



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

NRC INSPECTION MANUAL

LPEB

INSPECTION PROCEDURE 72701

MODIFICATION TESTING

PROGRAM APPLICABILITY: 2515

72701-01 INSPECTION OBJECTIVE

The objective of this procedure is to ascertain whether the licensee's modification testing program for new or modified structures, systems, and components involving a licensing amendment is in conformance with the license amendment, detailed design documentation, regulatory requirements, Technical Specifications (TS), and industry-approved codes and standards.

72701-02 INSPECTION REQUIREMENTS

02.01 Construction Testing

- a. Review the modification work package to determine whether the new structures, systems, and components were properly prepared for pre-operational testing. These preparations should include the following as appropriate:
 1. Preservation (e.g., painting).
 2. Wiring continuity and separation checks.
 3. Cleaning and flushing.
 4. Calibration of instrumentation and setpoints.
 5. Hydrostatic pressure testing of fluid systems.
 6. Component functional tests including:
 - (a) Trip testing of breakers.
 - (b) Freedom of movement checks for mechanical components.
 - (c) Rotational directional testing of prime movers.
 7. Structural concrete and structural steel tests.
 8. Greasing and lubrication.
 9. Installation of packing and filtering materials.
 10. Connection of support systems.
 11. Reservoir priming, filling, and venting.
 12. Adjustment of limit switches, interlocks, and stops.
 13. Preventive maintenance (depending on the elapsed time between construction and commencement of preoperational testing).

- b. Verify that the licensee's review and evaluation of completed construction phase test procedures addressed whether test results were within previously established acceptance criteria, that test deviations were resolved, and that retesting was accomplished as appropriate.

02.02 Preoperational and Startup Testing*

- a. Verify that testing was conducted under procedures which possessed the following appropriately detailed features:
 - 1. Scope and objectives
 - 2. Limitations
 - 3. Precautions
 - 4. Prerequisites
 - 5. References
 - 6. Acceptance criteria
 - 7. System lineups and tag outs
 - 8. Checkoff lists that include provisions for:
 - (a) Recording the completion of procedural steps, observed of parameters, and observed deficiencies.
 - (b) Identifying the personnel conducting the test procedure and performing the individual steps.
 - (c) Recording Quality Control (QC) verification of critical step completion or important parameter observation by independent QC inspectors.
 - (d) Recording the completion of system restoration.
- b. Verify that pre-test training was conducted to ensure proper test conduct and proper operation of new or modified equipment.
- c. Verify that test procedures and changes thereto were reviewed and approved in accordance with Technical Specifications and the licensee's administrative procedures.
- d. Verify that the licensee's review and evaluation of completed test procedures addressed whether test results met previously established acceptance criteria, and that test deviations were resolved and required retesting accomplished prior to the next testing phase or release for operation.
- e. Review quality assurance records to verify that the test performance records received an independent QA audit.

*The steps of Section 02.02 are to be conducted twice, as appropriate (for both the preoperational phase and startup phase of post-modification testing). The inspector may additionally conduct the more extensive reviews of IP 70300 (Preoperational Test Procedure Review) and IP 72300 (Startup Test Procedure Review) as determined necessary.

- f. Verify that the testing criteria and results establish that the levels of performance of new structures, systems, and components were as described in the license amendment application and detailed design documentation (normally generated subsequent to the approval of the license amendment application).

72701-03 INSPECTION GUIDANCE

General Guidance

- a. Modification Categories. Modifications addressed in this inspection procedure will fall into one of two categories (the inspector should ensure that the prescribed testing is consistent with the category of modification):
1. Small Modifications. Small modifications are those changes made to existing structures, systems, and components that are within the capability of the onsite operating organization and that require only those inspections and performance tests typically conducted during routine maintenance and surveillance.
 2. Major Modifications. Major modifications are major structural, system, and component repairs or replacements, or the installation of new systems. These modifications in general will require the same type of inspections and performance testing as is applied during original plant construction.
- b. Modification Phases. This inspection procedure addresses the Licensee's program for implementing three phases of plant modification testing:
1. Construction Testing. Construction testing includes preliminary tests, inspections, and preparation activities.
 2. Preoperational Testing. Preoperational testing is conducted to demonstrate the capability of structures, systems, and components to meet performance requirements of design criteria. Preoperational testing includes:
 - (a) Instrumentation, control system, flow rate, interlock, alarm, equipment protection devices, support system adequacy, structural support, and vibration damping tests.
 - (b) Cold functional tests, such as heat runs or the simultaneous operation of interfacing equipment.
 - (c) Hot functional tests at PWRs where pump flow heating is used to simulate plant operating conditions at elevated operating temperatures.

3. Startup Testing. Startup testing is conducted with the reactor critical "behind the stops" or at appreciable neutron power to confirm design bases and to demonstrate, to the degree practical, that integrated systems will operate in accordance with structure, system, and component design criteria. Startup testing demonstrates that the plant, as modified, is capable of responding to anticipated transients and postulated accidents as specified in the Safety Analysis Report.

Specific Guidance

03.01 No specific guidance.

03.02.a No specific guidance.

03.02.b No specific guidance.

03.02.c Test procedure descriptions for the specific phases of modifications can be found in the ANSI standards referenced in 72701-04 (below). A well written modification testing procedure would include:

1. A description of necessary communication equipment.
2. Reference to supporting documentation such as the license amendment application, drawings, TS applicable industry-approved codes and standards, and equipment operating procedures necessary during the conduct of the test.
3. The origin of acceptance criteria.
4. The means by which acceptable performance is to be established.
5. The location, arrangement, restoration conditions, and retest requirements for bypass lines, spool pieces, blank flanges, disconnected or removed interlocks or stops, lifted leads, removed fuses, temporary strainers, and temporary setpoints.
6. Hazards to personnel, equipment, and the plant.

03.02.d-f No specific guidance.

72701-04 REFERENCES

10 CFR 50, Appendix B, Criterion XI, "Test Control."

Regulatory Guide 1.68, Rev. 2, "Initial Test Programs for Water-Cooled Nuclear Power Plants," August 1978.

ANSI N18.7-1976/ANS 3.2, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants."

ANSI N45.2.4-1972, "Installation, Inspection, and Testing Requirements for Instrumentation and Electrical Equipment During Construction of Nuclear Power Generating Stations."

ANSI N45.2.5-1974, "Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants."

ANSI N45.2.8-1975, "Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants."

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