INSPECTION PROCEDURE 48051

STRUCTURAL STEEL AND SUPPORTS PROCEDURE REVIEW

PROGRAM APPLICABILITY: 2512

48051-01 INSPECTION OBJECTIVES

01.01 To determine whether the technical requirements detailed or referenced in Chapters 3 and 5 of the facility SAR associated with structural steel and supports, as defined in the guidance section below (Section 03), have been adequately addressed in the construction specifications, drawings, and work procedures, and whether the established system of management controls is adequate.

01.02 To determine whether quality assurance plans, instructions and procedures for structural steel and supports have been established in the facility QA manual and whether these documents conform to the QA program as described in Chapter 17 of the facility SAR.

01.03 To determine whether specification or procedural inadequacies associated with structural steel and supports indicate any potentially generic problems or other weaknesses within the preparing technical organization.

Inspection Schedule

May Be Started	Must Be Started	Must Be Completed
After specifications and procedures for structural steel or support work are developed	Before installation of structural steel or supports into buildings	Before structural steel installation is 20% complete

48051-02 INSPECTION REQUIREMENTS

02.01 For each onsite organization with QA/QC responsibilities relative to structural steel and supports, as defined in the guidance section below, complete the inspection requirements of Inspection Procedure (IP) 35100 relative to this area. Usually IP 35100 will be completed before conducting the inspection requirements of this section. If there are multiple contractors with QA/QC responsibilities in this area, the region may inspect a sample using engineering judgment concerning the safety significance and complexity of the work activity.

02.02 Determine whether the licensee has an established audit program (including plans, procedures, and schedule) covering the safety-related work and control functions in the area of structural steel and supports, including welding.

02.03 Determine whether the licensee has an established audit program for ensuring that all examination and inspection personnel associated with structural steel and supports are qualified to perform their assigned work. Determine whether a program has been established to train craft personnel in their assigned tasks.

02.04 Determine the interfaces and boundaries of the civil-structural and mechanical engineering disciplines with respect to the various structural steel systems utilized as building structures or supports for mechanical and electrical equipment. Because of these interfaces, there should be coordination of the region's inspection effort between the civil, mechanical, and welding disciplines. These disciplines may tend to overlap in the area of structural steel and supports and the inspection plan should ensure adequate coverage of the safety significant areas. The interrelated areas are safety-related supports and restraints (IP 50090), structural welding in accordance with the AWS D1.1, and nuclear welding in accordance with the ASME Code.

02.05 Review the construction specifications related to structural steel and support activities, including welding, and ascertain whether the specified technical requirements conform to the commitments contained in Chapter 3 and 5 of the SAR.

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.

02.07 Additional inspections, as determined by regional management, may be conducted in the inspection areas covered above when licensee performance is classified as Category 3 by the SALP program or if regional management concludes that recent findings will likely result in a SALP Category 3 rating. In these cases, particular consideration should be given to an expanded sample of items to be inspected under Section 02.01 and 02.06 above.

48051-03 INSPECTION GUIDANCE

General Guidance. Applicable portions of the SAR (3.8, 3.9, 5.4, and 17.1), the SER, and NRR/licensee questions and answers should be reviewed to determine licensee commitments relative to construction and inspection requirements before performing this inspection. The inspector should then utilize these documents during the review of the construction specifications. The implementing QA/QC and construction procedures subsequently should be reviewed with the applicable specification and QA manual in mind. Most of this review can be completed during inspection preparation after these procedures have been obtained from the site.

Findings from this inspection activity should address each item in Section 02 above 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 licensee management.

For this inspection procedure and related procedures (IPs 48053 and 48055) structural steel and supports are intended to include the areas listed in Table 1.

As Table 1 shows, these structures, components, supports, and restraints may be procured, designed, fabricated, installed, and inspected in accordance with various standards, codes, and procedures. Therefore it is important that the inspector identify and be cognizant of the applicable requirements and commitments for the items being inspected. In addition the interface boundaries of the civil-structural and mechanical engineering areas must be determined.

Specific information concerning the licensee's plans and schedules for performing comprehensive audits and ongoing surveillances of structural steel and support activities should be defined as a result of this inspection. Information should be obtained about audit procedures, schedules, scope, and auditor qualifications. Licensee on-site QA staffing and surveillance plans should ensure that contractor QC activities are adequately monitored and evaluated. QA/QC inspection and construction procedures should be reviewed and compared with the requirements of the applicable codes and construction specifications. Evaluation should result in a sound indication that all quality-related inspections will be adequately performed and will be based on appropriate criteria and further, that the results of inspections will be transmitted to responsible quality assurance and management personnel. Refer to IP 35100 for additional guidance.

03.01 Specific Guidance

a. Inspection Requirement 02.01. The inspector should also review the appropriate version of ANSI N45.2.5, "Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations During the Construction Phase of Nuclear Power Plants," if cited by the licensee. Specific attention also should be given to the quality assurance program needs that may result from the distribution of contractual responsibilities. Examples of these needs may be provisions for adequate on-site engineering direction, appropriate and adequate procedures related to procurement and use of materials, and adequate control of hold points.

b. Inspection Requirement 02.05. The construction specification must translate the design requirements into details sufficient to define the acceptance testing requirements, and it should specify the personnel and interface responsibilities required to define, control, and resolve field problems that are evidenced during construction.

c. Inspection Requirement 02.06. QA/QC procedures must provide for effective inspections which 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 quality assurance 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

(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

(n) documentation of inspection and testing

48051-04 REFERENCES

04.01 Safety Analysis Report and Regulatory Guides. SAR, Chapters 1, 3, 5, and 17, including pertinent codes and standards referenced in these chapters.

Regulatory Guide 1.19, Nondestructive Examination of Primary Containment Liner Welds.[1]

Regulatory Guide 1.26, Quality Group Classification and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants.

[1] This regulatory guide was 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.

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

Regulatory Guide 1.146, Qualification of Quality Assurance Program Audit Personnel for 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 1.136, Materials, Construction, and Testing of Concrete Containments.

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

04.02 Industry Codes and Standards. The following are some codes and other references that may apply: (The applicable edition or revision of codes and standards should be stated in the SAR.)

ACI 359, Code for Concrete Reactor Vessels and Containments (also known as ASME, B&PV Code, Section III, Division 2).

ACI 349, Code Requirements for Nuclear Safety-Related Concrete Structures, Appendix B, Steel Embedments.

AISC, Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, American Institute of Steel Construction.

AWS D1.1, Structural Welding Code.

ASME, Section III, Division 1, Subsections NB, NC, ND, NE and NF.

ASTM A-36, Structural Steel.

ASTM A-242, High-Strength Low-Alloy Structural Steel.

ASTM A-252, Welded and Seamless Steel Pipe.

ASTM A-441, High-Strength Low-Alloy Structural Manganese Vanadium Steel.

ASTM A-500, Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

ASTM A-501, Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

ASTM A-514, High Yield Strength Quenched and Tempered Alloy Steel Plate, Suitable for Welding.

ASTM A-529, Structural Steel with 42,000 psi Minimum Yield Point (1/2 in. maximum thickness).

ASTM A-570D&E, Hot-Rolled Carbon Steel Sheets and Strip, Structural Quality.

ASTM A-572, High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.

ASTM A-588, High-Strength Low-Alloy Structural Steel with 50,000 psi Minimum Yield Point to 4 in. Thick.

ASTM A-606, Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low-Alloy, With Improved Corrosion Resistance.

ASTM A-607, Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low-Alloy, Columbium and/or Vanadium.

ASTM A-618, Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.

Specifications:

SA-240	SA-106	SA-312	SA-541	SA-105
SA-285	SA-210	SA-333	SA-351	SA-181
SA-299	SA-213	SA-334	SA-403	SA-216
SA-516	SA-358	SA-376	SA-420	SA-234
SA-537	SA-178	SA-430	SA-508	SA-266
SA-738	SA-155	SA-350		

END

Table

TABLE 1

AREA	TYPICAL CODE REQUIREMENTS
Steel containments and appurtenances[1]	ASME Section III, Division 1, Subsection NE
Liner plate and liner anchors for concrete containments[1]	ACI 359/ASME Section III, Division 2
Safety-related steel building structures	AISC; AWS D1.1
Safety-related auxiliary building steel (floor grating supports, stairways, etc.)	AISC; AWS D1.1
Major steel equipment supports for: Reactor vessel, reactor coolant pump, steam generator, pressurizer, polar crane, tanks, heat exchangers, etc.	ASME Section III, Division 1, Subsection NF
Field-fabricated tanks	ASME Section III, Division 1, Subsections NB, NC, ND
Pipe-whip restraints	As defined in the SAR

[1] The containment sleeves, barrels, penetrations, and access hatches are covered under IP 53051 through 53055.