
INSPECTION PROCEDURE 88138

ELECTRICAL COMPONENTS AND SYSTEMS

PROGRAM APPLICABILITY: 2630

88138-01 INSPECTION OBJECTIVES

01.01 To determine whether the technical requirements detailed or referenced in the facility Construction Authorization Request (CAR), associated with electrical components and systems in Seismic Category I (SC-I) and SC-II systems, have been adequately addressed in the construction specifications, drawings, and work procedures.

01.02 To determine whether requirements, and commitments, in the approved, Quality Assurance (QA) Plan have been addressed in QA plans, instructions, and procedures for electrical components and in SC-I and SC-II systems, and whether they have been established in the facility QA Manual.

01.03 To determine, through direct observation and independent evaluation of work, whether the licensee's work control system is functioning properly and whether the installation of electrical components and systems in SC I and II systems are in compliance with U.S. Nuclear Regulatory Commission (NRC) requirements, licensee commitments, and applicable codes.

01.04 To determine whether: (1) the licensee is adequately implementing the QA program associated with electrical components and systems, including preparing, reviewing, and maintaining a system of quality records; (2) the records reflect work accomplishment consistent with NRC requirements, CAR commitments, and the QA Plan; and (3) the records indicate any potential generic problems, management control inadequacies, or other weaknesses that could have safety significance.

88138-02 INSPECTION REQUIREMENTS

02.01 Review of QA Implementing Procedures. Review QA Manual and implementing procedures associated specifically with electrical component and systems, to determine whether the commitments in the approved QA Plan are being implemented, as follows:

- a. Adequate QA audit procedures have been established for this activity in accordance with the approved QA Plan including: (1) scope and frequency of audits; (2) audit criteria; (3) reporting requirements; (4) follow-up action; and (5) resolution of findings by those audited.

- b. Provisions have been made to ensure that those engaged in conducting audits are qualified and have been adequately trained. Provisions must ensure that auditors do not have direct responsibility in the areas being audited.
- c. Means have been established to verify that technical requirements, including material and component specifications (including traceability and marking requirements), acceptance criteria, and required documentation are specified in design and procurement documents.
- d. Means have been established to verify that any significant design and field changes from approved drawings are adequately controlled and processed commensurate with the original design.
- e. Provisions have been established to ensure that quality requirements are met (including documentation that quality requirements of materials and components are met before installation or use) and that deviations, nonconformances, and defects are adequately documented and processed through to complete resolution.
- f. The licensee has established a program for ensuring that all craft, nondestructive examination (NDE), and inspection personnel associated with the installation of electrical components and systems have been trained, or otherwise qualified to the work procedures involved.

02.02 Specific Technical Review Areas. Determine whether procedures covering work and inspection activities in the following areas are appropriate to the activity and are technically adequate:

- a. Receiving-Inspection Procedures (IPs). Receiving inspection and related procedures provide means to ensure the following:
 - 1. Received components are as specified, properly identified and controlled - or otherwise noted.
 - 2. Input from other groups or other organizations to be used during receiving inspection activities are obtained and properly used, such as the results of source inspections, environmental qualification tests, and other required quality tests.
 - 3. Procurement requirements, such as qualification tests (seismic, environmental, etc.), functional tests, and other quality tests (material, physical, and chemical), have been successfully completed, or status of how and when such requirements will be satisfied is documented and adequately controlled.
- b. Storage Procedures. Storage procedures provide means to ensure the following:
 - 1. The proper storage environments (as specified by the construction specifications and the manufacturers) are established for the various types

of electrical components and meet applicable storage-classification levels, regardless of the location of the stored component.

2. Storage-inspection procedures require initial verification of storage conditions and periodic verifications (internal preservation, motor and generator-shaft rotation, insulation-resistance tests, etc.) for the duration of the storage period. They must also ensure that special and in-place storage requirements are met.

c. Work Procedures. Work procedures are established to ensure the following:

1. NRC requirements and CAR commitments are properly translated into the work procedures (construction specifications, drawings, and work instructions) for adequate control and installation of electrical components and associated items. Areas to review shall include, but are not limited to, the following:
 - (a) Electrical components are identified, located, oriented, and supported as specified.
 - (b) Physical separation and independence requirements of redundant components are met.
2. Interface controls are adequate when multiple contractors are involved.
3. Procedures cover special handling, installation, and maintenance requirements, including those pertaining to protection, preservation of internal cleanliness, and maintenance of component-qualification requirements. For example, all covers, seals, plugs, internal preservatives, and protective coatings are left intact until installation and/or use, as appropriate.

d. Handling Procedures. Handling procedures are established to ensure that the following handling activities and conditions are controlled and performed, as required during receipt, storage, and installation of large electrical equipment:

1. Attachment points,
2. Use of rigging,
3. Positioning,
4. Special handling requirements, and
5. Temporary covers.

e. IPs. "IPs" are established to ensure the following:

1. All safety-related aspects of construction specifications, drawings, and work

instructions are included in the scope of planned inspections.

2. The technical aspects of inspection requirements and acceptance criteria are sufficient to determine whether the components and their installation, testing, maintenance, and protection conform to applicable design and construction specifications.
 3. Records of initial and follow-up inspections include the specific results of the inspection. This should include the specific characteristics being inspected (or the actual measured values), the inspectors' determination of acceptability, and identification of any nonconformances found.
- f. Construction-Testing Procedures. Procedures are established to ensure that special conditions of testing electrical components (prerequisites, sequence, special handling, removal, precautions, etc.) are included and described in proper detail, as required to conduct and monitor the work performed, including the following:
1. Equipment and systems to be tested and the related test procedures are properly identified and controlled. Procedures specify which construction tests are to be performed on each component requiring testing.
 2. Proper type of test equipment (range, accuracy, etc.) is specified.
 3. Type of data to be recorded and method of reporting results.
 4. Review and evaluation of test results by qualified personnel.
 5. Resolution of discrepancies.
- g. Change-Control Procedures. Procedures have been established to control design and field changes and ensure the following:
1. Retrieval of voided drawings and specifications at work sites is controlled.
 2. Field changes are subject to adequate design control and are incorporated into the as-built records.
 3. Coordination among participating design and construction organizations is adequate.

02.03 Follow-up Procedure Review. When electrical components and systems are about 50 percent installed, review work and QA/quality control (QC) procedures pertaining to installation and inspection. Review a selected sample of the procedures addressed in Sections 02.01 and 02.02, above, and note significant changes made (revisions, deletions, additions, etc.). Determine whether the changes are appropriate and whether NRC requirements and licensee commitments remain in these procedures.

02.04 Additional Inspection. Additional inspections, as determined by Regional

management, may be conducted in the inspection areas covered above, if Regional management concludes that recent findings warrant additional attention. In these cases, particular consideration should be given to an expanded sample of items to be inspected under Sections 02.01, 02.02c, and 02.02e, above.

02.05 Inspection of Electrical Systems and Components.

a. General.

1. Inspection of selected electrical systems, components, and associated items [including the emergency power system for principal structures, systems, and components (SSC) loads] shall be accomplished by observation and evaluations of both in-process and completed work at the appropriate stage of completion for the activity to be inspected.
2. Sample selection shall be based on importance to operational safety and shall include redundant components and a diversity of components and locations.
3. Before inspecting selected items, review the specifications, drawings, work procedures, QA/QC procedures, and work schedules applicable to the systems or components selected for inspection.

b. Raceway Systems.

1. For each periodic inspection of the activities in Section 02.02 below, select a representative sample of two safety-related raceway systems.
2. Complete the inspection requirements of Subsections 02.02a, b, d, e, and f for the sample selected.

c. Distribution, Control, and Protective Apparatus.

1. For each periodic inspection of the activities in Section 02.02 below, select a representative sample of three components in this category, such as transformers, switch gear, large motors, M-G sets, motor control centers, and heaters.
2. Complete all the inspection requirements of Section 02.02 for the sample selected.

d. Other Electrical Components.

1. For each periodic inspection of the activities in Section 02.02, below, select a representative sample of three electrical components not selected in Subsections b through e, above. The selections shall include components such as: (1) motor-operated valves; (2) solenoid valves; (3) limit switches; (4) interlocks; (5) containment penetrations; (6) circuit breakers; (7) fuses; and (8) electrical control panels.

2. Complete the inspection requirements of Subsections 02.02a, b, d, e, and f for the sample selected.

02.06 Inspection Activities.

- a. Receiving Inspection. Observe and evaluate portions of receiving-inspection activities pertaining to the electrical components and associated items selected for inspection in the appropriate subsections of Section 02.01, above. Determine whether receiving-inspection activities are being controlled and performed in a manner that will ensure applicable requirements are satisfied in the following areas:
 1. Identification appears on components and in receiving documents.
 2. Physical conditions (damage, deterioration, etc.) are indicated.
 3. Documentation regarding quality requirements (e.g., results of functional and qualification testing) received with components is reviewed to, and meets, requirements. Where qualification testing of components to be placed in a harsh environment (e.g., inside containment) is not a requirement of the specification, follow-up with the licensee to determine what means will be used to ensure that applicable environmental qualification will be satisfied.
 4. Nonconforming components.
 5. An adequate number of qualified personnel are available to perform the receiving-inspection function.
- b. Storage. Observe and evaluate storage activities and conditions for the components selected in the appropriate subsections of Section 02.01. Determine whether:
 1. Components are stored in the proper storage-level designation.
 2. Components are properly identified.
 3. Storage conditions (temperature, humidity, cleanliness, etc.) and requirements are controlled and monitored as directed by the applicable specification and by the manufacturer's specifications.
 4. Licensee and contractor inspection and monitoring activities are being performed in accordance with procedural requirements, if in progress during NRC inspection.
 5. Nonconforming items placed in storage are identified and/or segregated as required.
 6. In-place storage requirements are satisfied.

7. An adequate number of qualified personnel are available to perform the required storage functions.
- c. Handling. As inspection scheduling permits, determine whether handling activities are being controlled and performed as specified when large electrical components are being moved during receipt, storage, and installation.
- d. In-Process Installation. Observe and evaluate in-process installation pertaining to the components and associated items selected in the appropriate subsections of Section 02.01. Determine whether:
 1. The latest approved revision of applicable construction specifications, drawings, and/or construction procedures are available and used by the installers.
 2. The components are as specified, such as type, size or rating, and material.
 3. The components are installed in the proper location and orientation by qualified craft personnel using suitable equipment and tools.
 4. Associated mounting hardware, supports, and anchors are of the type (welded, bolted, etc.,) and material specified, and are properly located.
 5. The required component identification is properly established or maintained.
 6. Installed components are adequately protected from damage by adjacent construction activities.
 7. Licensee and contractor inspections are performed or scheduled to be performed, before “covering up” the work to be inspected; QC hold points are observed.
 8. Inspection activities are completed in a timely and proper manner by qualified personnel.
 9. Documentation of installation and inspection activities is completed in a proper and timely manner.
 10. Nonconformances are identified and handled in accordance with established procedures. Where corrective action is being taken, determine whether it meets the appropriate requirements.
- e. Completed Work. Observe, inspect, and evaluate the completed installation of electrical components and associated items selected in the appropriate subsections of Section 02.01. Determine whether:
 1. Components are installed in accordance with design, construction specifications, and work procedures; components are at the correct location, configuration, and orientation.

2. Specified materials are used.
 3. Bolts, anchors, weldments, other fasteners, and supports are as specified and properly mounted and secured.
 4. Protective coatings, softeners, bushings, and other specified materials have been used as specified.
 5. Equipment and item identifications have been maintained.
 6. Equipment and components are protected from hostile environments, such as high-pressure pipe, rotating equipment, and non-seismically supported equipment.
 7. Electrical components, such as conduit, tray, motors, and power distribution centers maintain specified physical and electrical separation and independence between redundant components.
 8. Statuses of completion, maintenance, and readiness for pre-operational testing are indicated or otherwise documented.
 9. Adequate actions or provisions have been taken and/or maintained (as needed) to ensure that the validation of the environmental qualification of components is maintained.
- f. As-Built Verification. When electrical components and associated items, as selected in appropriate subsections of Section 02.01, are completely (or essentially) installed and inspected, select two of the latest revisions (as-built, if available) of electrical design and/or installation drawings pertaining to the components selected. Review construction specifications and other applicable work instructions referenced by the drawings or otherwise applicable to the installation. Compare the actual installation with the above drawings and associated documents. For each drawing selected, determine whether several components shown on the drawing are of the type specified (function, range, qualification, material, etc.) and whether they have been installed, located, oriented, supported, protected, etc., in accordance with this drawing.
1. Before performing the above, verify the number and statuses of outstanding design changes on the selected drawings (and related specifications).
 2. Discrepancies observed may result from in-process changes, such as those initiated in the field. If in-process changes are involved, determine whether the licensee has properly controlled and documented these changes for engineering review, approval, and subsequent incorporation into the as-built drawings.
- g. Construction Testing. Observe construction-testing activities for the electrical components selected in the appropriate subsections of Section 02.01. Determine whether:

1. The latest revisions of applicable test procedures and/or specifications are available at the work location and used by personnel performing the testing.
2. Properly identified, traceable, and calibrated measuring and test equipment are used.
3. Equipment or components are able to obtain the degree of accuracy and tolerance specified or otherwise meet specified requirements.
4. Required testing results are recorded during the activity; not after the testing has been completed. (Where test results are immediately available to the NRC inspectors, note whether they are within specified limits.)
5. Components that have been tested are adequately identified as to their statuses, (i.e., specified requirements have been met or deficiencies noted).
6. Personnel performing the testing are properly qualified.
7. Test personnel adhere to any special handling or removal requirements.
8. Test discrepancies are properly identified for resolution.

02.07 Regional management can determine that additional inspections, determined by Regional management, may be conducted in the areas covered above, if it concludes that recent findings regarding the licensee warrant such actions. In these cases, inspectors should carefully consider expanding the sample of items to be inspected under Subsections 02.02d, e, and f, above.

02.08 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 CAR commitments.

02.09 Work and Inspection Records. Review and evaluate pertinent quality records in the areas listed below. Determine whether: (1) adequate preparation, control, review, and evaluation of these records have been made; (2) the records reflect that requirements have been met; and (3) 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: (1) raceway and raceway supports; (2) switch gear and associated breakers; (3) emergency diesel generator and electrical auxiliaries; (4) transformers; (5) motors; (6) dc systems; (7) motor control centers; (8) electric valve operators; and (9) 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 Section 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 Section 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 Section 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. Qualified personnel performed, recorded, reviewed, and evaluated required inspections.
 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.

02.10 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. Responsible licensee/contractor organizations have acted to independently authenticate the record material.

02.11 Nonconformance and Deviation Reports. Review and evaluate a selected sample of 10 nonconformance and deviation reports, and determine whether:

- a. Records are legible and complete, and qualified personnel promptly review them.
- b. Reporting requirements of 10 CFR Part 21 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.

02.12 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 IP changes, reflect that timely review and evaluation of design and field change

documents have been performed by personnel who are qualified.

- 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.

02.13 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 follow-up action, on those matters in need of correction.
- e. Auditing organization and personnel are independent of the work being audited.

88138-03 INSPECTION GUIDANCE

03.01 General Guidance.

- a. Electrical components and systems consist of those elements of the facility that are designed to supply, use, control, transform, condition, or interrupt electric power. This IP applies, but is not limited, to the following safety-related electrical components and associated items: (1) raceways; (2) raceway hangers and other supports; (3) switchgear; (4) motor control centers; (5) transformers; (6) batteries and racks; (7) battery chargers; (8) inverters; (9) motor-generator sets; (10) circuit breakers; (11) relays; (12) electrical penetration assemblies; (13) motors; (14) motor operators on valves; (15) electrical-control panels; (16) local cabinets; (17) limit switches; (18) solenoid valves; (19) emergency power system for principal structures, systems, and components (SSC) loads, and (20) other protective devices.
- b. Applicable portions of the CAR, Safety Evaluation Report (SER), and Office of

Nuclear Material Safety and Safeguards requests for additional information should be reviewed during inspection preparation. Determine specific licensee procedural and work instruction commitments relative to construction and inspection requirements for electrical components. The inspectors should then use the above information during the review of the licensee's construction specifications, drawings, work, and IPs, to determine whether the above requirements are adequately translated into the appropriate documents.

- c. To be adequate, procedure-control activities, such as storage, installation, inspection, and testing, must contain sufficient detail to ensure that the specific work steps, that affect the functioning of the installed equipment will be performed properly. These work steps are to be identified and adequately controlled. While reviewing procedures, the inspection should be aware of, and look for, inadequacies that could lead to construction deficiencies and/or indicate an inadequate management-control system.
- d. The inspectors should bear in mind that NRC's sample covers only a small portion of the procedures involved. Thus, substantive errors or departure from requirements identified in NRC's sample raises the issue of whether the licensee is maintaining adequate control and whether the NRC inspectors and/or the licensee should conduct additional examinations to determine the extent of the identified problem.
- e. Findings from this inspection activity should include each functional area as being satisfactory, being unresolved and requiring resolution, or being in violation and requiring correction. When significant inadequacies are identified, indicating weakness within the responsible organization, the inspectors should inform cognizant Regional supervision. The issue should be addressed also at the appropriate level of licensee management.
- f. 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 a part of the containment structure.

03.02 Specific Guidance.

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

- a. Inspection Requirement 02.02. For the purpose of this IP, the term "work procedures" includes construction-specifications, drawings, and work instructions. (Procedures describing methods of fabrication, construction, and/or installation are sometimes called construction procedures.)
- c. Inspection Requirement 02.02a. The CAR should identify and describe all safety-related components that must operate in a hostile environment (e.g., high radiation, temperature, humidity) during or subsequent to an accident. Where environmental-qualification testing or other qualification provisions (such as seismic) are specified, the licensee shall establish means to ensure that the results

of this testing are documented, reviewed, and determined to be acceptable. If this is not performed when components are received, the procedures should specify the organization that will be performing this review and the controls to ensure that all such documentation requirements are satisfied before the component is placed in use. This is a particularly significant area for NRC review.

d. Inspection Requirement 02.02b.

1. U.S. Nuclear Regulatory Commission, Regulatory Guide (RG) 1.38 [American National Standards Institute (ANSI) N45.2.2] or equivalent requirements relative to storage are applicable here.
2. Electrical components may be released for installation on the merits of certifications if the organization involved has established satisfactory program control and audit requirements in this area (ANSI N45.2.1.3). However, certifications do not release the licensee from having other records for operation and for the life of the plant.

e. Inspection Requirement 02.02c.

1. Appropriate and adequate construction specifications, procedures, and other work instructions for a particular activity are required to be approved and available before that activity is started.
2. Model number and type (only) are not considered to be adequate identification. Procedures should specify a unique identification number, along with the model number and name of manufacturer. Adequate (positive) identification is important because similar-looking electrical components can be significantly different with respect to rating, output, material, etc. Safety-related electrical components should be listed in the CAR.
3. Anchor bolts holding or mounting electrical components should be of the type, size and length specified. Provisions should exist to prevent indiscriminate cutting of reinforcement steel during the drilling of anchor holes.
4. The licensee is required to meet Institute of Electrical and Electronics Engineers, (IEEE) Standard 279, and may be committed to RG 1.75, which endorses IEEE 279 with certain modifications. For example, procedures should be established to ensure that independence and separation requirements of safety-related functions from normal operating functions are met.

f. Inspection Requirement 02.02e.

1. The licensee/contractor procedures involved will differ from site to site and may take various forms, such as formal procedures, instructions, checklists, drawings, etc. Review the IPs and compare with the applicable requirements

and construction specifications. Evaluation should indicate whether adequate quality-related IPs are established and are based on appropriate criteria, and, further, whether the results of the licensee's inspection will be transmitted to responsible QA and management personnel.

2. Provisions should include procedures for monitoring or surveillance of locally mounted components by inspection (QC) personnel. They should ensure that maintenance requirements while "stored in place" are satisfied and that adequate protection is provided against possible damage from adjacent construction activities, including construction traffic. (Where protective means used during construction may affect proper operation, provisions should be provided for timely removal.)
- g. Inspection Requirement 02.02f. NRC inspectors who are knowledgeable in the area of electrical systems, in general, and testing, in particular will inspect this area.
1. The CAR should include or reference general testing requirements, and work procedures should provide detailed instructions. In addition, the QA manual should include general surveillance procedures relative to testing, [i.e., activities should be monitored (inspected or audited, as appropriate), in accordance with established procedures].

These procedures should include verification of the following:

- (a) Data sheets (or equivalent) are being used as specified.
 - (b) Testing procedures are current and approved for use; ranges, accuracies, etc., are specified.
 - (c) Testing techniques are appropriate for the component to be tested.
 - (d) Controls are included for removal and handling of components during testing activities.
2. Test data/records should include:
 - (a) Specific identify of the component tested.
 - (b) The specific identity of the measuring and testing equipment used to perform the testing.
 - (c) Identity of the technician performing the test and date of test.
 - (d) Approval signature of responsible individual.
 3. Certificates of calibration should be available at the site for test instruments used to perform tests. These certificates should show that the standards used to establish the accuracy of the test instruments are traceable to a

nationally recognized standard. Procedures should require that the performance and accuracy of test equipment are demonstrated by periodic checking.

4. This item does not include preoperational testing. Construction testing generally verifies that certain components perform as intended, but it is not a test of system capability.
5. Typical tests that may be required include insulation resistance, continuity, battery load, and breaker trips.
6. The licensee is required to provide information, relative to protection of the safety-related portions of the onsite AC power system from certain fault conditions. Significant aspects of this protection include: (1) manual and automatic interconnections between buses, buses to loads, and buses to supplies, and capability of components to withstand anticipated fault conditions; (2) interconnections between safety-related and non-safety-related buses; (3) circuit protection network (e.g., selective trip), including setting criteria, protection for overvoltage, undervoltage, and frequency; and (4) load-shedding devices.

One method to determine the adequacy of these protective systems and devices includes a relay-coordination study. The inspectors should determine whether provisions are established to ensure that adequate procedures are available for this activity. The results of this study should be evaluated by qualified personnel to ensure acceptability of the results.

03.03 Prevalent Problems and Concerns. The inspectors should be alert to problems of a generic nature, such as:

- a. Adequate procedures or other means have not been established to ensure and document that all safety-related electrical components and subsystems have met applicable acceptance criteria or are nonconforming in specific areas.
- b. IPs do not include adequate inspection requirements and acceptance criteria.
- c. Inadequate means to control location and status of electrical components; especially during removal for repair, modification, or replacement.
- d. Inadequate procedures to control the evaluation, approval, and use of field changes. (The licensee/contractor should establish means to ensure that only the latest approved field changes and other revisions or changes are being used for construction and inspection activities.)

88138-04 RESOURCE ESTIMATE

This IP is expected to take, on the average, 24 to 32 hours for each review of licensee/contractor activities. The procedure should be run once early in the installation

of electrical components and systems, with primary focus on procedures and personnel qualifications. A second inspection should be conducted about mid-way in the installation of electrical components and systems, with the primary focus on observation of work and review of installation records.

88138-05 REFERENCES

Duke, Cogema, Stone and Webster, "Mixed-Oxide Fuel Fabrication Facility, MOX Project Quality Assurance Plan (MPQAP)," Docket Number 070-03098, under U.S. Department of Energy Contract DE-AC02-99-CH10888, latest revision accepted by NRC.

Duke, Cogema, Stone and Webster, "Mixed-Oxide Fuel Fabrication Facility Construction Authorization Request," Docket Number 070-03098, latest revision accepted by NRC, Section 11.5, "Electrical Systems" including standards referenced therein.

U.S. Nuclear Regulatory Commission, Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)," Revision 3.

U.S. Nuclear Regulatory Commission, NUREG 1821, "Final Safety Evaluation Report on the Construction Authorization Request for the Mixed-Oxide Fuel Fabrication Facility at Savannah River Site, South Carolina," Section 11.5, "Electrical Systems" including standards referenced therein.

Code of Federal Regulations, 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."

Code of Federal Regulations, 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."

Code of Federal Regulations, 10 CFR Part 21, "Reporting Defects and Noncompliance."

END

ATTACHMENT 1

Revision History for IP 88138

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	08/08/07 CN 07-024	IP 88138 is a newly issued procedure. Issued for MOX inspection program to improve effectiveness and efficiency by incorporating and consolidating electrical components and systems inspection requirements.	None	N/A	ML071980417