



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION IV  
1600 EAST LAMAR BOULEVARD  
ARLINGTON, TEXAS 76011-4511

March 12, 2020

Ms. Mary J. Fisher, Vice President  
Energy Production and Nuclear Decommissioning  
Omaha Public Power District  
Fort Calhoun Station  
Mail Stop FC-2-4  
9610 Power Lane  
Blair, NE 68008

SUBJECT: FORT CALHOON STATION INDEPENDENT SPENT FUEL STORAGE  
INSTALLATION (ISFSI) - NRC INSPECTION REPORT 050-00285/2019-005 AND  
072-00054/2019-001

Dear Ms. Fisher:

This letter refers to the U.S. Nuclear Regulatory Commission's (NRC's) inspections conducted on September 16-19, 2019 and on November 11-14, 2019, of the dry cask storage activities associated with your Independent Spent Fuel Storage Installation (ISFSI). The inspection continued with in-office review of information provided by your staff from September 2019 through January 2020. The NRC inspectors discussed the results of this inspection with you and other members of your staff during a final telephonic exit meeting conducted on January 29, 2020. The inspection results are documented in the enclosure to this letter.

The NRC inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of site meetings, performance of independent radiation measurements, and interviews with personnel. Specifically, the inspections reviewed compliance with the requirements specified in the Transnuclear Certificate of Compliance No. 1004 and the associated Technical Specifications, the Transnuclear Nuclear Horizontal Modular Storage Final Safety Analysis Report (FSAR), and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, Part 50, and Part 20.

Based on the results of these inspections, the NRC documented one violation of NRC requirements. The violation was determined to be a Severity Level IV violation of low safety significance under the NRC's traditional enforcement process. The NRC is treating this violation as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to: (1) the Regional Administrator, Region IV, and (2) the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC's Website at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response, if you choose to provide one, should not include any personal privacy or proprietary information so that it can be made available to the public without redaction.

If you have any questions regarding this inspection report, please contact Mr. Lee Brookhart at 817-200-1549, or the undersigned at 817-200-1249.

Sincerely,

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Greg G. Warnick, Chief  
Reactor Inspection Branch  
Division of Nuclear Materials Safety

Docket Nos.: 50-285; 72-054  
License Nos.: DPR-40

Enclosure:  
Inspection Report 050-00285/2019-005  
and 072-00054/2019-001

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION IV**

Docket Nos.: 050-00285; 072-00054

License Nos.: DPR-40

Report No.: 050-00285/2019-005; 072-00054/2019-001;

Enterprise Identifier: I-2019-005-069; I-2019-001-0137

Licensee: Omaha Public Power District

Facility: Fort Calhoun Station

Location: 9610 Power Lane  
Blair, Nebraska

Inspection Dates: September 16, 2019 through January 29, 2020

Inspectors: Lee Brookhart, Senior ISFSI Inspector  
Reactor Inspection Branch  
Division of Nuclear Materials Safety, Region IV

Eric Simpson, CHP, Health Physicist  
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Approved By: Greg Warnick, Chief  
Reactor Inspection Branch  
Division of Nuclear Materials Safety, Region IV

Enclosure

## EXECUTIVE SUMMARY

### NRC Inspection Report 050-00285/2019-005 and 072-00054/2019-001

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine inspection of the licensee's programs and activities for safe handling and storage of spent fuel at the Fort Calhoun Station's (FCS) Independent Spent Fuel Storage Installation (ISFSI) on September 16-19, 2019 and November 11-14, 2019. The NRC performed an ISFSI programs review prior to the continuous spent fuel loading campaign to move all spent fuel from the pool to storage pad and then returned to the site to perform an inspection of the on-going loading activities (operations associated with Canister No. 15). The inspection continued with in-office review of information from September 2019 through January 29, 2020. The inspections included an evaluation of the current condition of the ISFSI and reviews of several topics to evaluate compliance with the applicable NRC regulations and the provisions of the general license in accordance with the Transnuclear (TN) Standardized Nuclear Horizontal Modular Storage (NUHOMS) system. At conclusion of the on-site inspection, FCS had 14 concrete horizontal storage modules (HSMs) loaded on the FCS ISFSI pad. The HSMs were being maintained in good condition. The quality assurance program and corrective action program were being effectively implemented to capture and correct issues related to the dry cask storage program. One Severity Level IV violation of low safety significance under the NRC's traditional enforcement process was identified which related to a design change that was implemented by the licensee. The violation was treated as a non-cited violation in accordance with the NRC's Enforcement Policy.

#### Operation of an Independent Spent Fuel Storage Installation, IP 60855

- The inspectors observed the critical loading activities associated with canister No. 15. This was the fifth canister loaded in the 2019-2020 loading campaign. The operations observed included fuel loading, welding, non-destructive examination, draining of the canister, drying of the canister, helium backfill, and helium leak testing. The loading operations were conducted in accordance with site procedures and in accordance with the NRC's rules and regulations. (Section 1.2.a)
- The inspectors reviewed the licensee's revision of the seismic analysis for the auxiliary building crane (HE-2 crane), which is utilized to lift the transfer cask during dry cask storage operations. The licensee's evaluation used the seismic response spectra and methods from Appendix F of the Decommissioning Safety Analysis Report for the analysis of the crane structure and components. (Section 1.2.b)
- Modifications to the HE-2 crane since the last ISFSI inspection were reviewed. The licensee made a number of changes to comply with Occupational Safety Health Association (OSHA) standards, update the crane's electronic components, and installed new seismic restraint assemblies to ensure the crane met ASME NOG-1 and NUREG-0554 requirements. (Section 1.2.c)
- The Fort Calhoun Quality Department had included ISFSI related activities in their audit and vendor surveillance program. Quality assurance audits and vendor surveillances performed since the last ISFSI inspection were reviewed. No findings were identified related to the licensee quality assurance activities. (Section 1.2.d)

- Radiological conditions at the ISFSI were evaluated, the radiation levels recorded on the dosimeters around the ISFSI pad showed low radiation levels, as expected for an ISFSI with 10 casks. Offsite monitoring data from the 2017 and 2018 annual environmental reports documented that there were no offsite radiological impacts attributable to ISFSI operations. (Section 1.2.e)
- Selected condition reports were reviewed for the period 2017 through 2019. A wide range of issues had been identified and resolved. Resolution of the issues was appropriate for the safety significance of the issue. No adverse trends were identified during the review. (Section 1.2.f)
- The licensee's fuel selection evaluations for placing spent fuel assemblies into the storage canisters were reviewed for the 2019-2020 continuous loading campaign. The inspectors selected a number of the canisters' contents to compare against the applicable Technical Specifications and Final Safety Analysis Report (FSAR) requirements to ensure the spent fuel met license's requirements. No findings were identified. (Section 1.2.g)

#### Review of 10 CFR 72.48 Evaluations, IP 60857

- A review was completed of the licensee's procedures, equipment, and process changes that had been performed through the site's 10 CFR 72.48 program since the last NRC ISFSI inspection. Additionally, all revisions to the site's 10 CFR 72.212 report that had been completed in the same timeframe were reviewed. The inspectors identified one Severity Level IV violation that was treated as a non-cited violation. The violation involved a design change that FCS completed to expand the site's Horizontal Storage Module array from 10 casks to 42 casks. The inspectors determined that the violation was of low safety significance since the canister and the interior of the Horizontal Storage Module would not have been significantly impacted, the licensee restored compliance, and the dry cask storage system would have maintained confinement and all other safety functions. No other concerns were identified that related to the other changes performed by the licensee. (Section 2.2)

## REPORT DETAILS

### Summary of Facility Status

The Fort Calhoun Station (FCS) permanently ceased power operations on October 14, 2016. Since that time, Omaha Public Power District (OPPD), the licensee, selected to commence decommissioning activities through a contract with Energy Solutions. Decommissioning activities on-site are scheduled to increase once all remaining spent fuel is transferred from the spent fuel pool to the Independent Spent Fuel Storage Installation (ISFSI).

The FCS's general licensed 10 CFR Part 72 ISFSI pad contained 42 Horizontal Storage Modules (HSMs). Each HSM is designed to contain a 32PT dry shielded canister (DSC). Each 32PT canister holds 32 pressurized water reactor spent fuel assemblies. The licensee planned to load a total of 40 HSMs with fuel and leave the remaining two HSMs available for Greater-Than-Class C waste (GTCC). The HSMs were located within the plant's Part 50 protected area.

Three loading campaigns had been performed at FCS. The first loading campaign, in 2006, loaded 4 canisters. The second loading campaign, in 2009, loaded 6 canisters. The third loading campaign was in progress and is scheduled to load 30 canisters to remove all fuel from the site's spent fuel pool. In 2009, FCS upgraded their 75-ton auxiliary building Ederer X-SAM crane to 106 tons. This allowed the licensee to utilize the 100-ton OS197H transfer cask during the 2009 and current loading campaigns. Previously, FCS had utilized the 75-ton lightweight OS197L transfer cask.

The first loading campaign, in 2006, was completed using Certificate of Compliance (CoC) No. 1004, Amendment 8 and the Transnuclear (TN) Final Safety Analysis Report (FSAR), Revision 9. The second loading campaign, in 2009, was completed using CoC No. 1004, Amendment 9, and FSAR, Revision 10. The third loading campaign used CoC No. 1004, Amendment 15, and FSAR, Revision 18. At FCS, the first four canisters are maintained to CoC No. 1004, Amendment 8, Revision 1, and FSAR Revision 15. Canisters numbered five through 10 are maintained to CoC No. 1004, Amendment 9, Revision 1, and FSAR Revision 15. The remaining canisters that are being loaded in 2019 through 2020, are maintained in accordance with CoC No. 1004, Amendment 15, and FSAR Revision 18.

On December 4, 2017, the NRC approved the renewal of CoC No. 1004 for an additional 40 years of storage. All canisters at FCS, under Amendments 8, 9, and 15 will now expire on January 23, 2055. Fort Calhoun Station will be required to implement the license's ageing management program on the first loaded canisters in 2026.

## **1 Operation of an Independent Spent Fuel Storage Installation (IP 60855)**

### **1.1 Inspection Scope**

The inspectors performed a review of FCS's ISFSI activities to verify compliance with requirements of the TN CoC No. 1004 and the TN FSAR. The inspection reviewed a broad range of topics including audits and surveillances conducted by the licensee, condition reports related to the ISFSI and the auxiliary building HE-2 crane, crane maintenance, design changes performed on-site, environmental radiological data collected around the ISFSI for the past several years, and compliance with license

Technical Specifications for fuel loading activities. Inspectors observed loading and processing operations associated with Canister No. 15 during the week of November 11-14, 2019. Additionally, a tour of the ISFSI area was completed to ensure the spent fuel overpacks were maintained in compliance with license and FSAR requirements.

## 1.2 Observations and Findings

### a. Loading Operations

Various loading activities were observed by the NRC inspectors during the inspection. The licensee was in the process of loading Canister No. 15 at the time of the inspection. The NRC inspectors observed fuel movement activities to place spent fuel assemblies into Canister No. 15. The licensee's staff was experienced in moving the spent fuel assemblies and were proficient in locating the correct assembly, verifying the assembly, moving the assembly from the rack to the canister, and inserting the assembly into the assigned canister slot.

Selected welding and non-destructive examination activities were observed during the loading activities associated with Canister No. 15. An automatic welding process was used to weld the canister lid, which utilized one weld head to weld the lid-to-shell weld. The welders operated the equipment remotely in a low radiation dose area. Hydrogen monitoring was performed during the welding of the root weld through the final pass. Additionally, the inspectors observed the non-destructive liquid dye penetrant exams conducted on the lid-to-shell weld and the welds on the vent and drain port covers. No indications or defects were identified during performance of the non-destructive examinations.

Other activities that were observed by inspectors during the loading of Canister No. 15 included the draining of the DSC, drying of the DSC, helium backfill, and helium leak testing. The licensee's performance exhibited a high level of oversight during the vendor's dry cask loading operations. The loading operations were conducted in accordance with site procedures and in accordance with the NRC's rules and regulations. No findings were identified related to the loading operations.

### b. Crane Seismic Evaluation

The licensee performed a complete revision of the seismic analyzes for the auxiliary building crane (HE-2 crane). Specifically, as noted in NRC ISFSI Inspection Report 050-00285/2013-007 (ADAMS Accession No. ML13114A977), the licensee had used an unapproved seismic methodology, known as Alternate Seismic Criteria Methodology to evaluate the crane's seismic response. In response to this issue, the HE-2 Crane Evaluation FC07263, "Auxiliary Building Crane (HE-2) Uprate from 75 Ton to 106 Ton Maximum Rated Capacity," Revision 0, was revised to use the approved seismic method. Evaluation FC07263, Revision 1, used the seismic response spectra and methods from Appendix F of the Decommissioning Safety Analysis Report for the analysis of the crane structure and components. No findings were identified.

c. Crane Design Changes

The licensee completed several engineered design changes to the existing auxiliary building crane (HE-2 crane) since the last NRC routine ISFSI inspection. Design change packages EC-70200, EC-70054, and EC-68812 were reviewed during the inspection. The changes to the HE-2 crane included: 1) installation of safety chains on the trolley and bridge bumpers to comply with OSHA standards; 2) replacement of encoders, counters, and interposing relays associated with the crane's Drive Train Continuity Detector protection system; and 3) installation of new seismic restraint assemblies on each of the four existing HE-2 seismic restraints.

The licensee's modification to add the seismic restraints was to ensure the crane met all requirements of ASME NOG-1 and NUREG-0554. The installation of the new seismic restraint assemblies provided a flat contact interface between each of the existing crane seismic restraints and the building's structure during a seismic event. The modified seismic restraints were analyzed to laterally restrain the crane during a seismic event. No findings were identified related to the HE-2 crane's modifications.

d. Quality Assurance Audits and Surveillances

The FCS Office of Nuclear Oversight (NOS) last completed a quality assurance (QA) audit of its ISFSI program in November 2018. The NOS audit assessed the FCS ISFSI program's performance in the areas specified in 10 CFR Part 72, Subpart G, Quality Assurance, including organization; design control; procurement; document control; instructions, procedures and drawings; document control; corrective actions; and other program areas. The ISFSI Audit Report, NOSA-FCS-18-03, was issued on November 15, 2018. ISFSI problem areas were characterized in the audit report as either enhancements or deficiencies. The 2018 audit report identified one enhancement and eight deficiencies.

Most of the issues identified in the NOS QA audit were related to maintaining up-to-date records and references, procedure enhancement, or timely incorporation of industry operational experience (OE) into FCS procedures. All identified issues were placed into the licensee's corrective action program (CAP) as condition reports (CRs). Each CR required a formal response from the impacted ISFSI program department. As a result of the November 2018 audit report, nine CRs were generated to address issues identified by the NOS group.

The NRC inspectors reviewed the problem statements for all CRs that resulted from the NOS ISFSI audit. The CRs were evaluated to ensure that the problems being identified were properly categorized based on their safety significance and were properly resolved by the licensee. The corrective actions identified or taken for the issues were appropriate for the significance of the problems being identified. The inspectors did not identify any concerns related to the findings of the NOS auditing program at the FCS ISFSI.

The inspectors also reviewed several OPPD vendor surveillance documents related to QA assessments that were performed during the manufacturing of ISFSI components by Orano TN Americas and some of their suppliers. The inspectors reviewed numerous QA checklists and vendor/supplier documentation for ISFSI components that were slated for



delivery and use at FCS. No findings were identified during the review of vendor and supplier surveillance documents provided by OPPD.

e. Radiological Conditions of the ISFSI

The FCS ISFSI is located inside a fenced enclosure within the plant's protected area (PA), approximately 750 feet west-northwest of the reactor building. Inspectors reviewed the radiological conditions of the ISFSI through a document review of the most recent semi-annual ISFSI radiological survey, 7 years of thermoluminescent dosimeter (TLD) monitoring data from around the ISFSI pad, and monitoring data from several years of annual Radiological Environmental Operating Reports. A review of the TLD monitoring records of fence line dose rates showed that all accessible areas of the ISFSI were below the 10 CFR 20.1502(a)(1) limit for unmonitored individuals, which is 500 mrem per year.

Annual Radiological Environmental Operating Reports (AREORs) for FCS were reviewed for the previous several years. The AREORs were produced by the FCS Radiological Environmental Monitoring Program (REMP). REMP is responsible for measuring the direct radiation impacts of plant operations at 47 TLD monitoring stations. All TLD monitoring stations at FCS, including those in close proximity to the ISFSI at the site boundary, documented the dose equivalent to any real individual located outside of the owner controlled area was well below the 10 CFR 72.104(a)(2) requirement of less than 25 mrem per year due to the direct radiation influence from the ISFSI. No findings were identified related to the radiological review.

f. Corrective Action Program

The NRC inspectors performed a review of FCS's CAP associated with ISFSI operations, which included reports related to the auxiliary building crane (HE-2). A list of ISFSI and HE-2 related condition reports (CRs) that had been issued since the last routine NRC inspection of May 2017 was provided by the licensee during the current inspection activity. Several CRs were selected by the NRC inspectors for further review based on the problems as described in the CR listing.

The adverse to quality conditions discussed in the CRs reviewed by NRC covered a broad range of paperwork and maintenance issues that were identified during routine ISFSI storage operations. Based on the types of problems identified, the licensee continued to demonstrate a reasonably low threshold for placing ISFSI and maintenance issues into its CAP. The actions taken for the resolution of the issues were appropriate to the low safety significance of the issues that were identified. Since the FCS site has been idle for the entire time since the last routine ISFSI inspection, the issues identified were mostly related to routine maintenance and scheduling.

No significant trends were identified during the review of the CAP at FCS. The CRs were processed in accordance with FCS Procedure PI-FC-125, "Decommissioning Corrective Action Program," Revision 2. No adverse trends were identified during the CAP review.

g. Fuel Selection

The NRC inspectors reviewed the fuel selection criteria for placing spent fuel assemblies into the storage canisters at FCS. The inspectors reviewed Design Analysis EA19-002, "FCS Fuel Selection and Loading Plan," Revision 0. Design Analysis EA19-002 contained loading plans which provided the fuel loading patterns for the 30 canisters that would contain the 944 spent fuel assemblies that remained in the spent pool after power operation ceased. These documents contained DSC loading maps and fuel assembly specific information such as qualification data, identification numbers, decay heat (kW), cooling time (years), average U-235 enrichment (%), burn-up values (MWd/MTU), and other information. Additionally, the inspectors reviewed Design Analysis EA19-001 "FCS Fuel Classification Report," Revision 1, which documented the process that determined if each of the assemblies were either intact, damaged, or failed assemblies.

The inspectors reviewed the contents of several canisters to compare against the applicable Technical Specifications and FSAR requirements to ensure the spent fuel met license's requirements. No findings were identified during the review of fuel selection documentation.

1.3 Conclusions

The inspectors observed critical loading activities of Canister No. 15. The operations observed included fuel loading, welding, non-destructive examination, draining of the canister, drying of the canister, helium backfill, and helium leak testing. The loading operations were conducted in accordance with site procedures and in accordance with the NRC's rules and regulations.

The inspectors reviewed the licensee's revision of the seismic analysis for the auxiliary building crane (HE-2 crane). The licensee's evaluation used the seismic response spectra and methods from Appendix F of the Decommissioning Safety Analysis Report for the analysis of the crane structure and components.

Modifications to the HE-2 crane since the last ISFSI inspection were reviewed. The licensee made a number of changes to comply with OSHA standards, update the crane's electronic components, and installed new seismic restraint assemblies to ensure the crane met ASME NOG-1 and NUREG-0554 requirements.

The FCS Quality Department had included ISFSI related activities in their audit and vendor surveillance program. Quality assurance audits and vendor surveillances performed since the last ISFSI inspection were reviewed.

Radiological conditions at the ISFSI were evaluated, the radiation levels recorded on the dosimeters around the ISFSI pad showed low radiation levels, as expected for an ISFSI with 10 casks. Offsite monitoring data from the 2017 and 2018 annual environmental reports documented that there were no offsite radiological impacts attributable to ISFSI operations.

Selected CRs were reviewed for the period 2017 through 2019. A wide range of issues had been identified and resolved. Resolution of the issues was appropriate for the safety significance of each issue. No adverse trends were identified during the review.

The licensee's fuel selection evaluations for placing spent fuel assemblies into the storage canisters were reviewed for the 2019-2020 continuous loading campaign. The inspectors reviewed the contents of several canisters to compare against the applicable Technical Specifications and FSAR requirements to ensure the spent fuel met license's requirements.

No findings were identified during the review conducted under IP 60855.

## **2 Review of 10 CFR 72.48 Evaluations (IP 60857)**

### **2.1 Inspection Scope**

The licensee's 10 CFR 72.48 screenings and evaluations performed since the NRC's last ISFSI inspection (ADAMS Accession No. ML19190A217) were reviewed to determine compliance with regulatory requirements.

### **2.2 Observations and Findings**

#### **a. 10 CFR 72.212 Report Changes**

The inspectors reviewed the changes that had been made by the licensee to the site's 10 CFR 72.212 report under the licensee's 10 CFR 72.48 program since the last NRC ISFSI inspection in May 2017. There had been four revisions to the site's 72.212 report since the last inspection (Revisions 3-6). Each revision was reviewed to ensure the licensee had adequately accepted and reviewed the changes in accordance with the licensee's 72.48 process. The major revision changes are discussed below.

- Revision 3: FCS implemented NRC CoC No. 1004, Revision 1, to the canisters that were loaded under Amendment 8 and 9 of the NUHOMS system. The NRC issued Revision 1 to delete the requirement of general licensees to have an operational spent fuel pool after loading of the site's ISFSI was completed and the site was in process of decommissioning.
- Revision 4: FCS adopted newer TN FSAR revisions for the first 10 canisters that were loaded at the site. The first 10 canisters loaded into the ISFSI are now maintained under FSAR Revision 15 instead of canisters 1-4 at Revision 9 and canisters 5-10 at Revision 10. The changes included relevant updates that eliminated the requirements of a spent fuel pool. Additionally, FSAR Revision 15 contained changes related to NRC's renewal of the CoC No. 1004 that increased the life qualification of the storage system's approved life from January 2015 to January 2055.
- Revision 5: Included changes from the site's updates to the fire hazards analysis for the ISFSI.
- Revision 6: Included changes to evaluate and utilize CoC No. 1004 Renewed Amendment 15 for the loading of 30 DSCs for the 2019-2020 continuous loading campaign to remove all spent fuel from the spent fuel pool.

No issues or concerns were identified during the review of the licensee's 10 CFR 72.212 report changes.

b. 72.48 Reviews

The licensee's 10 CFR 72.48 screenings and evaluations for ISFSI program changes since May 2017 were reviewed to determine regulatory compliance. The licensee had performed several procedure revisions and many equipment or process changes under the 72.48 process since the last inspection. The NRC inspectors reviewed the 72.48 screenings and evaluations for the procedure changes and design changes made within the ISFSI program.

The NRC inspectors identified one design change package for additional review to determine if it was performed in accordance with NRC requirements. In March of 2019, the NRC's Division of Fuel Management (DFM) performed an inspection of the vendor, Orano TN Americas, LLC (ADAMS Accession No. ML19148115). In that inspection report, the NRC's vendor inspectors documented an unresolved item regarding a temporary field change and associated 10 CFR 72.48 evaluation that was performed by TN for FCS. The design change allowed the temporary removal of the end-shield walls from two loaded HSMs to expand the HSM array. The end-shield walls were then repositioned to the end of newly constructed empty HSMs. Fort Calhoun Station had required the repositioning of the end-shield walls to the end of the HSM array to ensure all the previously existing HSMs and the newly constructed HSMs could all fit on the original ISFSI concrete pad.

The vendor inspection report documented the following concerns with the 10 CFR 72.48 evaluation performed by TN: (1) operator manual action to meet 10 CFR 72.104; (2) no tornado pressure analysis on the temporary steel plate used following the removal of the end wall and outlet vent covers; and (3) blocking of the vents and how it would impact the technical specification surveillance requirements. The vendor team documented the need for additional information and to coordinate with regional counterparts to determine if the field change potentially constituted as a violation of NRC requirements.

During the inspection period, regional inspectors reviewed FCS's 10 CFR 72.48 Evaluation No. 18-021, which relocated the end-shield walls. The licensee's design change package contained a detailed and thorough review of the operations and evaluations required to safely relocate the end-shield walls. Fort Calhoun Station was able to address the NRC concerns related to the unresolved item, except for item (2) regarding the tornado pressure analysis. Specifically, the inspectors identified that the 72.48 evaluation failed to properly analyze for tornado pressures in accordance with FSAR requirements.

The licensee's end wall repositioning operation included many protections to ensure adverse weather conditions would not cause damage to the existing loaded HSMs and the DSCs. This one-time, end wall repositioning operation was to be performed during a clear day with verification of no severe thunderstorms in the area for the next 48 hours. Next, the empty HSMs were staged for installation in very close proximity to the existing end-shield walls (42 inches). As the end-shield walls were lifted and removed, one at a time, the licensee installed large  $\frac{3}{4}$ -inch steel plates that were designed and reviewed to protect the HSMs and DSCs, including vent openings from tornado bourn missiles.

Once the new empty HSMs were lifted, the large ¾-inch plates were removed to allow placement of the empty HSMs up against the existing HSMs that contained the loaded canisters. The licensee had evaluated that no other structural function (sliding, tip-over due to flood or earthquake, thermal and dead load stresses in concrete, etc.) were affected during the operations. Once the two empty HSMs were placed against the adjacent HSMs and the vent openings were re-covered by the HSM's roof components, the system was restored to the FSAR's original design. Once all new 32 HSMs were placed on the ISFSI pad, the end-shield walls were positioned to the end of the array, which ended the construction of the new array of HSMs.

The NRC's vendor inspectors identified that licensee had reviewed all FSAR accident conditions, except tornado pressures. Once this was identified to the licensee, FCS and TN performed Engineering Change (EC) #70412, "OPPD FCS ISFSI Tornado Pressure During End Wall Removal Evaluation," Dated October 22, 2019. In the EC, the licensee identified that an assumption was made, in the original 72.48 evaluation, that the ¾-inch plate missile shields would have stayed on the loaded HSMs during a postulated tornado event. The EC-70412 concluded that the negative pressure from a tornado event would have pulled the ¾-inch steel plate missile shields away from the loaded HSMs and exposed the interior sides of the HSMs and the vent openings (access to DSCs) to tornado-generated missiles. The evaluation then provided technical justifications that damage from the tornado-generated missiles would not have created any damage beyond the FSAR's design base limits. The only design basis tornado-generated missile that could have contacted either the interior side of the HSM or the DSC was the sphere missile, since the automobile and steel rod design basis missiles would not have fit in the 42-inch opening between the existing HSMs and the staged empty HSMs. Using the FSAR methodology, the licensee calculated that the site-specific sphere tornado missile would not have penetrated, perforated, or scabbed the interior of the HSM nor the DSC. The evaluation demonstrated the DSC would not have lost confinement capability and both the DSC and HSM would continue to perform all design functions had the postulated sphere tornado missile impacted the system.

Additionally, FCS concluded that even though the 72.48 evaluation made an inaccurate assumption that tornado pressure was not a factor, the licensee's position was the 72.48 evaluation was performed within NRC's rules and regulations. Fort Calhoun Station stated in EC-70412, that a tornado event was not credible because the original evaluation and associated procedures to perform the operation required a 48-hour window of non-severe weather using National Oceanic and Atmospheric Administration and local weather forecasts. The licensee stated the evaluation was consistent with requirements in Inspection Manual Chapter (IMC) 0326 "Operability Determinations and Functionality Assessments of Conditions Adverse to Quality or Safety" and Regulatory Informational Summary (RIS) 2001-009 "Control of Hazard Barrier", which allows removal of credited barriers during maintenance activities and requires no temporary protection when severe weather is not a valid threat. As such, the licensee concluded that the use of the supplemental missile shields was a conservative measure and not required.

The NRC inspectors, however, concluded that FCS's use of the guidance in RIS 2001-009, was not in conformance with guidance in NRC's endorsement NEI 96-07, Appendix B, "Guidelines for 10 CFR 72.48 Implementation," and was not in compliance with NRC rules and regulations. The RIS 2009-001 clearly stated the intent of the

document was for operating licenses for nuclear power reactors and did not apply to those who have permanently ceased operations. Additionally, the RIS described that the intent of the document was to be used in conjunction with the 10 CFR 50.65 maintenance rule program, implemented at operating power reactor facilities.

The NEI 96-07 Appendix B guidance further described in Section B3.4 under "Temporary Changes," states that removal of barriers to facilitate ISFSI cask activities are subject to 10 CFR 72.48 in the same manner as permanent changes, to determine if prior NRC approval is required. Additionally, numerous sections in the NEI 96-07 guidance explicitly state that the maintenance rule, 10 CFR 50.65, does not apply to an ISFSI or license holder under 10 CFR Part 72. The end-shield walls at FCS, were not degraded nor non-conforming, FCS was required to perform a 72.48 in accordance with the guidance of NEI 96-07 "other temporary changes." As described in the guidance, the maintenance rule which would include other NRC guidance, such as the RIS 2009-001, for operating licensees does not apply to ISFSI/cask changes.

The NRC concluded that FCS made a change to the ISFSI under the 10 CFR 72.48 Process, 72.48 No. 18-021, and failed to review the change for the design basis accident condition of tornado pressure. Following the licensee's review of tornado pressure, it was identified that the end wall repositioning operations potentially exposed the DSCs to a new accident (impact from a sphere tornado-generated missile) that had not been previously reviewed and approved within the TN FSAR.

Title 10 CFR 72.48 (c)(1)(ii)(C) states in part, a licensee may make a change in the facility or spent fuel storage cask design as described in the FSAR without obtaining a CoC amendment if the change does not meet any of the criteria in paragraph (c)(2).

Title 10 CFR 72.48 (c)(2)(v) states in part, a general licensee shall request that the certificate holder obtain a CoC amendment pursuant to 10 CFR 72.244, prior to implementing a proposed change if the change would: Create a possibility for an accident of a different type than any previously evaluated in the FSAR.

Contrary to the above, from September 20, 2018, to October 29, 2018, FCS made a change in the spent fuel storage cask design as described in the TN FSAR and failed to request the certificate holder to obtain a CoC amendment prior to implementing the proposed change which created a possibility of an accident of a different type than any previously evaluated in the FSAR. Specifically, the licensee created the possibility of a new accident not previously analyzed in the FSAR through 10 CFR 72.48, which removed the end-shield walls from two loaded HSMs, which created the potential of exposing the loaded DSC to the sphere tornado missile, during a hypothetical tornado accident condition.

This violation was dispositioned in accordance with the traditional enforcement process using Section 2.3 of the NRC's Enforcement Policy. The inspectors determined that the finding was of low safety significance since the DSC and the interior of the HSM would not have been significantly damaged by the postulated sphere tornado missile. The dry cask storage system would have maintained confinement and all other safety functions (thermal, criticality, shielding, etc.).

The inspectors determined that the violation was similar to the violation examples in Section 2.1.3.D.5 of the NRC Enforcement Manual, which states that violations of 10 CFR 50.59 will be considered more than minor and categorized at Severity Level IV if the licensee failed to request a license amendment, the NRC would likely approve the amendment, and the change resulted in a condition having low safety significance.

Because the licensee entered the issue into their CAP, the safety significance of the issue was low, compliance was restored within a short period of time once the operations were completed, and the issue was not repetitive or willful, this Severity Level IV violation was treated as a non-cited violation (NCV), consistent with Section 2.3.2.a of the Enforcement Policy (NCV 07200054/2019-001-01, Failure to request the certificate holder to obtain a CoC amendment (10 CFR 72.48)).

The NRC inspectors did not identify any concerns on the other 10 CFR 72.48 screenings or safety evaluations that were reviewed during the inspection period.

### 3.3 Conclusions

A review was completed of the licensee's procedures, equipment, and process changes that had been performed through the site's 10 CFR 72.48 program since the last NRC ISFSI inspection. Additionally, all revisions to the site's 10 CFR 72.212 report that had been completed in the same timeframe were reviewed. The inspectors identified one Severity Level IV violation that was treated as an NCV. The violation involved a design change that FCS completed to expand the site's HSM array from 10 casks to 42 casks. The inspectors determined that the violation was of low safety significance since the DSC and the interior of the HSM would not have been significantly impacted, the licensee restored compliance, and the dry cask storage system would have maintained confinement and all other safety functions. No other concerns were identified related to the other changes made by the licensee.

## 4 **Exit Meeting Summary**

On January 29, 2020, the NRC inspectors presented the final inspection results to Mr. Bradley Blome, Director of Licensing and Regulatory Assurance, Omaha Public Power District and other members of the licensee's staff. The licensee acknowledged the issues presented.

**SUPPLEMENTAL INSPECTION INFORMATION**

**PARTIAL LIST OF PERSONS CONTACTED**

Licensee Personnel

B. Blome, Director of Licensing and Regulatory Assurance  
C. Cameron, Regulatory Assurance  
N. Hurdesty, Project Manager, Dry Cask Storage  
T. Maine, Plant Manager  
B. Obermeyer, Site Security Manager  
D. Shaw, Licensing Manager, TN America  
T. Uehling, Senior Director, FCS Decommissioning

**INSPECTION PROCEDURES USED**

IP 60855      Operation of an Independent Spent Fuel Storage Installation  
IP 60857      Review of 10 CFR 72.48 Evaluations

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened and Closed

07200054/2019-001-01	NCV	Failure to request the certificate holder to obtain a CoC amendment (10 CFR 72.48)
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## LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
AREOR	Annual Radiological Environmental Monitoring Report
ASME	American Society of Mechanical Engineers
CR	Condition Report
CAP	Corrective Action Program
CFR	<i>Code of Federal Regulations</i>
CHP	Certified Health Physicist
CoC	Certificate of Compliance
DBE	Design Basis Earthquake
DFM	NRC Division of Fuel Management
DSC	Dry Shielded Canister
EC	Engineering Change
FCS	Fort Calhoun Station
FSAR	Final Safety Analysis Report
GTCC	Greater-than-Class C
HE-2	Designation for the FCS Auxiliary Building Crane
HSM	Horizontal Storage Module
IP	Inspection Procedure
ISFSI	Independent Spent Fuel Storage Installation
MWd/MTU	Megawatt Days per Metric Ton of Uranium
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NOS	Nuclear Oversight Office
NRC	U.S. Nuclear Regulatory Commission
NUHOMS	Nuclear Horizontal Modular Storage
OE	Operational Experience
OPPD	Omaha Public Power District
PA	Protected Area
REMP	Radiological Environmental Monitoring Program
TLD	Thermoluminescent Dosimeter
TN	Transnuclear or, alternatively, Orano TN Americas