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## INSPECTION PROCEDURE 88200 APPENDIX C

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### INSPECTION OF STRUCTURAL STEEL AND SUPPORTS AT FUEL CYCLE FACILITIES

Effective Date: May 28, 2025

#### 88200.C-01 INSPECTION OBJECTIVES

- 01.01 To determine if safety-significant structural steel and supports work is being performed in accordance with regulatory requirements, the licensing basis, specifications, drawings, and work procedures.
- 01.02 To determine if the applicant/licensee's system for preparing, reviewing, and maintaining records relative to safety-significant structural steel and supports activities reflect work accomplishment consistent with specifications and procedures.
- 01.03 To determine if the as-built condition of safety-significant structural steel and supports meet the specified design requirements, specifications, and drawings. For work related to foundations and buildings, refer to Appendix A of this inspection procedure (IP). For work related to structural concrete, refer to Appendix B of this IP.
- 01.04 To determine if the implementation of the management measures related to work activities for safety-significant structural steel and supports associated with items relied-on for safety (IROFS) is effective and to verify that deviations from requirements are appropriately resolved.

#### 88200.C-02 INSPECTION REQUIREMENTS

- 02.01 For the safety-significant items and services (SSIS) selected for inspection of structural steel and supports, determine whether procedures exist in the following areas, are compatible with the management measures program for IROFS, and prescribe adequate methods to meet the licensing basis and construction specifications, where applicable:
  - a. use of specified materials and components
  - b. installation and erection
  - c. inspection, testing, nondestructive examination (NDE), and records
  - d. configuration management
- 02.02 Determine whether the applicant/licensee has an established audit program (including plans, procedures, and audit schedule) for assessing the adequacy of work control functions and requirements, as applicable in their licensing basis, in the area of safety-significant structural steel and supports, and for ensuring that examination, inspection, and if required, test personnel associated with performing tests and inspections of safety-significant activities are qualified and/or certified to perform their assigned work.

- 02.03 Ascertain whether the following structural steel and supports activities, as required by licensing commitments and applicable building codes, are being controlled and accomplished in accordance with documents reviewed in Inspection Requirement 02.01, above:
- a. use of specified materials and components
  - b. installation and erection
  - c. inspection, testing, NDE, and records
  - d. configuration management
- 02.04 Review the documentation generated for the safety-significant structural steel and supports construction activities, as required by the licensing basis. Determine whether the applicant/licensee/contractor system for documenting safety-significant work is functioning in accordance with requirements. Records should be complete, reviewed by quality control, engineering personnel, or designee, as required, and readily retrievable.
- a. receipt inspection and material certification
  - b. installation inspection
  - c. nonconformance/deviation record(s)
  - d. training/qualification records of craft, and quality inspection personnel (as required)
  - e. configuration management records

## 88200.C-03 INSPECTION GUIDANCE

### General Guidance

Inspectors should review the facility description in the integrated safety analysis, integrated safety analysis summary, or equivalent and be familiar with the SSIS being constructed at the site. The purpose of these as-built inspections is to verify that the assumptions and critical attributes reviewed during the licensing review process remain valid; the design was appropriately translated to construction specifications; the licensee/applicant constructed the facility in accordance with these specifications; and any modifications performed complies with the licensee's configuration management program and does not impact any NRC licensing decisions. For buildings that will store or process special nuclear materials, and are not designated as an IROFS, inspections should be risk-informed and consider attributes that focus on verifying that a failure of the structure would not create an additional unmitigated accident sequence, such as criticality, radiological, fire, etc.

Inspectors should also be familiar with the licensee's management measures and/or quality assurance program, if applicable, and the licensing basis associated with these measures. It is not the objective of this IP to verify the adequacy of the applicant/licensee's management measures program, but inspectors should be prepared to identify potential gaps in the implementation of management measures for future inspections. Inspectors should complete this appendix by inspecting the attributes listed in this appendix for as-built structural steel and supports work with a focus on safety-significant structures, such as IROFS, or regulatory requirements for structures (e.g., Title 10 of the *Code of Federal Regulations* Section 70.64), as applicable. Inspectors should also coordinate this appendix with inspection of foundations and buildings (Appendix A of this IP), and structural concrete (Appendix B of this IP) for efficiency.

Inspectors should contact the applicant/licensee prior to the onsite inspection to help determine which structures and associated structural steel and supports are to be inspected. Observation

during in progress construction of the buildings is desirable but not required. If necessary, inspectors may select completed structural steel and supports for inspection. Inspectors should not attempt to inspect all of the buildings on the site but may expand if significant concerns with the applicant/licensee's control of structural steel and supports construction arise.

Inspectors should collect applicant/licensee procedures, building specifications, and work completion records in advance. If unable to review these documents in advance of the onsite inspection, then the licensee should be notified that these documents, and any other relevant documents, should be available when the inspector(s) arrives at the site.

Inspectors should choose one or more safety-significant structural steel and supports samples and review the areas listed in Inspection Requirements 02.01 through 02.04 to the extent practical and may use their judgment in determining which areas to concentrate on if time is limited.

#### 03.01 Inspection Requirement 02.01

- a. Review procedures, construction specifications, work instructions and drawings for safety-significant structural steel and supports and ascertain whether the specified technical requirements conform to the commitments contained in the licensing basis.
- b. Review structural steel and supports procedures and work instructions to verify they specify the following provisions, as applicable:
  1. use of specified materials and components
  2. installation and erection, which may include onsite engineering direction of construction activities and use of hold points
  3. inspection, testing, NDE, and records
  4. configuration management
- c. For IROFS, determine if procedures are compatible with the management measures program, and prescribe adequate methods to meet the construction specifications.

#### 03.02 Inspection Requirement 02.02

- a. Review applicant/licensee's established audit program (including plans, procedures, and audit schedule) for assessing the adequacy of work control functions and requirements, as applicable, in their licensing basis, in the area of safety-significant structural steel and supports construction activities.
- b. Review audit program to verify if examinations and inspections are performed in accordance with applicant/licensee's requirements and if test personnel associated with performing tests and inspections of safety-significant structural steel and supports construction activities are qualified and/or certified to perform their assigned work.
- c. Verify records establish that required audits, as applicable, were performed and that deficiencies identified during audits were tracked and corrected.

### 03.03 Inspection Requirement 02.03

Ascertain whether the following applicable activities, as required by licensing commitments and applicable building codes, are being controlled and accomplished in accordance with the requirements of the documents reviewed in Inspection Requirement 02.01, above:

- a. Use of Specified Materials and Components. Verify the following, as applicable:
  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.
  3. The items selected for review during this inspection should include the following, as appropriate for the specific site design:
    - (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
- b. Installation and Erection. Verify that the following items are implemented, as applicable:
  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. Connection joints in structures are usually the area of potential installation issues and are generally not given the same engineering attention as other structural steel and supports. Therefore, review a few connections in each structure or supports:
    - (a) For bolted connections, ensure that the 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.

- (b) For friction type connections, ensure that the craft personnel follow the procedures, so that the bolts will have the required bolt tension. For example, 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.
  - (c) For sliding-type connections, ensure the craft personnel follow the procedures so that the bolts are not over-tightened, and bolts are not at the end of slots, preventing movement of the connection.
- 9. The items selected for review should include control of specific processes or activities as appropriate for the specific site design:
  - (a) repair
  - (b) cutting, forming, bending, and aligning
  - (c) erection and bracing
  - (d) welding: for cross flange welding on loaded members, verify that procedures or engineering evaluations ensure that the structural integrity of the loaded beams or columns affected will not be compromised. (If applicable, construction codes may reference American Welding Society (AWS) D1.1, Structural Welding Code).
  - (e) bolting: ensure that procedures will provide the required bolt tension. For example, 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.
- c. Inspection, Testing, NDE, and Records. For inspection, testing, NDE, and records, verify the following items, as applicable:
  - 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.
  - 5. The items selected for review should include the following, control of specific processes or activities as appropriate for the specific site design:
    - (a) heat treatment
    - (b) post weld heat treatment
    - (c) impact testing
    - (d) examination
    - (e) radiography
    - (f) other NDE methods

- d. Configuration management. For the activities observed during Inspection Requirement 02.03., verify if changes occurred during these construction activities, the applicant/licensee properly controlled and documented these changes for engineering review, approval, and subsequent incorporation into the final as-built drawings, as applicable. Verify these actions were completed in accordance with their procedures and management measures for IROFS.

#### 03.04 Inspection Requirement 02.04

Ascertain whether for the safety-significant structural steel and supports construction activities, the applicant/licensee/contractor system for documenting safety-significant work is functioning in accordance with requirements.

- a. Receipt Inspection and Material Certification. Records confirm that required material characteristics, performance tests, nondestructive tests, and other specification requirements were met. Verify the acceptability receipt inspections specification requirements, and for storage, verify that controls, markings, protection, and segregation are maintained, as required.
- b. Installation Inspection.
  - 1. Records confirm that specified materials and components were installed as specified and that the required construction inspections were performed, and acceptance criteria are defined.
  - 2. Review licensee and contractor requirements covering the span of records for structural steel and support work. Determine the initiation point for those records sampled and, importantly, the effectiveness of those responsible for reviewing the records for accuracy and completeness and ensuring that the recorded information meets documentation requirements.
  - 3. Review and evaluate pertinent quality records in a sampling of the areas listed below. Determine whether:
    - (a) Adequate preparation, control, review, and evaluation of these records have been made.
    - (b) Records reflect that appropriate requirements have been met.
    - (c) The system of records is functioning properly.
- c. Nonconformance/Deviation Record.
  - 1. Records include current status of these items. Nonconformance reports include the status of corrective action or resolution, (e.g., determine whether adequate corrective action is being taken when test results are not within tolerance or acceptance criteria.)
  - 2. For the inspection, review and evaluate a sampling of reports applicable to nonconformances or deviations. Determine whether:
    - (a) Records are complete and promptly reviewed by qualified personnel.

- (b) Records have been routinely processed, evaluated in a timely manner and controlled through established channels, for resolution of the root-cause as well as the immediate problem.
- (c) Records are properly identified and stored, indicate current status, and can be retrieved in a reasonable time.
- (d) Nonconformance reports include the status of corrective action or resolution, and adequate justification is provided for use-as-is disposition.
- d. Training/Qualification Records of Craft, and Quality Inspection Personnel. Records establish that quality inspection personnel, as applicable, are adequately qualified for their assigned duties and responsibilities and that craft personnel have been trained in their assigned tasks. Records are complete and current and show which activities inspectors are qualified to perform.
- e. Configuration Management Records. Review and evaluate a selected sample of configuration management records, and determine whether:
  1. 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.
  2. Records of periodic inspections ensure that only the most recent approved documents, including design changes, were used in the field.
  3. 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.
  4. Records of nonconformance's to design requirements include preparation of a nonconformance report even if the nonconformance is resolved through the design-change process.

#### 03.05 Additional Guidance

Note: Personnel Interviews. Informal interviews with field-craft and inspection personnel may be randomly conducted to determine how well employees know the requirements of their work activity. Ascertain whether a sufficient number of adequately qualified quality control inspection personnel, if required, are at the construction site, commensurate with the work in progress, and adequately performing their assigned duties through the established organizational structure.

Prevalent Errors and Concerns. Areas in which the inspector should be alert to potential generic issues. This section is included to provide background for inspectors on past structural steel and supports issues related to construction experience at previous projects. (Note - These are not listed in order of their perceived importance to safety.) These areas include:

- a. Storage of safety-significant structural steel 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. Instances of cutting or edge finishes not being in accordance with specifications or drawings.
- h. Instances of weld undercut have gone undetected by construction quality 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 the 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. Welding across the flange of loaded members without engineering evaluation is only to be done under controlled conditions.

#### 88200.C-04 RESOURCE ESTIMATE

This appendix is intended to provide inspection requirements and guidance applicable to a wide variety of potential construction projects at both existing and new fuel cycle facilities (FCFs). These projects may vary greatly in scope, complexity, and potential risk to public health and safety. Recommended inspection scope and hours for a specific new FCF will be documented in the principal inspection plan (PIP) for that facility developed in accordance with Inspection Manual Chapter (IMC) 2694, "Fuel Cycle Facility Construction and Pre-Operational Readiness Review Inspection Program."

Additionally, this IP can be used to provide additional inspection guidance for plant modification inspections at existing facilities but is not required to be implemented for these projects. Use of this appendix, or sections of this appendix, for modifications at existing FCFs, would be done on a case-by-case basis, in accordance with IMC 2600, Appendix B, "NRC Core Inspection Requirements."



#### 88200.C-05 PROCEDURE COMPLETION

This IP is complete when the applicable appendices or applicable appendix sections are completed for the facility, as determined by the PIP. Inspectors are not expected to complete every activity in the appendices of this IP. Instead, inspectors should prioritize inspection activities based on 1) importance of the activity to safety, 2) availability of the onsite activity at the time of the inspection, and 3) available inspection resources. This appendix does not need to be completed if there are no SSIS covered by this appendix at a FCF.

#### 88200.C-06 REFERENCES

Refer to licensing basis requirements for applicable codes and standards for each fuel facility.

AWS D1.1, "Structural Welding Code"

END

List of Attachments:

Attachment 1: Revision History Table

Attachment 1: Revision History for IP 88200 Appendix C

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional Non-Public Information)
	ML24206A259 05/28/25 CN 25-014	Initial issuance. Discipline specific appendix developed to provide technical inspection guidance for new construction and major modifications activities for fuel facilities with varying technologies, size, licensing requirements, etc.	N/A	N/A