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NLS2010111 72.75(g)
December 29, 2010

ATTN: Document Control Desk
Director, Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Subject: Independent Spent Fuel Storage Installation Sixty-Day Follow-Up Report
Cooper Nuclear Station, Docket No. 50-298, DPR-46
Cooper Nuclear Station ISFSI, Docket No. 72-066

Dear Sir or Madam:

The purpose of this letter is for the Nebraska Public Power District to provide follow-up information regarding a non-emergency, 24-hour event notification (EN 46391) to the Nuclear Regulatory Commission concerning a partial loss of neutron shielding on a dry fuel storage transfer cask at Cooper Nuclear Station. The attached report is submitted pursuant to the requirements of 10 CFR 72.75(g).

Should you have any questions concerning this matter, please contact David Van Der Kamp, Licensing Manager, at (402) 825-2904.

Sincerely,

For Demetrius Willis

Demetrius L. Willis
General Manager of Plant Operations

/bk

Attachment

cc: Regional Administrator, w/attachment
USNRC - Region IV

Cooper Project Manager, w/attachment
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector, w/attachment
USNRC - CNS

NPG Distribution, w/attachment

CNS Records, w/attachment

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Independent Spent Fuel Storage Installation Sixty-Day Follow-Up Report

Abstract:

At 08:13 Central Daylight Time (CDT) on November 3, 2010, Cooper Nuclear Station (CNS) control room operators received a report of a partial neutron water shield drain down on an Independent Spent Fuel Storage Installation (ISFSI) Transfer Cask (TC). The TC contained a dry shielded canister (DSC), fully loaded with spent fuel assemblies, and was undergoing final preparations for transfer to the ISFSI Horizontal Storage Module (HSM).

Personnel took immediate action to stop the water from draining by shutting the TC neutron water shield drain valve and control room operators conservatively evacuated the reactor building and portions of the administration building. The maximum dose rates measured during the event were determined to be within limits of the ISFSI Technical Specifications. The neutron water shield volume was re-filled by 18:45 on November 3, 2010.

The root cause of the event was that human factors deficiencies were inadvertently designed into the equipment. In order to prevent recurrence, the neutron shield connection ports on the TC were labeled and physically secured prior to recommencing the dry cask storage campaign. Associated procedures for DSC loading, sealing, and transport were also revised to show the updated TC configuration and to include a "checked by" initial step for steps associated with TC neutron shield venting and annulus draining.

There were no safety consequences associated with this event.

Plant Status:

CNS was at 100% power in Mode 1, Power Operation, at the time of the event. Final preparations were in progress to transfer a second DSC, which was loaded with spent fuel assemblies, from the reactor building to the ISFSI HSM.

Background:

The CNS ISFSI provides long-term interim storage for spent fuel assemblies. Authorization for storage of spent nuclear fuel in the CNS ISFSI is granted under a general license issued by the Nuclear Regulatory Commission (NRC) per 10 CFR 72. The spent fuel assemblies are confined in a helium atmosphere by a stainless steel DSC. Following loading, sealing, and drying operations, DSCs are transferred from the reactor building via a TC on a transfer trailer, and inserted into a reinforced concrete HSM. When a TC is loaded with spent fuel, the TC neutron shield jacket is filled with water to provide protection from neutron radiation.

The CNS ISFSI uses the following NRC-approved Transnuclear, Inc. (TN) designs:

- NUHOMS® HSM Model 202 Horizontal Storage Module
- NUHOMS® 61BT Dry Shielded Canister
- NUHOMS® OS197 Transfer Cask

Event Description:

At 08:13 CDT, on November 3, 2010, CNS control room operators received a report that water was draining from the ISFSI TC neutron shield. Water was found on the floor under the TC and water was observed draining from the TC through a hose into a bucket. The TC is configured with three fill and drain ports near the bottom of the TC; the annulus drain port, neutron shield fill port, and neutron shield drain port. The hose, which was supposed to be connected to the annulus drain port, was inadvertently connected to the neutron shield drain port. The TC contained a fully loaded DSC and was stationed inside the reactor building railroad airlock area undergoing final preparations prior to transfer to an ISFSI HSM.

Personnel, involved with the TC transfer, entered the abnormal procedure for ISFSI/Dry Fuel Storage and took immediate action to stop the water from draining by shutting the neutron shield drain valve. Radiological protection personnel performed local portable radiation monitoring in the area and reported to the control room operators that the TC had readings of 130 millirem (mRem) per hour at 30 centimeters (cm), which is above the normal readings of 10 mRem per hour at 30 cm.

Control room operators entered the abnormal procedure for building radiation trouble and took conservative actions to evacuate the reactor building and portions of the administrative building (outside the radiologically controlled area) that had potential for higher-than-normal dose rates. Conditions were evaluated with respect to TN Technical Specifications and emergency action levels. An emergency declaration was not required.

Radiological surveys were performed inside and outside the reactor building near the railroad airlock doors at ground level and indicated normal background radiation levels. Follow-up radiological surveys indicated that there was shine from the upper portions of the TC due to partial draining of the neutron shield.

By 18:45 on November 3, 2010, workers had completed filling the TC neutron shield. During investigation of the event, the dry cask storage campaign was temporarily suspended and corrective actions to prevent recurrence were completed prior to recommencing work. Additionally, extra oversight was assigned and the DSC was transferred to the HSM on November 11, 2010.

Analysis of the Event:

At the time of the event, the DSC was fully loaded with 61 irradiated fuel assemblies containing licensed material, all of General Electric design and manufacture. All 61 fuel assemblies had the fuel channel installed and all were characterized as intact with no cladding perforations. Of the 61 assemblies, six were of the P8x8 design, 42 of the GE7B design, and 13 of the GE9B design. All of these designs are an 8x8 matrix of fuel rods enriched in U-235 (initial assembly average enrichment range approximately 2.6 to 3.0 wt% U-235). The assemblies range in age from 15 to 20.6 years since discharge.

The TC involved in the event was a TN model NUHOMS® OS197 TC. As previously noted, the TC is configured with three fill and drain ports near the bottom of the TC. The three fill and drain ports are located close to one another and use the same size quick connect fittings; i.e., fittings were able to be used interchangeably on the three ports. None of the drain and fill ports were marked with signs or identifying tags, although TN design drawings indicated they were labeled, and there were no warning or precautionary signs associated with the TC neutron shield. A particular TC configuration is referred to in CNS procedures, however, TCs used across the industry can vary in configuration; i.e., they are not exactly identical. Thus, the possibility of a mistake being made with respect to draining the neutron shield jacket instead of the annulus had been inadvertently engineered into the equipment.

Assessment of Safety Consequences:

There were no actual safety consequences. No plant equipment was damaged nor rendered inoperable and no personnel were injured. While the partial draining of the neutron shield did increase the level of radiation emanating from the TC, especially in the upward direction, no personnel exceeded their direct reading dosimeter or regulatory dose limits.

The DSC contained a decay heat load of approximately 11.4 kW. About 40% (220.81 gallons) of the neutron shield volume was drained. The maximum neutron dose rate measured was 205 mRem per hour on contact. The maximum gamma dose rate measured was 30 mRem per hour on contact. Converting the dose rate on contact to the dose rate at three feet gives 104 mRem per hour neutron and 7.5 mRem per hour gamma dose. These parameters were within the limits of TN Technical Specification 1.2.11 for TC dose rates when loaded with a DSC. The extent of exposure to individuals was 47.4 mRem total to 20 individuals during the recovery from this event.

A potential safety consequence is that a complete draining of the TC neutron shield could have occurred and exposed workers in the immediate area to unexpected radiological dose during the DSC transfer process. If there had been a complete loss of water from the TC neutron shield, the maximum anticipated radial dose on contact would have been 600 mRem per hour neutron dose and 400 mRem per hour gamma dose.

Basis for Report:

The event was reported as Event Notification 46391 under 10 CFR 72.75(d) for an important-to-safety fuel storage equipment that failed to function as designed when required to prevent releases, prevent exposures in excess of regulatory limits, or mitigate the consequences of an accident and no redundant equipment was available or operable to perform the required safety function.

Cause:

The root cause of this event was that human factors deficiencies were inadvertently designed into the equipment. These deficiencies made the potential for human performance errors possible.

TN is also evaluating this design issue under their Corrective Action Program.

Corrective Actions:

CNS implemented the following corrective actions to prevent recurrence.

1. Provided a non-destructive physical means of securing the neutron shield ports such that they cannot be operated after the neutron shield jacket has been filled with water. Provided a means of identification on the same ports/fittings.

2. Revised the CNS procedures for DSC loading, sealing, and transport as follows:

   - Incorporated a figure update showing the new configuration with the neutron shield ports clearly labeled with function, and a second figure showing the configuration with the physical constraint installed.

   - Affixed labels on the neutron shield ports.

   - Included a "checked by" initial step for the steps associated with the neutron shield venting and annulus draining.

Previous Events:

There have been no similar events previously reported by CNS.

ATTACHMENT 3 LIST OF REGULATORY COMMITMENTS©[4]

Correspondence Number: NLS2010111

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
None		