INSPECTION PROCEDURE 88133

STRUCTURAL STEEL AND SUPPORTS ACTIVITIES

PROGRAM APPLICABILITY: 2630

88133-01 INSPECTION OBJECTIVES

01.01 To determine whether the technical requirements detailed or referenced in the Construction Authorization Request (CAR), the U.S. Nuclear Regulatory Commission (NRC) Safety Evaluation Report (SER), and the approved Mixed-Oxide (MOX) Project Quality Assurance (QA) Plan (MPQAP), associated with structural steel and supports activities and quality control (QC) for Seismic Category I (SC-I) and SC-II structures, have been adequately addressed in the licensee and/or contractor construction specifications, drawings, and work procedures, and whether the established system of management controls is adequate.

01.02 To determine whether QA plans, instructions, and procedures for structural steel and supports activities have been established in the facility QA manual.

01.03 To determine, by direct observation and independent evaluation, whether work and inspection performance relative to structural steel and supports activities are being accomplished in accordance with design specifications, drawings, and procedures.

01.04 To determine whether the licensee's system for preparing, reviewing, and maintaining records, is functioning properly, and to determine whether the records reflect work accomplishment consistent with specifications and procedures.

01.05 To determine by direct observation of work activities and review of records whether inadequacies in work activities associated with structural steel and supports activities indicate any potentially generic problems, management control inadequacies, or other weaknesses that could have safety significance.

88133-02 INSPECTION REQUIREMENTS

02.01 For each onsite organization with QA/QC responsibilities relative to structural steel and supports activities, the inspectors should refer to the appropriate MOX Fuel Fabrication Facility QA inspection procedures (IPs). If there are multiple contractors with QA/QC responsibilities in this area, inspect a sample, using engineering judgment, concerning the safety significance and the complexity of each work activity.

02.02 Review the construction specifications related to structural steel and supports activities and ascertain whether the specified technical requirements conform to the commitments contained in the CAR. Determine whether appropriate and adequate

procedures in the following areas are compatible with the QA program and prescribe adequate methods to meet the construction specifications, where applicable:

a. Receipt inspection and storage.

Use of specified materials and components;

1. Installation and erection; and

2. Inspection, testing, (non destructive examination (NDE), and records.

02.03 Determine whether the licensee has an established audit program (including plans, procedures, and schedule) covering the SC-I and SC-II work and control functions in the area of structural steel and supports activities and for ensuring that examination and inspection personnel associated with structural steel and supports activities are qualified to perform their assigned work.

02.04 By direct observation of work in progress on the material supporting SC-I and SC-II structures, ascertain whether the following applicable structural steel and supports activities are being controlled and accomplished in accordance with the requirements of the documents reviewed in Section 02.02, above:

a. Receipt Inspection and Storage. Verify that the following items have been implemented:

1. Receipt inspections: Verify the acceptability of specification requirements.

2. Storage: Verify that controls, markings, protection, and segregation are maintained.

b. Use of Specified Materials and Components. On a sampling basis verify the following:

1. Type and grade of materials are as indicated in specifications and drawings.

2. Certificates of conformance or mill test reports meet the proper specifications or physical and chemical requirements, including impact tests, if required.

c. Installation and Erection. Verify that the following items are implemented in the installation or erection process:

1. The component or support is being erected in accordance with the most current specifications and drawings.

2. The layout crew's instruments and tapes are calibrated.

3. Fit-up and alignment meet the tolerances in the specifications and drawings.

4. Components are being properly handled (including bending or straightening).

5. Specified clearances are being maintained.

6. Edge finishes and hole sizes are within tolerances.

7. Anchor bolts, embedded weldments, liner plate anchors, concrete anchors, and studs are of the proper material and grade and have been properly located, and tested and examined.

8. For bolted connections: bolts, nuts, and washers are of the specified type and grade; torque wrenches are calibrated in accordance with approved procedures; other test and measuring equipment used in the bolting process are calibrated; and thread engagement is as specified.

   The inspectors should independently sample installed and QC-accepted bolts and bolted connections of various bolt diameters by use of a calibrated torque wrench, to ensure that proper tension is being developed in the bolt. Proper torque values may be obtained through the use of site-generated data.

   For friction type connections, ensure that the craft personnel follow the procedures properly, so that the bolts will have the required bolt tension. For instance when the turn-of-nut method is used, make sure enough bolts are brought to a “snug tight” condition, to ensure that the parts of the joint are brought into good contact with each other.

   For sliding-type connections, ensure the craft personnel follow the procedures properly so that the bolts are not over-tightened and so that bolts are not at the end of slots, preventing movement of the connection.

d. Inspection, Testing, NDE, and Records. For inspection, testing, NDE, and records, verify the following items:

   1. Inspections are performed at the specified frequency, in accordance with appropriate codes, specifications, and procedures, and adequate acceptance criteria are specified.

   2. Accurate records are developed in accordance with procedures.

   3. Proper and calibrated equipment is used as required.

   4. Personnel conducting testing and NDE are qualified as required (i.e., in accordance with SNT-TC-1A).

02.05 Review the documentation generated for the structural steel and supports activities. Determine whether the licensee/contractor system for documenting safety-related work is functioning properly. Records should be legible, complete, reviewed by QC and/or engineering personnel, and readily retrievable. Review a sample of the following records:

a. Receipt Inspection and Material Certification (if applicable). Applicable for materials purchased from offsite suppliers. Records confirm that required material characteristics, performance tests, nondestructive test, and other specification requirements were met.

b. Installation Inspection. Records confirm that specified materials and components were installed as specified and that the required inspections were performed and acceptance criteria are defined.

c. Nonconformance/Deviation Record. Records include current status of these items. Nonconformance reports include the status of corrective action or resolution.

d. Training/Qualification Records of Craft, QA, and Inspection (QC) Personnel. Records establish that QA/QC personnel are adequately qualified for their assigned duties and responsibilities and that craft personnel have been trained in their assigned tasks.

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

02.06 Review the construction and QC procedures generated from the specifications and determine their adequacy with respect to prescribing adequate methods for achieving the construction specification requirements, including handling and storage of materials.

88133-03 INSPECTION GUIDANCE

General Guidance. Applicable portions of the CAR, the SER, and approved MPQAP should be reviewed to determine licensee commitments relative to construction and inspection requirements, before performing this inspection. The inspectors should then use these documents during the review of the construction specifications, drawings, work procedures, and QA implementing procedures. Structural steel and supports activities should also be reviewed in the light of being consistent with standard industry practice for the successful completion of that activity.

Because structural steel and supports involve unique construction processes for each project, the number of structural steel and supports activities, listed above, which should be reviewed, depends on the significance and applicability of that activity with respect to site conditions and the need for establishing a close relationship between the structural design and the construction techniques. It is for this reason that this inspection module should be performed by someone who is able to discriminate between, and weigh, those activities which will require the most attention and that will have the most impact on safety. The inspectors should use judgment in determining sample selection during inspection activities. Sample selection should reflect the importance of the activity to safety. Observations of work and independent verification of critical dimensions, locations, etc. should be performed at various stages of completion.

The licensee is responsible for implementing or having implemented, the approved QA

program and the commitments described in the CAR. The inspectors must determine if this program is implemented in an adequate and timely manner for the important-to-safety work in progress.

QA/QC procedures must provide for effective inspections that will ensure that work is performed in accordance with specification requirements. QA audits should identify procedural inadequacies and the root cause of repetitive nonconforming conditions. Inspections should require verification of specified controls and should not be accomplished merely by surveillance. Laboratory and field testing procedures must provide for verification of correct material usage, correct selection of reference standards, and should prohibit contractor or QC personnel from discretionary selection of inspection and testing parameters. Qualified personnel should review and determine if the results of testing are acceptable. Construction procedures must reference the required inspection hold points and must also address the QA/QC department stop-work authority.

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 the specifications or procedures, indicating weakness within the preparing organization, the inspectors should inform cognizant regional management. The issue should be addressed at the appropriate level of licensee management.

03.01 Specific Guidance.

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

02.04a The licensee may perform varying degrees of acceptance inspection, as part of its vendor shop-surveillance program. Results of these inspections should be reviewed.

02.04c Connection joints in structures are usually the area of installation problems and also are generally not given the same engineering attention as other structural steel items. Therefore, it is important to select, for review, a few connections in each structure or support reviewed in Section 02.04, above.

02.06 QA/QC procedures must provide for effective inspections that will ensure that work is performed in accordance with specification requirements. Inspection should require verification of specified controls and should not be accomplished merely by surveillance. Construction procedures must reference the required inspection hold points and also must address the QA Department's authority to stop work.

The items selected for review during this inspection should include the following, as appropriate for the specific site design:

1. Control of Specific Materials.

(a) Steel plates and shapes;

(b) Pipes and tubes;

(c) Forgings and castings;

(d) Bolts and studs;

(e) Weld filler-metal

(f) Coatings; and

(g) Other related materials.

2. Control of Specific Processes or Activities.

(a) Heat treatment;

(b) Impact testing;

(c) Examination;

(d) Repair;

(e) Cutting, forming, bending, and aligning;

(f) Erection and bracing;

(g) Welding (for cross flange welding on loaded members, be sure that the procedures or engineering evaluations ensure that the structural integrity of the loaded beams or columns affected will not be compromised.);

(h) Radiography;

(i) Other NDE methods;

(j) Bolting (ensure that the procedures will provide the required bolt tension. For instance, when the turn-of-nut method is used, the procedures should make sure enough bolts are brought to a "snug tight" condition so that the parts of the joint are brought into good contact with each other.);

(k) Postweld heat treatment;

(l) Local leakage testing;

(m) Inspection; and

(n) Documentation of inspection and testing.

03.02 Prevalent Errors and Concerns. Prevalent errors and recent concerns are areas in where the inspectors should be alert to potential generic issues. These areas include:

a. Storage of structures and support components should ensure that contact with ground surfaces is avoided.

b. Inattention to damage and normal wear and tear of protective coverings may lead to substandard or unacceptable weather protection. The licensee's maintenance of protection (canvas or plastic covering) should be reviewed.

c. In the area of maintenance of material identification, damage by handling or weather frequently makes paper tags illegible. Paper tags are usually considered to be inadequate.

d. The use of galvanized bolts and nuts in bolted connections may require thread lubricant, to ensure that minimum torque or pretension requirements are met. There may be frequent adjustments of the minimum torque value.

e. Piece-work traceability of structural steel and American Society of Testing and Materials (ASTM) A325/A490 bolting material has been a problem in the recent past.

f. Deficient alignment or fit-up for welded connections has caused improper welding practices.

g. There have been instances of cutting or edge finishes not being in accordance with specifications or drawings.

h. Instances of weld undercut have gone undetected by QC inspections.

i. Uncalibrated torque wrenches have been used. There should be provisions for the evaluation or reverification of the activities performed by the uncalibrated torque wrench since the last calibration.

j. Difficulties in using the turn-of-nut method, for bolted connections, in defining the initial "snug-tight" condition, and inadequate gauge marks to determine amount of additional turns after "snug-tight." Actual observation may be the only means of verifying the proper implementation the turn-of-nut method.

k. NRC personnel, through independent sampling of bolted connections using calibrated torque wrenches, found that high strength bolted connections do not meet project requirements for proper bolt tension.

l. Welding across the flange of loaded members without engineering evaluation is only to be done under controlled conditions.

88133-04 RESOURCE ESTIMATE

This IP is expected to take, on the average, 24 to 32 hours for each review of licensee/contractor activities. This procedure should be performed every 3 months, during the first year of placement of SC-I and SC-II structures. Thereafter, select at least two placements per year (as applicable). Regional Management should use the inspectors observations of the relative complexity of required SC-I structural steel work activities, and of the observed competency of licensee and contractor personnel, to schedule additional inspections, as required.

88133-05 REFERENCES

American Concrete Institute (ACI), ACI 349.1R-91, "Reinforced Concrete Design for Thermal Effects on Nuclear Power Plant Structures."

ACI 349-97, "Code Requirements for Nuclear Safety-Related Concrete Structures."

ACI 349.2R-97, "Embedment Design Examples."

American National Standards Institute/American Institute of Steel Construction (ANSI/AISC), ANSI/AISC N690-1994, "Specifications for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities."

ANSI/ANS-2.8-1992, "Determining Design Basis Flooding at Power Reactor Sites."

American Society of Civil Engineers (ASCE), ASCE 4-98, "Seismic Analysis of Safety-Related Nuclear Structures and Commentary."

ASCE 7-98, "Minimum Design Loads for Buildings and Other Structures."

American Welding Society (AWS) D1.1, "Structural Welding Code."

U.S. Nuclear Regulatory Commission, Draft Safety Evaluation Report, Revision 1.

U.S. Nuclear Regulatory Commission, Letter to P. Hastings, Duke Cogema Stone & Webster, RE Mixed Oxide Fuel Fabrication Facility Construction Authorization - Request for Additional Information, June 21, 2001.

Duke Cogema Stone & Webster, letter to U.S. NRC, "Requests for Additional Information," Clarification, and Open Item Mapping into the Construction Authorization Request Revision (DCS01-NRC-000120), November 22, 2002.

Duke Cogema Stone & Webster, letter to U.S. NRC, RE MOX Fuel Fabrication Facility Site Geotechnical Report (DCS01-WRS-DS-NTE-G-0005-C), August 10, 2001.

Duke Cogema Stone & Webster, letter to U.S. Nuclear Regulatory Commission, RE Clarification of Responses to NRC Request for Additional Information (DCS-NRC-000085), March 8, 2002.

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," latest revision accepted by NRC.

U.S. Nuclear Regulatory Commission, NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants."

U.S. Nuclear Regulatory Commission, NUREG-1718, "Standard Review Plan for the Review of an Application for a Mixed Oxide (MOX) Fuel Fabrication Facility."

U.S. Nuclear Regulatory Commission, Regulatory Guide 1.122, "Development of Floor Design Response Spectra for Seismic Design of Floor- Supported Equipment or Components."

U.S. Nuclear Regulatory Commission, Regulatory Guide 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants."

U.S. Nuclear Regulatory Commission, Regulatory Guide 1.61, "Damping Values for Seismic Design of Nuclear Power Plants."

U.S. Nuclear Regulatory Commission, Regulatory Guide 1.92, "Combining Modal Responses and Spatial Components in Seismic Response Analysis."

U.S. Nuclear Regulatory Commission, Regulatory Guide 3.40, "Design Basis Floods for Fuel Reprocessing Plants and for Plutonium Processing and Fuel Fabrication Plants."

END

ATTACHMENT 1

Revision History for IP 88133

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	C A

N/A	07/25/07 CN 07-023	IP 88133 is a newly issued procedure. Issued for MOX inspection program to improve effectiveness and efficiency by incorporating and consolidating inspection requirements involving structural steel inspection activities.	None	N/A	ML071720022