

NRC INSPECTION MANUAL

SFPO/NMSS

INSPECTION PROCEDURE 60853

ON-SITE FABRICATION OF COMPONENTS AND CONSTRUCTION OF AN ISFSI

PROGRAM APPLICABILITY: 2690 and 2515

60853-01 INSPECTION OBJECTIVES

01.01 To determine whether Independent Spent Fuel Storage Installation (ISFSI) dry cask storage system (DCSS) components are fabricated in accordance with:

- a. the Safety Analysis Report (SAR);
- b. the Quality Assurance (QA) program;
- c. the Safety Evaluation Report (SER);
- d. the Certificate of Compliance (CoC), or the site-specific license and technical specifications; and
- e. 10 CFR Part 72.

01.02 To determine whether ISFSI construction activities are conducted in accordance with the QA program.

01.03 To determine whether the licensee has reviewed ISFSI activities for determination of no adverse impact on site operations or Technical Specifications.

60853-02 INSPECTION REQUIREMENTS

02.01 Determine whether:

- a. materials, components, and other equipment received by the fabricator meet DCSS design procurement specifications; and
- b. the procurement specifications conform to the design commitments and requirements contained in the SAR and, as applicable, the CoC or the site-specific license and technical specifications.

- 02.02 With regard to on-site DCSS fabrication activities, determine whether:
- a. the fabrication specifications are consistent with the design commitments and requirements documented in the SAR, and, as applicable, the CoC or the site-specific license and technical specifications;
 - b. the licensee, vendor, and fabricator personnel have established an effective method for tracking, evaluating, and dispositioning changes or modifications to the DCSS component design;
 - c. for selected design changes, the applicable documentation is complete and accurate, including relevant 10 CFR 50.59 or 72.48 evaluations;
 - d. individuals performing quality-related activities are trained and certified where required; and
 - e. the on-site fabricator's personnel are familiar with the specified design, designated fabrication techniques, testing requirements, and quality controls associated with the construction of the DCSS.
- 02.03 With regard to on-site DCSS fabrication QA activities, determine whether:
- a. they are conducted under an NRC-approved QA program (10 CFR 72.140);
 - b. DCSS components are being fabricated per approved QA and 10 CFR Part 21 implementing procedures and fabrication specifications.
 - c. the fabricator's personnel are familiar with the reporting requirements of 10 CFR Part 21;
 - d. the fabricator has complied with 10 CFR 21.6, "Posting requirements;"
 - e. the fabricator has been audited by either the licensee or CoC holder;
 - f. for selected audits and inspection findings from (as applicable) QA audit or surveillance and/or inspection reports issued in the previous 2 years, the findings were appropriately handled with corrective actions implemented in a time frame commensurate with their safety significance;
 - g. supervision and quality control/assurance personnel perform appropriate oversight during fabrication activities; and
 - h. nonconformance reports documenting the deficiencies have been initiated and resolved and corrective actions for identified fabrication deficiencies have been implemented in a time frame commensurate with their significance.
- 02.04 With respect to ISFSI pad design:
- a. for generally licensed ISFSIs, if not previously done, perform Sections 2.01b and 2.02a of IP 60856; or
 - b. for specific licensed ISFSIs, verify that design requirements contained in the SAR, SER, and license or technical specifications have been properly incorporated into documents governing construction of the ISFSI storage pad.
- 02.05 If pad construction activities are observed, then verify:

- a. through the review of records, that the pad's subsoil has been compacted or otherwise treated to meet the specifications defined in the SAR, SER, C of C, and, if applicable, the site-specific license and technical specifications;
 - b. subsoil has been properly treated to meet the requirements specified for the ISFSI pad;
 - c. the correct size, grade, and spacing of reinforcing steel are installed per the pad's specifications;
 - d. restrictions on batch composition and time between mixing and pouring of concrete are met;
 - e. concrete is properly placed in adequate forms, consolidated (vibrated), finished, and cured;
 - f. slump and air entrainment tests fall within the specified values;
 - g. the overall dimensions, orientation, and levelness of the pad meet the design specifications;
 - h. compressive strength samples are collected, cured, and tested, per specifications, and tests indicate whether the concrete meets the specified minimum design strength;
 - i. appropriate QA/QC involvement in and oversight of pad construction activities; and
 - j. through interviews with selected workers and supervisors, that individuals are familiar with the design and construction specifications for the ISFSI pad.
- 02.06 For other ISFSI-related items and activities, such as construction or modification of roadways/railways, buildings, security systems, and other support systems, such as cranes, verify:
- a. for specific licensed ISFSIs, that the design requirements contained in the SAR, SER, and license or technical specifications have been properly incorporated into documents governing construction or modification of these items;
 - b. for generally licensed ISFSIs, that design requirements contained in the 10 CFR 72.212(b) evaluations have been properly incorporated into documents governing construction or modification of these items; and
 - c. if construction or modification activities are observed, then verify through interviews with selected workers and supervisors, that individuals are familiar with the design and construction specifications for the activity and that there is appropriate QA/QC involvement in and oversight of the activity.
- 02.07 For generally licensed ISFSIs, if not previously done, perform Section 02.03 of IP 60856.

60853-03 INSPECTION GUIDANCE

Definitions

Participants: The terms "licensee," "vendor," "CoC holder," "fabricator," "general licensee," and "site-specific licensee" are terms you will commonly encounter while reviewing ISFSI activities. Refer to Inspection Manual Chapter (IMC) 2690, "Inspection Program for Dry Storage of Spent Reactor Fuel at Independent Spent Fuel Storage Installations," Section 03, for definitions of these terms.

Safety Classification: ISFSI systems, structures, and components (SSCs) are classified as either "important to safety" or "not important to safety" by the ISFSI designer.

If “important to safety,” the SSC will typically either:

1. maintain the functions or conditions (i.e., confinement, criticality, shielding, and heat removal) necessary to store spent fuel safely;
2. prevent significant damage to the spent fuel container (DCSS) during handling and storage;
or
3. provide reasonable assurance that spent fuel can be received, handled, packaged, stored, and retrieved without undue risk to public health and safety.

If an SSC does not perform any of the preceding functions, it may be classified as “not important to safety.”

General Guidance

- a. Overall Focus: The inspection focus is to determine whether:
 1. the fabricator is constructing on-site ISFSI components in accordance with an NRC approved QA program, and whether the DCSS component, as fabricated, will perform its intended function as stated in the SAR and, as applicable, the CoC or the site-specific license and technical specifications. DCSS components must be constructed under an NRC-approved QA program, which may be either the licensee's, CoC holder's, or the fabricator's. Refer to IP 60851, “Design Control of ISFSI Components,” for guidance on inspecting design changes.
 2. the ISFSI and its storage pad is designed and constructed in accordance with the site specific license and technical specifications or in accordance with the DCSS CoC, as applicable. Licensees for a generally licensed ISFSI will also need to review ISFSI activities for determination of no adverse impact on site operations or Technical Specifications. Refer to IP 60856, “Review of 10 CFR 72.212(b) Evaluations” for guidance on reviewing generally licensed ISFSIs.
- b. Additional Assistance: You may obtain additional assistance for both technical and design questions from the cognizant Spent Fuel Project Office (SFPO) project manager (PM).
- c. ISFSI SSCs Safety Classification: Before performing an inspection of ISFSI SSCs, the inspector should review the licensee's design basis documents to determine whether the licensee has applied an appropriate safety classification to a particular SSC. Note that site-specific variations in ISFSI designs may affect the safety classification of some SSCs.
- d. ISFSI SSCs Not Important to Safety: For this class of SSCs, the licensee's use of generally accepted commercial-grade standards, practices, and materials in design, fabrication, and construction activities is acceptable. However, these SSCs must still conform to the design requirements described in the safety analysis report (SAR) and supporting engineering documents.
- e. Design Changes: Each DCSS design has been approved by the NRC through the licensing process, for a site-specific license, or the 10 CFR Part 72, Subpart L, process for a general license. All changes to the design described in the SAR must be approved by the licensee or CoC holder. Approval authority for changes can be difficult for the inspector to determine. In such cases, you can find additional guidance in IMC 2690, Section 05.10. (NOTE: Recent changes to Part 72 have extended the provisions of 72.48 to CoC holders, not just licensees.)
- f. Component Functionality: Functionality is the ability of a component to meet its design requirements. Some components may have multiple design requirements and several

functions. These requirements and functions are defined in the SAR, SER, and, as applicable, the CoC or the site-specific license and technical specifications for the DCSS . For example, the cask support basket that separates the individual fuel bundles serves several functions: structural integrity, criticality control, heat transfer, and radiation shielding. Assistance in identifying the function(s) of a given component may be obtained from SFPO.

- g. Document Review: Before any onsite inspection activity, for each DCSS in use, review (as applicable) the:
1. safety analysis report and corresponding NRC safety evaluation report;
 2. certificate of compliance;
 3. site-specific license and technical specifications;
 4. 10 CFR 72.212(b) evaluations for generally license ISFSIs; and
 5. 72.48 evaluations performed since the last update to the DCSS SAR.

SARs and SERs describing DCSS components have been written for each type of approved DCSS. Information on operational commitments for a particular DCSS may also be found in the CoC or the site-specific license and technical specifications. As DCSS designs vary, be careful to review the appropriate documentation. You can obtain copies of these documents from the appropriate regional division or cognizant SFPO PM.

Specific Guidance

03.01 Verify that the procurement specifications conform to the design requirements contained in the SAR, CoC, and other applicable engineering documents. Place emphasis on instances in which components or raw materials do not meet the procurement specifications thus representing a nonconforming condition. Verify that the licensee's or CoC holder's design change process has evaluated and handled these nonconformances. Reference Section 03.03(h) of this procedure for guidance on the evaluation of nonconformances.

You can find supplemental guidance on the quality classification levels of ISFSI components from references found in Section 05 of this inspection procedure.

03.02 Guidance for on-site DCSS fabrication activities.

- a. Fabrication specifications include, but are not limited to, component material specifications, fabrication techniques, examination techniques, and required dimensions and tolerances. Previously identified problems related to DCSS component fabrication include
 1. incomplete documentation of actual fabrication activities in fabrication traveler documents;
 2. failure to explicitly state required critical component dimensions, such as minimum allowable wall thickness, on fabrication traveler documents;
 3. failure to require verification of critical component dimensions using a specified non-destructive examination (NDE) technique (i.e.- ultrasonic testing) as required in the DCSS design documentation;
 4. design changes made outside of the approved design change process (e.g., by letter or memorandum);
 5. inadequate oversight of fabrication activities by the licensee or CoC holder; and
 6. fabrication of a component to a different safety classification than that shown in the design specifications.
- b. Determine, through review of records, inspection of equipment and components, and/or interviews with selected personnel, whether the licensee or CoC holder has performed design changes and modifications. Evaluate the quality and timeliness of such documentation. Assess the thoroughness of documentation and the independence of reviews, particularly for those design changes that resolve nonconformances and field change requests. Check that evaluations contain a discussion of the effect on component functionality. You can find information on component functionality in the SAR, SER, CoC, or, as applicable, the site-specific license and technical specifications.

Determine the adequacy of the timing of design change reviews. Ideally the licensee or CoC holder should complete the reviews before the component is fabricated. However, if the licensee elects to proceed with fabrication "at risk," verify that the licensee does not use the DCSS until all design changes have been evaluated and appropriately dispositioned.

Review IP 37700 for additional guidance and a listing of potentially related procedures. Note that although IP 37700 contains guidance on reactor design changes, ISFSI SSCs are only classified as "important to safety" or "not important to safety," and a "safety-related" classification is not considered. Consequently, exercise caution in assessing the scope and thoroughness of the evaluations if you use IP 37700. Contact the cognizant SFPO PM for assistance on acceptable calculational methods or code applicability. You

can obtain supplemental information on the quality classification of components from references found in Section 05 of this inspection procedure.

- c. Design-basis accidents, such as a DCSS tipover or a drop from a maximum specified height, are addressed in the SAR; however, you may obtain assistance from the cognizant SFPO PM in determining whether a change requires NRC approval for a particular DCSS design.
- d. Fabricator personnel performing quality functions may be welders, NDE inspectors, quality control (QC) staff, and QA auditors. A program for certification of each of these personnel should have been defined and implemented by the fabricator and approved by the licensee prior to performance of quality activities by these individuals.
- e. No specific guidance.

03.03 Guidance for on-site DCSS fabrication QA activities.

- a-d. No specific guidance.
- e-g. Determine if and when the licensee's QA staff or other licensees' QA staffs have audited fabricator activities. You can obtain information about audits of specific fabricators from the owners' groups for specific DCSS designs, the licensee's QA staff, or NMSS/SFPO.

You should obtain and review copies of audits and surveillances performed by onsite QA personnel (the fabricator's or other oversight groups such as the CoC holder's or licensee's). Assess the quality and depth of the audits and surveillances and determine if appropriate corrective actions were implemented for negative findings. You should also review fabrication documents, such as travelers, to ensure that hold points are identified and QA signatures made where required.

- h. For nonconformance reports in which the adverse condition is determined to be acceptable "as is," the report should contain sufficient information to justify why the nonconforming condition does not compromise the ability of the component to perform its intended function(s). Nonconformances should be dispositioned before the DCSS is released to the licensee, unless otherwise authorized by the licensee. Review nonconforming conditions that are resolved by design changes to ensure that component function is not compromised. You may obtain assistance in determining component function from NMSS/SFPO. Also, you can find supplemental information on inspecting design changes in IP 60851.

03.04 Guidance on ISFSI pad design.

- a. Reference Sections 03.01b and 03.02a of IP 60856.
- b. No specific guidance.
- c. No specific guidance.

03.05 IPs 46053 and 46051 may be used for supplemental guidance.

03.06 No specific guidance.

03.07 Reference Section 3.03 of IP 60856.

60853-04 INSPECTION RESOURCES

To prepare for these inspections, each inspector should spend approximately 16 hours on in-office review. Inspection activities will require approximately 40 hours, each, by three inspectors at the ISFSI site. Documentation is estimated to require 16 hours for each inspector. Inspection hours may vary, depending on the amount of activity occurring at the site.

60853-05 REFERENCES

NRC Information Notice 95-28, "Emplacement of Support Pads for Independent Spent Fuel Dry Storage Installations at Reactor Sites," June 5, 1995.

NRC Information Notice 95-29, "Oversight of Design and Fabrication Activities for Metal Components Used in Spent Fuel Dry Storage Systems," June 7, 1995.

NRC Inspection Manual Chapter 2690, "Inspection Program for Dry Storage of Spent Reactor Fuel at Independent Spent Fuel Storage Installations," February, 1997
NRC IP 37700, "Design Changes and Modifications," September, 1990.

NRC IP 60851, "Design Control of ISFSI Components." May, 2000

NRC IP 60852, "ISFSI Component Fabrication by Outside Fabricators." August, 2000

NRC IP 60856, "Review of 10 CFR 72.212(b) Evaluations," November, 1999.

NUREG/CR-6407, "Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety," February 1996.

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

10 CFR 72, Subpart L, "Approval of Spent Fuel Storage Casks."

10 CFR § 50.59, "Changes, tests, and experiments."

10 CFR § 72.48, "Changes, tests, and experiments."

END