

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 93802

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### OPERATIONAL SAFETY TEAM INSPECTION (OSTI)

PROGRAM APPLICABILITY: 2515

SALP Category: Plant Operations

#### 93802-01 INSPECTION OBJECTIVES

01.01 Verify that the plant is being operated safely and in conformance with regulatory requirements.

01.02 Verify that the organizations that control and support plant operations are functioning effectively to ensure operational safety. These entities include operations, maintenance, surveillance, management oversight, technical support, safety review, quality assurance, and corrective action.

01.03 Verify that the licensee has properly prepared the staff and the plant for resumption of power operations after an extended shutdown.

#### 93802-02 INSPECTION REQUIREMENTS

During this inspection, emphasis will be placed on the effectiveness of the licensee's operations activities to ensure the safe operation of the plant, including the effectiveness of other organizational components in supporting operations. The inspection should focus only indirectly on programs, and the primary emphasis should be directed at the licensee's performance and whether the interfaces between operations and the other areas in the plant organization are controlled and conducted in a manner that contributes to plant safety. In general, the identification of programmatic deficiencies should be a by-product of the examination of the licensee's safety significant performance problems, including the evaluation of test data and any exceptions taken to test acceptance criteria.

The OSTI, which can be performed by either a Headquarters or regional team, will typically consist of a two week onsite inspection conducted by a team of approximately seven inspectors and a team leader. Three team members will be assigned to the operations area on a rotating shift basis to monitor control room and related activities for a minimum of 72 continuous hours. When

selecting team members, nuclear power plant operating experience should be a primary consideration, especially in the operations area.

Because the inspection is directed at safe performance and not simply compliance, direct observations of licensee activities should be emphasized (e.g., plant

evaluations, maintenance activities, surveillance testing, and QA audits) and supplemented by personnel interviews and document reviews.

A team member will be assigned the lead responsibility for the inspection in each of the areas listed below. The inspection procedures listed in Section 93802-03, "Inspection Guidance," may be used for additional inspection guidance. Depending on the particular plant inspected, the team may not be able to thoroughly complete each of the inspection tasks described below. Team leaders must exercise discretion to guide the individual inspectors toward topics of safety significance in each functional area.

#### 02.01 Operations

- a. Observe the conduct of operations personnel both inside and outside the control room for approximately 72 continuous hours. When possible, periods of continuous observation should be selected to include changes in plant operating conditions, tests, and surveillances as these activities are more illustrative of operator knowledge and skills than those observed during sustained steady state operations. Based on these observations, determine the quality of operator professionalism, attentiveness, awareness of plant status, communications, conduct of plant evolutions, response to alarms and other abnormal indications, adequacy of training, and overall planning and control of plant and shift activities.
- b. Assess the effectiveness of shift turnovers by observing as many different turnovers as possible. Determine if adequate time is allotted for the conduct of turnovers and if control room documentation (e.g., shift logs and night orders) is useful and available.
- c. While observing routine activities inside the control room, evaluate access control and traffic in the control room. Determine whether collateral duties of the operators (e.g., filling out tag-outs and interfacing with maintenance and surveillance test performers) have an adverse effect on their ability to operate the plant safely. Assess the adequacy of annunciator response, number of continuously lit annunciators, and response to out of service equipment and components.
- d. Determine the effectiveness with which operations appropriately controls support activities in progress, including maintenance, trouble shooting, and testing activities which can potentially influence plant operations.
- e. Accompany an auxiliary operator during routine rounds, or otherwise tour the plant at least once per shift. During these tours, assess the ability of operators to observe areas secured as a result of radiation levels or security plan requirements. Assess the adequacy of housekeeping, radiological controls, lighting, equipment labeling, and vital area access controls.

- f. Walk down portions of selected safety systems and evaluate the licensee's configuration control practices. Confirm that valve and breaker positions conform to procedure requirements and that positions required by procedure are consistent with those on controlled plant drawings and system lineup procedures.
- g. Review jumper, lifted lead, and other temporary modification logs. Determine (1) if an adequate technical review was performed before the plant modification was performed, and (2) if plant drawings were updated, as needed, to reflect the change before operators must operate the plant as changed. Temporary modification reviews should include an assessment of the licensee's root cause analysis process and thoroughness of 10 CFR 50.59 evaluations. The licensee's controls for limiting the duration of temporary modifications should be reviewed. Assess the role of the plant, system, and design engineering groups in the temporary modification process.
- h. Select one or more safety system tag-outs for inspection. Determine if the tagout is adequate for the work to be accomplished. Verify in the plant that operators are thorough in tagging and isolation of plant equipment. Verify, by observation that tags are properly hung and equipment has been placed in the designated position. Determine if equipment status changes and corresponding entry into or exit from technical specification action statements are appropriately documented. Determine if the licensee has adequate controls to ensure the independent verification of equipment status, particularly when equipment is returned to service. Assess the adequacy of operability verification testing when returning equipment to service.
- i. Determine the availability and currency of normal and abnormal operating procedures in the control room, including alarm response procedures. Observe the extent to which operations personnel appropriately follow plant procedures during the conduct of changes to plant operations. Determine if the licensee's process to revise and control procedures encourages or discourages identification and correction of procedure deficiencies.
- j. Select two recent required reading documents and familiarize yourself with their contents. By questioning and discussing these documents with on-shift reactor operators and senior reactor operators, assess the effectiveness of the required reading program.
- k. Determine the qualification and license status of on-shift operators. Ensure that the technical specification requirements controlling overtime and minimum shift staffing are satisfied.

02.02      Maintenance

- a. Observe licensee personnel performing corrective and preventive maintenance to verify that maintenance is planned,

controlled, and performed in a manner that enhances safe operation of the plant. Verify that the maintenance is performed in accordance with current written and approved instructions that are detailed enough to perform the intended maintenance and adequately document the maintenance performed. Also review a sample of completed work packages and machinery history records and verify that they demonstrate these same attributes.

- b. Verify that maintenance jobs that could affect technical specification limiting conditions for operation or safety-related equipment performance, or otherwise influence the safe operation of the plant, are appropriately prioritized and dispositioned in a timely manner.
- c. Verify that maintenance activities are coordinated with control room operations and that appropriate briefings and turnovers are held with control room operators. Verify that machinery isolation and tagging is appropriate for the activities and conforms to procedural requirements.
- d. Review the maintenance training program and selected craftperson's training records to verify that training is adequate and appropriate for the level of work being performed by that individual.
- e. Determine the nature and extent of the licensee's backlog of corrective and preventive maintenance, especially concerning equipment of high safety significance. Assess the licensee's efforts to integrate preventive and corrective maintenance to minimize equipment unavailability. Identify licensee efforts to reduce the corrective maintenance and preventive maintenance deferrals.
- f. Assess the adequacy and implementation of the preventive maintenance program through the selection and examination of several safety significant components or components for which machinery history indicates high corrective maintenance frequency.
- g. Assess the adequacy of trending of corrective maintenance history and measures to deal with high maintenance components. Maintenance history and trending should support the identification and correction of repetitive work.
- h. Determine if engineering input into maintenance activities is at an appropriate level to ensure safe and reliable plant operations.
- i. Determine whether quality control (QC) inspections are being conducted during the performance of maintenance and whether the number and nature of QC inspections are adequate to contribute to effective maintenance.
- j. Determine if specific guidance exists with regard to designation of QC hold points and that the guidance is being effectively applied.

- k. Determine if appropriate post-maintenance testing is being specified following the conduct of maintenance activities and that there is involvement of engineering in specifying the tests when appropriate.
- l. Observe activities and review documents related to the licensee's control of measuring and test equipment. Verify that calibrations are being performed at the required frequencies and that the program includes a tracking system so that when measuring and test equipment are found to be out of calibration, an evaluation is made and documented of the validity of previous inspection or test results and of the acceptability of items previously inspected or tested. Verify that appropriate measures are identified and employed to handle, store, and distribute contaminated test and measurement equipment.

02.03      Surveillance

- a. Observe a number of surveillance tests being performed by licensee personnel in the mechanical, electrical, and instrumentation and control maintenance groups and verify that:
  1. Required administrative approvals were obtained before testing was started and, when appropriate, entry into technical specification action statements was documented.
  2. Testing is being accomplished by qualified personnel in accordance with current and approved procedures that are adequate to meet technical specification requirements.
  3. Test instrumentation is calibrated and properly used.
  4. Procedures are adequate to satisfy the test requirements of the technical specification surveillances.
  5. Test results meet technical specification acceptance criteria.
  6. Test discrepancies or problems are documented and properly resolved in a timely manner.
  7. Surveillance testing is completed within the required technical specification frequency.
- b. Review a sample of completed surveillance tests. Determine if the test procedures used are of the correct revision and are technically accurate and if qualified personnel adequately tested the designated equipment. Determine if the acceptance criteria are clearly specified and shown to have been met in the tests reviewed. Where discrepancies are noted, determine if they have been adequately evaluated and if any required corrective actions have been initiated.
- c. The adequacy of the nontechnical specification surveillance program should be assessed. Include plant equipment which is

not explicitly addressed by the technical specifications but which requires periodic surveillance (e.g., vibration monitoring of rotating equipment, tank levels, instrument air quality, and lube oil levels). The inspection guidance listed above may also be applied to those required equipment surveillance not listed in the technical specifications.

02.04 Engineering and Technical Support

- a. By interviewing personnel and reviewing documents related to equipment performance problems, evaluate the effectiveness of the technical staff, including plant, technical, and design engineers, in supporting safe operation of the plant. Verify that the work backlog is manageable and that items that could affect safety are given a high priority and are addressed in a timely manner.
- b. Evaluate the effectiveness of system engineers (when applicable) to determine the extent that:
  1. The system engineer has received classroom training and practical experience on the systems assigned that individual.
  2. The system engineer is active and involved in the performance of the assigned system(s) and components and communicates effectively with operations, maintenance, and other engineering groups.
  3. System engineers effectively coordinate with design engineering to evaluate and improve system performance and safely modify the system when required.
- c. By review of selected modification packages determine the effectiveness of the licensee's efforts to meet its licensing commitments and to preserve the design basis. Through observations during the inspection assess the licensee's concern for control over plant configuration by attempting to identify unauthorized or undocumented modifications to plant equipment. This review should include:
  1. Identification of all temporary modifications currently in place and an assessment of their impact upon the plant's approved design configuration including appropriateness of the installation duration.
  2. Review of selected field change requests (FCRs) and nonconformance reports (NCRs) to ensure that an appropriate and timely evaluation, and where necessary, a corrective action has been completed.
  3. Ensure that the 10 CFR 50.59 safety evaluations have been prepared or reviewed by engineering personnel familiar with the technical basis of the associated licensing commitments.

4. Review the backlog of design changes (DCs) to be installed. Ensure that safety evaluations of other later DCs appropriately consider the status of related and yet to be installed DCs.
  5. Review the technical basis of selected DCs to ensure that all multi-disciplinary licensing commitments are met and a documented technical basis exists for the DC.
  6. Verify that the corrective action associated with NCRs, as well as DCs, address the root cause of the initiating concern, and are not addressing merely the proximate cause or a symptom.
  7. Review the FCNs associated with selected DCs to ensure that a modification is not engineered by FCN. Design changes should not have an excessive number of FCNs written against them.
  8. Review DCs to ensure that appropriate and timely changes have been made to Emergency Operating Procedures (EOPs), off normal response procedures, or maintenance, surveillance, and test procedures.
  9. Review a select number of DCs to verify the proper procedural steps were taken to declare a modification operable, and verify appropriate operator training was performed.
  10. Review temporary modifications to verify proper 10 CFR 50.59 review and appropriate involvement of the onsite safety review committee.
  11. Review maintenance records to verify changes to design were not made under maintenance requests.
- d. Assess the communication interface between operations, maintenance, and engineering. Verify that appropriate engineering guidance is requested and obtained to resolve technical problems. Assure that such guidance is accurate, complete, and technically correct and that it is incorporated into a corrective action plan.

02.05 Health Physics. By observation of activities and interviews, evaluate the safety-significant interaction of the health physics (HP) organization with the operations and maintenance staffs.

02.06 Management Oversight

- a. Interview licensee management personnel and observe activities concerning safety-significant equipment (e.g., plan-of-day meeting and outage planning meeting) to evaluate management's involvement and effectiveness in operating the facility. Evaluate its attitude toward operational safety, ALARA, response to events, identification and documentation of significant deficiencies, and corrective actions. Interview

personnel at all levels on the plant staff to evaluate communications effectiveness. Determine if workers understand management directives, policies, and goals and if management has a good perception of what is going on in the plant. Assess the actual time spent by management on independent observation of work in the control room and plant.

- b. Evaluate management's concern for keeping the plant on the line against its concern for safe operation of the plant by assessing, for example, the thoroughness of management reviews conducted before plant restart (e.g., post-trip and event reviews) or for root-cause analyses of equipment failures and corrective actions.
- c. Review and discuss with licensee personnel the effectiveness of any current licensee-initiated programs (e.g., procedures upgrade).
- d. Determine the extent to which licensed operators recognize the supervisory responsibilities associated with their license and assess their effectiveness in directing the activities of nonlicensed operators, technicians, and craftspersons.

02.07 Safety Review. Attend onsite and offsite safety review committee meetings and evaluate member participation, preparation, the approval process (e.g., review adequacy, the availability of technical experts to answer questions, and the 10 CFR 50.59 process). Determine if the overall conduct of the committee members appropriately supports and enhances the safe operation of the plant. Verify that technical specification requirements for document reviews are being followed.

02.08 Corrective Action

- a. Using safety-significant equipment that has had problems as the focus, review the licensee's program for identifying, documenting, and correcting problems. The program should have a mechanism for raising significant deficiencies to an appropriate level of management control.
- b. Determine if deficiencies are prioritized on the basis of safety significance and if deficiencies that could affect plant safety are corrected in a timely manner.
- c. Verify that deficiencies are reported to the appropriate level of plant management and, if required, to the NRC.
- d. Evaluate the effectiveness of the licensee's corrective action programs, including root cause determinations, in supporting operational safety by interviewing personnel, observing activities, reviewing procedures, deficiency reports, root cause evaluations, licensee event reports, and audit reports, especially those associated with equipment or plant problems. Assess whether the licensee makes appropriate periodic reviews of corrective action effectiveness to evaluate the need for an additional corrective action.

- e. Determine if the corrective action process is structured to emphasize safety as well as compliance.
- f. Verify that corrective action bounds the effects of any identified operational safety deficiency.
- g. Verify that the licensee's program for review and disposition of industry notifications and NRC bulletins, information notices, and generic letters addresses all safety aspects of these documents.

02.09 Restart After Prolonged Outage. Before plant startup from an extended outage, the inspection should ensure that the licensee has properly prepared the plant and staff for operations. This inspection supplements any inspections found necessary to ensure satisfactory accomplishment of the approved objectives of the licensee's restart plan. This inspection will also emphasize management oversight, corrective action programs, root-cause analysis, and the readiness to support operations.

The inspection should concentrate on plant operations, but should give due consideration to the importance of maintenance, surveillance, engineering, health physics, and technical staff effort in support of restart. Suggested inspection points include the following areas:

- a. Focus the inspection on activities that have the greatest potential impact on safety, such as reactor startup, heatup/cooldown, refueling, and surveillances. Direct observations are preferred and should be supplemented by personnel interviews and document reviews. Systems should be selected for inspection on the basis of their potential to cause safety challenges. Recently modified components or systems are likely candidates for examination. Also, the results of probabilistic risk assessment studies should be used, if available.
- b. Evaluate licensee management's attention to transitional controls. For example, outage deficiency "punch" list items converted to maintenance work order items still represent incomplete work. Evaluate management's oversight and controls in daily work and preparation activities. Review licensee performance in conducting preventive maintenance activities on schedule and in exercising appropriate control over deferred preventive maintenance.
- c. Review the licensee's operating experience feedback program as an administrative control program that continually addresses lessons learned and that establishes the safety significance of problems that have developed in the startup of similarly designed plants. Determine if procedural problems are being effectively identified and expeditiously corrected.
- d. Evaluate the licensee's self-assessment capability as it relates to readiness for operation. Evaluate the effectiveness of the root-cause analysis process and generic

applicability review of self-identified problems, as well as the effectiveness of the corrective action program.

- e. Determine whether operator training, including simulator usage, includes appropriate core characteristics and system response. Through operator interviews, control room observations, and review of alarm response procedures, establish whether shift personnel are prepared to properly respond to abnormal plant conditions, instrumentation and control (I&C) set point and display anomalies, and the potential for a high number of challenges to safety systems during testing. Determine if operator training has been provided on recently modified systems or components where the equipment may be expected to operate differently than before modification.
- f. Evaluate differences in the QA/QC organizational interfaces with other station departments under operational versus outage controls. Look for the adequacy of planning to complement startup testing activities under technical specification constraints as opposed to the latitude for "troubleshooting" problems that exists under outage testing controls. Verify QA/QC participation during maintenance work performed on backshifts.
- g. Determine if the licensee has implemented an effective technical specification update process and if human factors improvements (e.g., color coding) for the ease of operations and maintenance are being continually assessed and implemented in a timely manner. Verify that plant procedures accurately reflect the correct technical specification section.
- h. Assess whether the licensee has an effective program to review and focus attention on balance-of-plant (BOP) operations to reduce the frequency of plant transients.
- i. Evaluate the adequacy of licensee procedures to deal with material and personnel access and work control problems when the radiologically controlled areas (RCA) and protected and vital areas are reestablished.
- j. Evaluate the status of control room annunciators, alarms, and recorders. Verify the acceptability of the licensee's methodology for compensatory measures for those indications not operating properly.
- k. Evaluate the licensee's program to review and evaluate the impact of the backlog of the maintenance work requests, including its collective impact on safety system availability.
- l. Review some modifications to determine if 10 CFR 50.59 reviews were properly conducted and were appropriate. Consider if a technical specification change or relief should have been initiated in conjunction with the 10 CFR 50.59 review and if the evaluation was adequate to determine whether the modification involved an unreviewed safety question.

- m. Inspect a sample of completed modifications and review the conduct and adequacy of any additionally required operator training, the need for updating operating and emergency procedures, the adequacy of post-modification testing, and the proper control of affected drawing revisions to include the issuance of updated drawings to all controlled drawing areas (e.g., control room, technical support center, and emergency operations facility) before making the modification operational.
- n. Examine licensee adherence to commitments made in response to NRC orders, bulletins, and notices of violations.
- o. Inspect a sample of QA/QC records covering the conduct of outage activities to verify that the licensee has established the correct level of independent quality overview of the work and the specification of and compliance with meaningful inspection hold points.
- p. Review the scope of the licensee's restart plan to ensure comprehensive coverage of staffing and training requirements, system valve lineups, equipment operability, surveillance requirements, mode change checklists, and control of incomplete plant work. Special emphasis should be placed on inspection of completed corrective actions for the causes of the extended outage.
- q. Determine whether senior management has been closely involved in the restart effort, whether management is effective in directing restart activities for around-the-clock activities, and whether technical and other support staff coverage is available at all times. Where significant management turnover has occurred, verify that adequate training was completed.
- r. Evaluate the restart processes for problem identification and resolution, established authority for decisionmaking, and corrective action followup. Determine if these processes differ from those in practice during routine operations and whether quality goals are being achieved.

The inspection of a startup after a prolonged outage should include 72-hour coverage of shift operations for at least a portion of the readiness review period. The performance of different operating crews and other station staff should be monitored for effective communications, adequate support, and correct control of and response to major operational evolutions. Discussions with operations, maintenance, radiation control, technical support, and other plant personnel should be conducted on backshifts and the cognizance and effective control of backshift activities by plant management should be confirmed.

### 93802-03 INSPECTION GUIDANCE

General Guidance. Previous NRC evaluations disclosed that a team inspection focused on operational safety can be of value in assessing operational safety at a plant and especially in

identifying the root causes of operational problems. Teams have been found to be more effective than individual inspectors because operational problems contain implications for many functional groups, including operations, maintenance, surveillance testing, management, technical support, safety review, quality assurance, and all groups responsible for participating in the completion of required corrective actions.

In general, the identification of programmatic deficiencies in the preventive maintenance program should be a byproduct of the examination of the licensee's safety significant performance problems, including the evaluation of test data and any exceptions taken to test acceptance criteria.

03.01 Specific Guidance. Detailed inspection guidance for each applicable functional area is provided in the following inspection procedures.

Appropriate sections of the inspection procedures are to be used as additional guidance in performing the inspection. Inspection Procedure 42700, "Plant Procedures," should be used as guidance in assessing the adequacy and appropriate use of procedures in each of the areas.

a. Inspection Requirement 02.02.a, Operations

1. 71707 Operational Safety Verification.
2. 71710 Engineered Safety Features System Walkdown.
3. 71715 Sustained Control Room and Plant Observation.

b. Inspection Requirement 02.02.b, Maintenance

1. 62702 Maintenance Program.
2. 62703 Monthly Maintenance Observation.
3. 62704 Instrumentation Systems (Components and Systems).
4. 62705 Electrical Maintenance (Components and Systems).

c. Inspection Requirement 02.02.c, Surveillance

1. 61700 Surveillance Procedures and Records.
2. 61725 Surveillance Testing and Calibration Control Program.
3. 61726 Monthly Surveillance Observation.
4. 73753 Inservice Inspection.

d. Inspection Requirement 02.02.f, Management Oversight

1. 36100 10 CFR Part 21 Inspection.

2. 37700 Design, Design Changes, and Modifications.
  3. 10 CFR 50.59 Part 9800 CFR Discussions, Changes to Facilities, Procedures and Tests (or Experiments).
- e. Inspection Requirement 02.02.g, Safety Review
1. 40500 Evaluation of Licensee Self-Assessment Capability.
- f. Inspection Requirement 02.02.h, Corrective Action
1. 35701 QA Program Annual Review.
  2. 40702 Audit Program.
  3. 92720 Corrective Action.

#### 93804-04 INSPECTION RESOURCES

Each inspection is planned for 4 weeks for seven to nine persons with 2 of the 4 weeks being onsite inspection (an accumulative onsite total of 14 to 18 staff weeks) and two weeks in-office inspection preparation and report writing. With expected additional effort by the team leader, the resource allocation typically totals 30 to 38 staff weeks. This total includes preparation, inspection, and report writing.

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