

NRC INSPECTION MANUAL

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INSPECTION PROCEDURE 37051

VERIFICATION OF AS-BUILTS

PROGRAM APPLICABILITY: 2512

37051-01 INSPECTION OBJECTIVES

Determine whether:

- 01.01 As-built design and construction drawings and specifications correctly reflect the as-built condition of the plant.
- 01.02 Changes from the original design (or SAR) were properly reviewed and approved.
- 01.03 Plant seismic and other stress calculations are based on as-built conditions.

Inspection Schedule

May Be Started

18 months before
operating license

Must Be Started

1 year before
operating license

Must Be Completed

Before operating
license

37051-02 INSPECTION REQUIREMENTS

Approximately 1 year before estimated issuance of the operating license (OL), the construction site and design/engineering office(s) shall be inspected to determine whether the as-built configuration of the plant conforms to the approved final design and meets regulatory requirements and FSAR commitments.

02.01 Construction Site

- a. Determine adequacy of:
 - 1. Status of schedule for completion of as-built design documents.
 - 2. Procedures governing generation and completion of as-built design documents including design modifications (i.e., drawings, specifications, and incomplete calculations).

3. For design modifications
 - (a) Verify that prior to the modification(s) being declared operable, the controlled copy of all as-built documents used by the plant operators were either revised and distributed for design changes, or have been legibly marked-up on an interim basis to show all changes relating to the modification(s).
 - (b) Verify that administrative controls and responsibilities have been clearly established for the following:
 - (1) Making the as-built documents for design changes on an interim basis, review, approve authenticate the marked-up document and safeguarding the document and related papers until all marked-up changes have been incorporated on the revised documents.
 - (2) The program directs users of this as-built document to use and refer to, the marked-up copy for the purpose of testing, maintenance and future design change activities, until the revised as-built document incorporating all the marked-up changes is officially issued.
 - (3) Revision of documents incorporating all marked-up changes, issue and distribute these documents in a timely manner.
- b. Select representative final design documents as discussed under 1 through 4 below, including detailed design drawings and construction specifications relative to the specified inspection items. By comparing final detailed construction drawings and specification requirements with the actual installation, determine whether final design drawings and specifications reflect as-built conditions for each item indicated below. Each item should be completed and accepted through quality control inspection prior to this examination.
 1. Piping systems. From each of eight safety-related systems (at least four are to be ASME Class 1), select one (or one group of) isometric drawing(s) showing pipe welds, supports and restraints. For each system selected, examine a representative sample of:
 - (a) supports - location, type, and configuration
 - (b) pipe welds - location and identification
 - (c) piping - location, size, configuration, component location, weight (valves) and valve orientation (including operators)
 2. Electrical raceways. From different electrical divisions and locations in the plant, select appropriate electrical drawings and specifications that include six Class 1E conduit and six Class 1E cable tray runs of appropriate length. For conduits and cable tray runs selected, examine the following:
 - (a) location and routing
 - (b) supports
 - (c) separation and isolation

- (d) cable loading (physical and thermal)
 - (e) identification (conduit and tray)
3. Electric cables. Review design and construction records (drawings, pull cards, etc.) which represent as-built cable routing. Select two Class 1E cable runs in each of three different electrical systems.
 - (a) For each cable selected, compare design with actual installation relative to routing, identification, protection/isolation, and separation from redundant cable.
 - (b) For each cable or group of conductors selected above, compare design document and as-built identification for each conductor at termination points.
 4. Structures. Select one structural steel assembly from each of four Seismic Category I structures. Each assembly selected should contain at least three welded and/or three bolted joints.
 - (a) Determine whether the structural assembly configuration conforms to final design.
 - (b) Determine whether joint location/orientation, dimensions and configuration conforms to final design.
- c. Examine a sample of five plant changes not yet incorporated into as-built drawings, and have the licensee verify (to the NRC inspector) the status of review, approval, and revision of these identified changes from the "original" design.
 - d. Examine a sample of five as-built changes on design/construction drawings which correctly reflect the as-built condition, and have the licensee verify (to the NRC inspector) that the changes were properly reviewed and approved by appropriate personnel.

02.02 Licensee/AE Corporate Office or Construction Site

- a. Select a representative sample from the drawings used for inspection in item 02.01b above where changes had been incorporated in safety-related systems. Determine whether the as-built condition of the plant was used as the input to the seismic analysis of the system or that the as-built condition conforms to the original seismic criteria, as applicable.
- b. Determine what action the licensee has taken to ensure that final as-built design documents (drawings, specifications, and calculations) will be readily available to site operations personnel when commercial operation is initiated. If certain as-built design documents (e.g., system analysis) are to be retained by the nuclear steam system supply (NSSS) vendor or architect-engineer (A-E) examine adequacy of licensee's timely access to such records for analysis of plant operating conditions.

37051-03 INSPECTION GUIDANCE

General Guidance

- a. Applicable portions of the SAR should be reviewed to determine requirements before inspection in this area. The inspector should make this determination during inspection preparation.

- b. It should be noted that different editions or revisions to codes, standards, and regulatory guides may apply to different licensees. Additionally, regulatory guides are applicable only when invoked by the SAR, QA manual procedures, work procedures, or other special circumstances.

03.01 Specific Guidance

- a. Inspection Requirement 02.01a. Appropriate standards can be used as a guide in the area. For example, ANSI N45.2.11 requires that where changes to previously verified designs have been made, design verification shall be required for the changes, including evaluation of the effects of those changes on the overall design. Further, ANSI N45.2 states that records which correctly identify the as-built conditions of items in the nuclear facility shall be maintained and stored for the life of the particular item while it is installed in the nuclear facility. Additionally, 10 CFR 50, Appendix B, Criterion III, states, in part, that design and field changes shall be subject to the same design control procedures as the original design.

Normally, numerous changes will be made to the facility during construction that are different from the original design (SAR). Such changes will result in the accumulation of various types of design change documents and/or marked-up drawings. Since these changes reflect as-built conditions, they should be adequately controlled so they will be readily available for use with affected original design documents during future evaluations of the effect other design changes have on the overall design. Additionally, the as-built process should result in proper and timely updating of the original/master drawings and specifications to incorporate such changes. The intent of this item is to determine whether adequate procedures exist to assure that as-built inputs are properly documented and controlled.

Modifications to the plant systems may result in design changes which in some cases may be very extensive. In these cases, the affected design documents should be expected to be revised and issued before implementation of the modification. In other cases where design changes are minimal, the affected documents are updated by marking-up the design changes on a controlled set of documents on an interim basis, pending completion of the document revision, review and approval cycle. In every case, whether updating of the document is done by revising or through interim mark-up, the updating must be completed prior to the modification being declared operable. Drawings changed by the modification should indicate that a change is outstanding until all work (including drawing change) is complete. If the drawing markup is for a temporary modification, the applicable document shall clearly show period of time of its validity.

In cases where documents have been updated through a temporary mark-up, revision of the document to incorporate the marked up changes should be done on a timely manner following the modification. The timeliness of document revision should be consistent with the safety function of the modified system. Effects of marked-up design changes should not preclude the document being a "useable" reference document, i.e., without clutter which could cause difficulties in determining the actual installed configuration. The marked-up document should be referred to for testing, maintenance and future design change activities until the revised document is issued.

- b. Inspection Requirement 02.01b. In this section the intent is to select a specific sample for in-depth inspection. Select representative conduit and tray runs of sufficient length to determine whether there is reasonable assurance that the raceways meet applicable requirements.

- c. Inspection Requirement 02.02a. Completion of this inspection requirement will generally require followup at the licensee's and, if necessary, AE's engineering offices. As these examinations are unique to a specific project, the region (rather than Vendor Program Branch) has the lead in completing the inspection requirement by either one of the following methods:
 - 1. Arrange for a licensee audit of his A-E to ascertain (for drawings selected) whether final seismic analysis is based on as-built conditions; and conduct an inspection of the licensee in accordance with Inspection Procedure 35020.
 - 2. During an inspection arranged by Vendor Programs Branch in accordance with Regional Office/LCVIP Interface Policy of MC-2500.
- d. Inspection Requirement 02.02b. The intent is to determine whether the schedule of completion of as-builts, calculations, etc. indicates completion prior to commercial operation and whether the work required to be completed can meet the established schedule.

37051-04 REFERENCES

Applicable chapters of the SAR, including pertinent codes and standards referenced in these chapters

ASME Boiler and Pressure Vessel Code, "NCA 4137.7 and NCA 3554."

IE Bulletins 79-14 and 79-04

Regulatory Guide 1.26, "Quality Group Classifications and Standards"

Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)"

Regulatory Guide 1.29, "Seismic Design Classification"

Regulatory Guide 1.32, "Criteria for Safety-Related Electrical Power Systems for Nuclear Power Plants"

Regulatory Guide 1.75, "Physical Independence of Electrical Systems"

ANSI N45.2, "Quality Assurance Program Requirements for Nuclear Facilities"

ANSI N45.2.11, "Quality Assurance Requirements for the Design of Nuclear Power Plants"

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