



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NRC INSPECTION MANUAL

RSIB

INSPECTION PROCEDURE 93803

SAFETY SYSTEMS OUTAGE MODIFICATIONS INSPECTION

PROGRAM APPLICABILITY: 2515, 2525

93803-01 INSPECTION OBJECTIVES

01.01 To verify that the licensee has appropriate programmatic controls for accomplishing changes, modifications, and repairs.

01.02 To verify that the licensee is conducting activities related to design changes, modifications, and repairs in accordance with established procedures, commitments, and regulatory requirements.

01.03 To verify that completed modifications have been properly designed, installed, inspected, and tested to ensure the adequate performance of the modified systems and components.

01.04 To determine that the design margins of the modified safety-related systems and components have not been reduced.

01.05 To verify that the modified systems and components are ready for safe startup and operation of the plant.

93803-02 INSPECTION REQUIREMENTS

The Safety Systems Outage Modifications Inspection (SSOMI) consists of a design inspection and an installation and testing inspection.

02.01 Advance Preparation. Each of the inspection teams should review the following applicable documents, before the start of the inspections. The teams should become familiar with the licensee's administrative programs for designing, installing, and testing modifications in addition to the components and systems for which modifications are planned.

- a. Final Safety Analysis Report (FSAR).
- b. Technical Specifications (TS).
- c. Descriptions of the proposed modifications.
- d. Administrative documents used to implement modifications.

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- e. Corporate and site engineering procedures.
- f. Licensee event reports for the past 2 years.
- g. Past inspection reports.
- h. System descriptions.

02.02 Design Inspection. This part of the inspection should be performed by a design engineering team staffed with electrical and mechanical engineers who are familiar with design and analysis practice and techniques. The inspection should be conducted before the outage starts or soon after the start of a major outage, and should be done at the offices of the organization with principal engineering responsibility for the modifications. The inspection will verify the following for a sample of modifications selected during the advance preparation for the SSOMI.

- a. Regulatory requirements and design bases as specified in the FSAR and TS and as documented in NRC safety evaluations, have been correctly reflected in the modifications.
- b. The licensee has adequately performed 10 CFR 50.59 safety evaluations for the modifications, as required.
- c. Design information is current and correct and the assumptions used in the design calculations are based on sound engineering principles and practices.
- d. Design information has been properly incorporated into project documents such as specifications, drawings, procedures, and instructions used for the modifications.
- e. Design information is controlled and has been applied to the original design changes, including field changes.
- f. Field changes are properly recorded and evaluated.
- g. The licensee's engineering staff has sufficient technical guidance and experience to adequately perform the assigned engineering functions.
- h. The design verification process, such as alternate or independent calculation review or qualification testing, is performed correctly.

02.03 Installation Inspection. Sections 02.03 and 02.04 are performed by multi-discipline teams with expertise in electrical and mechanical system installation and testing requirements. The installation inspection should be conducted at the plant site at a time during the outage when sufficient modification installation activities have been accomplished to warrant the inspection.

The inspection should verify the following for a sample of modifications selected during the advance preparation phase of the SSOMI.

- a. The licensee has adequately performed 10 CFR 50.59 safety evaluations for the modifications, as required.

- b. The installed modifications agree with design requirements such as those pertaining to as-built dimensions, code requirements, ANSI standards, regulatory guides, A/E specifications, welding and NDE requirements, and seismic requirements.
- c. For the work packages selected, the proper maintenance procedures or work procedures were invoked and followed, QA/QC hold points were properly accomplished and verified, and all required forms were properly completed, signed, and reviewed.
- d. Required QA/QC audits and surveillances have been performed on the selected modifications, and the audit and surveillance findings have been properly dispositioned.
- e. Work requests and maintenance orders are in agreement with the work originally authorized, and work requests, if revised, did not expand the scope of the work originally planned by the modification.
- f. Deficiency reports, field change requests, engineering change notices, and similar documents recorded deviations from original design requirements, and adequate engineering review was done before corrective actions were accepted.
- g. QA documentation for replacement items is in agreement with the material installed, and the material is properly environmentally qualified (EQ) and agrees with design specifications.
- h. Maintenance or modifications on EQ components do not invalidate the qualification.
- i. All controlled documents (e.g., drawings, work procedures, site administration procedures, test procedures, TS, FSAR) affected by the modified component, system or structure have been revised or are being revised.

02.04 Testing Inspection. The testing inspection should be conducted near the end of the outage at a time when a significant amount of post-modification testing is being performed. The inspection team should verify the following for the systems modified:

- a. Modified systems and components were tested in accordance with approved procedures, and the results were properly reviewed and approved before startup testing occurred and the systems and components were placed into service.
- b. Performance of the modified systems and components conforms to requirements and acceptance standards identified in licensee procedures, and the operational margins of safety have not been compromised.
- c. Testing of individual modified components or subsystems takes into account the effects of the modifications on the operational performance of the entire system and on affected interfacing systems.
- d. Piping and instrumentation diagrams, critical drawings, including control room drawings, and operating procedures were revised to incorporate system changes before system operation.

- e. Operator training for significant operational changes occurred before system startup, and operator training programs were revised in a reasonable time to reflect the design changes or modifications that were implemented.
- f. As-built drawings were changed to reflect the current configurations, and this was accomplished not only for the modified systems, but also for other systems, components or structures which were affected by the modification activities.
- g. Deficiencies were clearly identified, and appropriate corrective actions were implemented.
- h. After corrective actions, or changes to the modifications, have been completed, tests were rerun as necessary to ensure that performance of the system is adequate.
- i. Results of the evaluations are reviewed by appropriate licensee personnel and/or contractor personnel, including the persons responsible for approving the original test procedures.

93803-03 INSPECTION GUIDANCE

03.01 General Guidance

- a. Team Composition. The design team normally is comprised of a team leader and four to six engineers who are experts in the design areas of electrical, instrumentation and control, mechanical systems, and mechanical components. The installation and testing team normally consists of a team leader for each of the mechanical and electrical disciplines, with, typically, two or three additional inspectors per discipline area. The installation inspectors should be knowledgeable in construction or modification and maintenance activities, and the testing inspectors should be knowledgeable in component and system testing.

Team compositions should be changed as necessary to meet changing inspection requirements or priorities for specific plants or specific outages. For example, one or more procurement specialists may be added to either the design team or the installation and testing team for a broader or more detailed inspection in that area. In addition, for major outages, separate teams may be warranted for installation activities and for testing activities.

- b. Inspection Scheduling. The design inspection and the installation and testing inspection are each normally four weeks long. The first week is typically devoted to in-office preparation, then two weeks are normally spent inspecting, with an interim week devoted to in-office review. If extensive or unusual findings are identified during the onsite inspection, team leaders should consider lengthening the onsite inspection period as necessary to complete the required inspections. Some other factors to consider when extending the inspection period include the complexity of the modifications to be reviewed, the length of the plant outage, travel time needed to get to the site, and the scope of the review. Following completion of the inspection activities, report inputs should be provided by each inspector on a schedule determined by the team leader and NRC management.

03.02 Specific Guidance

- a. Inspection Requirement 02.01. Advance preparation should be performed by the design team and the installation and test team. The teams should review the licensee's applicable administrative, corporate and site engineering procedures in detail during this period so that they are thoroughly familiar with the utility's program for performing modifications. In addition, individual inspectors should become familiar with the systems being modified so that they can understand the impact of the modifications. Before each team's advance review period, the team leader and selected team members should make a "bagman" trip to the utility to find and bring back the material needed during the advance preparation. The teams should also be familiar with other applicable documents such as the FSAR, Technical Specifications, LERS, and NRC inspection reports.
- b. Inspection Requirement 02.02. The design team inspectors will typically spend most of their time at the engineering offices where the organization responsible for the design of the modifications is located. Sharing of design findings and concerns with the installation and test team is particularly important for the successful completion of the SSOMI. If practical, the installation and test team leader and discipline leaders should attend the design team preexit and exit meetings to become more familiar with the design team findings and concerns.
- c. Inspection Requirement 02.02a. The inspector should verify that system information is consistent between the Technical Specifications, the FSAR, design documents, and other licensee technical manuals.
- d. Inspection Requirement 02.02d. Design documents and information should be numbered and categorized for future use and reference. Most licensees with good design engineering department practices will have all of the design documents numbered so that future modifications can be referenced to preexisting and accurate design information on the system rather than having to research existing design documents such as the TS and FSAR to resurrect good information whenever a system is modified.
- e. Inspection Requirement 02.02e. All design calculations should have technical independent reviews performed to ensure that design calculations are free from errors and that the assumptions made and the engineering approach taken are both conservative and reasonable.
- f. Inspection Requirement 02.03a. Proper safety evaluations should consist of more than a checklist and should state why the modification does not need a safety evaluation, if so noted. Additionally, the inspector should review for potential unreviewed safety questions.
- g. Inspection Requirement 02.03c. All work performed for the modifications should be with approved procedures which have been through the appropriate site approval process. If work has been completed with the use of a locally generated procedure, the assumptions made in the safety analysis may be incorrect and the licensee should perform a technical evaluation of the work performed to determine system operability.

- h. Inspection Requirement 02.04. A combined installation and test team may not have the opportunity to witness modification testing during a SSOMI of a short duration outage. Therefore, the team may have to rely on reviews of test procedures, evaluation of completed test results and limited observation of testing.
- i. Inspection Requirement 02.04a. Test results should be compared with the FSAR values (if values are specified in the FSAR) and the licensee's In-Service Testing reference values in order to determine the effect of the new test results on the ASME Section XI requirements.
- j. Inspection Requirement 02.04c. The site review and approval process for functional test procedures that have been written for specific modifications should be evaluated for adequacy and completeness.

END