

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 51055

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### ELECTRICAL COMPONENTS AND SYSTEMS - RECORD REVIEW

PROGRAM APPLICABILITY: 2509

#### 51055-01 INSPECTION OBJECTIVES

By selective sampling and evaluation of safety-related quality records pertaining to electrical systems and components, determine whether:

01.01 The licensee and contractor systems for preparing, reviewing, and maintaining records are functioning properly.

01.02 The records reflect work accomplishment consistent with NRC requirements and safety analysis report (SAR) commitments.

01.03 The records indicate any potentially generic problems, management control inadequacies, or other weaknesses of safety significance.

#### Inspection Schedule

<u>Inspection</u>	<u>May Be Started</u>	<u>Must Be Started</u>	<u>Must Be Completed</u>
First	After work is 30%	Before work is	Before work is
Second	After work is 60%	Before work is	Two months after

#### 51055-02 INSPECTION REQUIREMENTS

02.01 Record Control and Review. Review licensee and contractor requirements covering the span of records for safety-related electrical components and associated items.

- a. Determine who prepares each quality-related record, who reviews the records for accuracy and who ensures that the recorded information meets requirements.
- b. Evaluate the information obtained above and determine whether the established record management system satisfies SAR commitments.

02.02 Work and Inspection Records. Review and evaluate pertinent quality records in the areas listed below. Determine whether adequate preparation,

control, review, and evaluation of these records have been made; whether the records reflect that requirements have been met; and whether the system of records is functioning properly. The selection shall include records of diverse safety-related electrical systems and components from various areas of the plant such as raceway and raceway supports, switch gear and associated breakers, emergency diesel generator and electrical auxiliaries, transformers, motors, dc systems, motor control centers, electric valve operators, and containment penetration assemblies. The records selected shall include redundant components and components located inside containment.

- a. Receiving Inspection Records. Review and evaluate a selected sample of receiving inspection records associated with three types of electrical components (such as listed in 02.02 above), and determine whether:
  1. Receiving inspection documents properly and uniquely identified received electrical components and associated items.
  2. Applicable engineering and functional specifications (regarding size, type, material, etc.,) of received items and components were met or otherwise noted.
  3. The required electrical component characteristics, material, performance tests, environmental and seismic qualification tests, nondestructive tests, and other specification requirements were met or otherwise noted.
  4. Original records or certification system met requirements of applicable criteria.
- b. Storage Records. Review and evaluate a selected sample of storage records associated with three types of electrical components (such as listed in 02.02 above), and determine whether the records reflect that:
  1. Specified storage conditions and requirements were maintained (e.g., internal preservation, shaft rotation, insulation resistance tests).
  2. Storage inspections were properly made at specified intervals.
  3. Records of nonconforming items in storage areas were properly maintained.
- c. Installation Records. Review pertinent quality records pertaining to installation activities associated with five types of electrical components (such as listed in 02.02 above), and determine whether these records reflect the following:
  1. Most recent and approved design and construction documents were used during installation.
  2. Specified electrical components and associated items were installed in the location specified or otherwise noted.
  3. Materials and methods used for supports and anchors (including welds) met applicable specifications.

4. Required inspections were performed, recorded, reviewed and evaluated by qualified personnel.
  5. Inspection records were complete and satisfy documentation requirements.
  6. Physical separation and independence requirements were met.
  7. Required protection was provided after installation.
- d. Construction Testing Records. Review and evaluate a selected sample of construction testing records associated with three components, and determine whether:
1. Required tests were performed as required.
  2. Records indicate that approved procedures were followed.
  3. Test equipment was periodically checked and calibrated as specified.
  4. Test data and results were properly documented and evaluated, and corrective action, if required, was taken.

02.03 Personnel Qualification Records. Review and evaluate personnel records in general and the qualification records for two inspection (QC) personnel in detail and determine whether:

- a. The system of craft and inspection personnel qualification records meets stated requirements and is being maintained in a current status.
- b. The records are sufficient to reasonably support qualification in terms of certification, experience, proficiency, training, testing, etc., as applicable.
- c. Action has been taken by responsible licensee/contractor organizations to independently authenticate the record material.

02.04 Nonconformance and Deviation Reports. Review and evaluate a selected sample of ten nonconformance and deviation reports, and determine whether:

- a. Records are legible, complete, and promptly reviewed by qualified personnel.
- b. Reporting requirements of 10 CFR 21 and 10 CFR 50 were recognized during evaluation and appropriate action was taken where necessary.
- c. Records have been routinely processed, timely evaluated and controlled through established channels for resolution of the root cause as well as the immediate problem.
- d. Records are properly identified and stored, indicate current status, and can be retrieved in a reasonable time.

- e. Nonconformance reports include the status of corrective action or resolution, and adequate justification is provided for use-as-is disposition.

02.05 Change Control Records. Review and evaluate a selected sample of five change control records, and determine whether:

- a. Records associated with design and field changes, as well as related work and inspection procedure changes, reflect timely review and evaluation by qualified personnel and are of the type approved for that purpose.
- b. Records of periodic inspections ensure that only the most recent approved documents, including design changes, were used in the field.
- c. Design changes are subject to adequate design control, including consideration of the impact of the change on the overall design and on as-built records.
- d. Records of nonconformances to design requirements include preparation of a nonconformance report even if the nonconformance is resolved through the design change process.

02.06 Audit Records. Review and evaluate licensee and contractor audit records in general and the records of two recent audits in detail (one licensee audit and one contractor audit) pertaining to electrical components. Determine whether:

- a. Audits have been performed in accordance with the schedule and functional areas established in the audit plan.
- b. Audit records are sufficient to verify that the intended purpose and scope of the audits were achieved.
- c. Audit findings have been reported in sufficient detail to permit a meaningful assessment by those responsible for corrective action, final disposition, and trending.
- d. The licensee and contractor have taken proper and timely followup action on those matters in need of correction.
- e. Auditing organization and personnel are independent of the work being audited.

02.07 Additional Inspection. Additional inspections may be conducted in the inspection areas covered above if Regional management concludes that recent findings when evaluated by the SDP will likely result in an assigned color of 'white or above'. In these cases, particular consideration should be given to an expanded sample of items to be inspected under Sections 02.02c, 02.02d, and 02.04, above.

## 51055-03 INSPECTION GUIDANCE

### General Guidance

- a. Pertinent portions of the SAR and licensee/contractor quality assurance (QA) programs should be reviewed to determine documentation requirements before reviewing records in this area. The inspector should make this determination during inspection preparation. Refer to IP 51051, Section 03, for additional guidance, background material, and references. Where possible, the record reviews of this procedure should be performed in conjunction with the work observation inspections of IP 51053.
- b. Inspection records should provide the documentary evidence that criteria have been met. As a minimum, they should contain:
  - 1. Date of activity.
  - 2. Inspector's or data-taker's name or identification.
  - 3. Type of observation.
  - 4. Results.
  - 5. Acceptability.
  - 6. Actions taken for any deficiencies noted, or reference the document containing this information.
- c. While reviewing quality records, look for inadequacies that could lead to construction deficiencies and/or indicate an inadequate management control system.
- d. Because electrical components are so important and extensive, quality records are to be reviewed twice: once before electrical components are about 50% installed and once near the completion of work. The results of the first inspection should be reviewed before starting the second inspection. Areas where deficiencies or problems were identified during the first inspection should be noted and reviewed during the second inspection to determine whether adequate corrective action was taken.
- e. In general, the selection of quality records for review should be made on the basis of importance to operational safety. The sample size and diversity should be sufficient to determine whether the objectives of this IP have been met. It is recommended that records selected include, in part, those associated with components selected for as-built verification under IP 51053.
- f. Findings from this inspection activity should address each functional area as being satisfactory, being unresolved and requiring resolution, or being in violation and requiring correction. When significant inadequacies are identified in quality records, the inspector should inform cognizant Regional supervision. The issue should also be addressed at the appropriate level of licensee management.

- g. The inspector should bear in mind that the NRC's sample covers only a small portion of the records involved. Thus, substantive errors or departure from requirements identified in NRC's sample raise the issue of whether the licensee is adequately controlling the process.
- h. Penetration assemblies, as covered by electrical IPs, refer to assemblies installed in a containment structure opening (sleeve, nozzle, or barrel) and not to the opening itself. The containment opening is considered to be part of the containment structure.

### 03.01 Specific Guidance

#### a. Inspection Requirement 02.02a

- 1. The SAR should identify and describe all electrical components that must operate in a hostile environment (e.g., high radiation, temperature, pressure, humidity) during or after an accident (e.g., loss of coolant, steamline break, etc.). Where environmental qualification testing, or other qualification provisions (such as seismic) are specified, records should be available to verify that required testing has been satisfactorily completed. If these records are not available at the time of component receipt, the receiving inspection records should identify the need for subsequent receipt and review of these documents.
- 2. It is important to ensure that qualification testing has been successfully completed. Qualification documents should be reviewed to substantiate that electrical components are qualified to applicable standards and to the appropriate environment. When components are qualified by type testing, determine whether the testing environment meets or exceeds all service conditions postulated to occur during its installed life. The following types of tests may be required: radiation, temperature, humidity, water impingement, submergence, steam, chemical spray, and pressure. The sequence in which these tests are performed and the synergistic behavior should be conservatively accounted for in the qualification.
- 3. A variety of terms is used for documentation that confirm that certain specifications are met or that specific tests have been satisfactorily performed. For the acceptability of these documents, refer to the requirements of RG 1.123, QA Requirements for Control of Procurement of Items and Services for Nuclear Power Plants (ANSI N45.2.13).

- b. Inspection Requirement 02.02b. Control of storage conditions for equipment stored in place usually requires special effort. The inspector should note whether the specified storage conditions are reflected in the storage inspection records. Refer to RG 1.38 (ANSI N45.2.2, Section 6.5) for guidance applicable to in place storage.

#### c. Inspection Requirement 02.02c

- 1. Licensee and contractor inspection (QC) personnel should use a checklist or other means to ensure that installed equipment is properly identified. Checklists or records of inspection should be generated during the inspection,

and these records should be readily retrievable for review by the NRC inspector. "Properly installed" means that the installation meets applicable NRC requirements and licensee commitments in the SAR and requirements of approved site procedures. Required separation of redundant components is especially important. The as-installed inspection records should match the applicable requirements. In order for the inspector to assure himself that the records reflect actual conditions (identification, type, range, location, etc.), some electrical components selected for this procedure should be the same as those selected in IP 51053. (If the installation differs from the approved installation documents, a nonconformance report and a design change should have been generated.)

2. During installation of equipment or supporting components for the equipment, anchorage holes are sometimes drilled in concrete structures. The work and/or inspection records should indicate (or at least infer) that no indiscriminate cutting of reinforcing steel was done during drilling of anchor holes.
3. Installation and inspection records must contain sufficient detail to permit identification of the specific revisions or change notices used in these activities. Permanent records must provide a clear audit trail to any applicable change or nonconformance documentation. See also Subsection 02.05b, above.

d. Inspection Requirement 02.02d

1. In addition to the records indicating satisfactory testing, the records should reflect that the range, settings, protection, etc., for electrical components are appropriate for postulated accident conditions as well as for normal operating conditions. The SAR and procedures for testing should contain the necessary criteria.
2. Where special requirements are necessary, the records should reflect that such requirements were adhered to.

e. Inspection Requirement 02.04

1. The sample size and diversification of selection should be sufficient to determine whether the system used to handle and control nonconformances is working in an effective manner.
2. The effectiveness of the management control system in this area can be determined, in part, by how adequately and promptly the root cause of nonconforming activities are identified and corrected.
3. "Properly reviewed" means review and evaluation prior to continued or additional work associated with the identified nonconformance.

f. Inspection Requirement 02.06. The records should reflect that adverse audit findings were promptly evaluated and corrected in an adequate manner. The root cause involved should be identified to preclude repetition.

51055-04 REFERENCES

10 CFR 50, Appendix A - General Design Criteria for Nuclear Power Plants, Criteria 1, 2, 3, 4, 5, 17, 18, 19, 20, 21, 22, 23, 24, 34, 35, 38, 39, 40, and 46.

10 CFR 50, Appendix B - Quality Assurance Criteria for Nuclear Power Plants

Facility SAR, Chapters 1, 3, 4, 5, 6, 7, 8, 9 and 17, including pertinent codes and standards referenced in the SAR

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