

# NRC INSPECTION MANUAL

DQASIP

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## INSPECTION PROCEDURE 46055

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### STRUCTURAL CONCRETE RECORD REVIEW

PROGRAM APPLICABILITY: 2512

#### 46055-01 INSPECTION OBJECTIVES

01.01 To review structural concrete records to determine whether:

- a. The licensee system for preparing, reviewing, and maintaining records is functioning properly.
- b. The selected records reflect work accomplishment consistent with specifications and procedures.
- c. The records indicate any potentially generic problems, management control inadequacies, or other weaknesses that could have safety significance.

#### Inspection Schedule

##### May Be Started

In conjunction with  
Inspection Procedure  
(IP) 46053

##### Must Be Started

Before nine months of  
Category I concrete  
placements have elapsed

##### Must Be Completed

Six months after  
the last Category I  
concrete placement

#### 46055-02 INSPECTION REQUIREMENTS

Review licensee/contractor requirements for QA record generation and management. Determine who prepares each record and, importantly, who is required to review the records for accuracy and for assuring that the recorded information meets requirements.

02.01 Review the documentation generated for each concrete placement reviewed in Inspection Procedure (IP) 46053-023. A complete record review should be done for four placements with emphasis on the early placements. The remainder of the placements should have the documentation sampled. To determine whether the licensee/contractor system for documenting safety-related work is functioning properly, review a sample of these records by verifying:

- a. Receipt Inspection and Material Certification. Records confirm that required material characteristics, performance tests, nondestructive tests, and other specification requirements were met.

b. Installation Inspections

1. Records confirm that concrete production, concrete placement, and installation of components were performed as specified.
2. Records confirm that the required inspections (including after form removal) were performed and acceptance criteria defined.
3. Production test results quantitatively indicate test results and acceptance criteria.
4. Records confirm that required protection and curing conditions were provided after installation.

02.02 Review a sample of the following records:

a. Nonconformance/Deviation Records

1. Records include current status of these items (review about 10 nonconformance reports to ascertain adequacy).

In addition, be aware that some nonconformance/deviation reports for piping and equipment supports may affect the structural adequacy of plant structures. A sample of these reports (3-5) should be reviewed to determine the scope of the structural review performed (interface control between the piping, mechanical, and civil engineering units). The structural engineering review should ensure that structures have been adequately designed for the actual, as-built loading conditions.

2. Records are legible, complete, reviewed by QC personnel, and readily retrievable.
3. Nonconformance reports include the status of corrective action for resolution.

b. Training/Qualification Records of Craft, QA, and Inspection (QC) Personnel

1. Records are complete and current.
2. Records establish that QA/QC personnel are adequately qualified for their assigned duties and responsibilities. Certification of inspectors must show which ASTM tests the inspector is qualified to perform.
3. Records indicate that craft personnel have been trained in their assigned tasks.

c. QA Audits

1. Records establish that the required audits were performed.
2. Records show that deficiencies identified during audits were corrected and that corrective action was such that repetition of the deficiency, or similar deficiencies, would be precluded.

## 46055-03 INSPECTION GUIDANCE

General Guidance. Applicable quality assurance manuals and procedures should be reviewed to determine licensee commitments relative to documenting construction and inspection activities prior to performing this inspection. The adequacy of the licensee's documentation requirements are reviewed during IP 46051. Findings from this inspection should indicate proper implementation of documentation requirements for material certifications, installation inspections, and personnel qualification records. Review of QA audits and nonconformance/deviation records should incorporate an assessment of the licensee's conformance to the reporting requirements of 10 CFR 50.55(e).

Findings from this inspection activity should address each element as being satisfactory, being unresolved and requiring resolution, or being in violation and requiring correction. When significant inadequacies are identified in specifications or procedures indicating weakness within the preparing technical organization, the inspector should inform cognizant regional supervision. The issue should be addressed at the appropriate level of management.

It may be convenient and desirable to complete portions of this procedure in conjunction with IP 47055.

### 03.01 Specific Guidance

Note: The numbering of the guidance below refers to specific subsections of 02, above.

02.01a Chemical and physical tests for all materials used must indicate that specifications have been met at the required frequencies.

02.01b1 Review the results of compressive strength determinations. Verify that results are being evaluated in accordance with ACI 214, Recommended Practice for Evaluation of Compression Test Results of Field Concrete. During this portion of the inspection, also review the results of strength tests on mechanical reinforcing steel splices.

Records should be verified to show that mix specified was delivered and placed. Structural drawings or specifications will indicate the design concrete strength.

02.01b Replacement inspections performed by different crafts must not have been done so long ago that they no longer represent the actual conditions just prior to the placement.

02.02a1 This review may need to be performed at the designer's office. Adequate controls should exist to ensure that safety-related structures have been adequately designed for the actual, as-built loading conditions. Preliminary design loads may not be sufficient in all cases to cover all unforeseen loads or load changes. Inadequate structural engineering reviews or a lack of control over design reviews may indicate a need for an "as-built" load verification program.

02.02a3 Evaluate the licensee's trending analysis of nonconforming items and determine if generic items are being identified and corrected.

02.02b3 As part of craft personnel training, the qualification records of splicing crews should be reviewed.

## 46055-04 REFERENCES

SAR, Chapters 1, 3 and 17, including pertinent codes and standards referenced in the chapters.

Regulatory Guide 1.10, Mechanical (Cadmold) Splices in Reinforcing Bars of Category I Concrete Structures.<sup>1</sup>

Regulatory Guide 1.15, Testing of Reinforcing Bars for Category I Concrete Structures.<sup>1</sup>

Regulatory Guide 1.19, Nondestructive Examination of Primary Containment Liner Welds.<sup>1</sup>

Regulatory Guide 1.38, Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage and Handling of Items for Water-Cooled Nuclear Power Plants.

Regulatory Guide 1.58, Qualification of Nuclear Power Plant Inspection, Examination and Testing Personnel.

Regulatory Guide 1.88, Collection, Storage and Maintenance of Nuclear Power Plant Quality Assurance Records.

Regulatory Guide 1.94, Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants.

Regulatory Guide 1.103, Post-Tensioned Prestressing Systems for Concrete Reactor Vessels and Containments.<sup>1</sup>

Regulatory Guide 1.107, Qualifications for Cement Grouting for Prestressing Tendons in Containment Structures.

Regulatory Guide 1.123, Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants.

Regulatory 1.136, Materials, Construction, and Testing of Concrete Containments.

Regulatory Guide 1.142, Safety-Related Concrete Structures for Nuclear Power Plants (Other Than Reactor Vessels and Containments).

Regulatory Guide 1.146, Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants.

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<sup>1</sup> These Regulatory Guides were withdrawn by Regulatory Guide 1.136, Revision 2, June 1981. Implementation of Regulatory Guide 1.136, Revision 2 is for applications docketed after May 1981.