibrated against standards that have an accuracy that is better than or equal to the instrument being calibrated.
- c. Criticality Alarm Monitoring Systems. By observation, discussion, and document review, determine whether the system is designed to permit component and system operability testing periodically and after maintenance. Determine whether maintenance and testing of the entire alarm system are done and that such tests are announced.

The criticality accident alarm system is expected to be designed to permit component and system operability testing periodically and after maintenance. The licensee or certificate holder is expected to have procedures in place to require tests and checks equivalent to the initial installation tests following significant modification or repair to the system.

Determine by observation, discussion, and document review that the audibility of the criticality alarm signal was above background noise level, as specified in applicable American National Standards Institute (ANSI) standards or other regulatory requirements, throughout all areas to be evacuated or that other signals, such as lights or beacons, provide operator warning.

All tests and corrective actions should be recorded. Maintenance, surveillance, and test records for the alarm system are expected to be maintained.

03.03 Problem Identification and Resolution. As it relates to maintenance and surveillance, select a sample of problems documented by the licensee or certificate holder and determine whether the corrective actions were timely and appropriate. Also, determine whether the licensee or certificate holder has an information tracking and trending system for the availability and reliability of safety controls and IROFS. Determine whether the licensee utilizes such a system to perform preventative maintenance for risk significant safety equipment. Review the records of safety controls or IROFS that have degraded or declined in performance over time. Review the licensee or certificate holder's identification of the causes of the problems and the maintenance and/or surveillance actions taken for corrective action.

#### 88025-04 RESOURCE ESTIMATE

An inspection performed using this inspection procedure is estimated to require 30 hours of inspector resources. This estimate is only for the direct inspection effort and does not include preparation for and documentation of the inspection.

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

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

U.S. Code of Federal Regulations, "Domestic Licensing of Special Nuclear Material," 10 CFR Part 70, Section 61, "Performance Requirements"

Occupational Safety and Health Administration (OSHA,) "Process Safety Management of Highly Hazardous Chemicals," 29 CFR 1910.119 (j), "Mechanical Integrity"

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

END

# ATTACHMENT 1

## Revision History for IP 88025

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	09/25/06 CN 06-025	This document has been revised to: (1) emphasize the risk-informed, performance-based approach to inspection, (2) impose changes to the core inspection program based on operating experience, and (3) remove completed or obsolete MCs and incorporate other fuel cycle MCs into a central location.	None	N/A	ML061940381