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OFFICE OF NUCLEAR REACTOR REGULATION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, D.C. 20555-0001

November 15, 2006

**NRC REGULATORY ISSUE SUMMARY 2006-22: LESSONS
LEARNED FROM RECENT 10 CFR PART 72
DRY CASK STORAGE CAMPAIGN**

ADDRESSEES

All Title 10 *Code of Federal Regulations* (10 CFR) Part 72 specific licensees and certificate holders and holders of operating licenses for nuclear power reactors (including those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel) that are not 10 CFR Part 72 specific licensees.

INTENT

The U.S. Nuclear Regulatory Commission (NRC) is issuing this regulatory issue summary (RIS) to discuss lessons learned from the recent dry cask storage campaign at Fort Calhoun Station (FCS). The campaign involved an exemption from provisions in 10 CFR Part 72. This RIS discusses the exemption granted to FCS including the facts of this scenario, the insight gained, and the Commission's expectation that such issues, to the extent practicable and appropriate, be resolved well in advance of fuel movement through the normal licensing processes. No specific action or written response is required.

BACKGROUND

The NRC authorizes storage of spent fuel at an independent spent fuel storage installation (ISFSI) in accordance with 10 CFR Part 72. Two licensing options are provided under the provisions in 10 CFR Part 72: specific and general license. Under a specific license, an applicant submits a license application to the NRC, and the NRC performs a technical review of the safety aspects of the proposed ISFSI. If the application is approved, the NRC issues a specific license for the site. A general license authorizes a nuclear power plant licensee to store spent fuel in NRC approved dry storage systems at a site that is licensed to operate a nuclear power reactor. Several dry storage designs have received Certificates of Compliance (CoC) or NRC approvals. 10 CFR 72.48, "Changes, tests, and experiments," allows CoC holders and specific and general licensees to make changes to dry storage designs without NRC prior approval under certain conditions.

The NRC granted an exemption from provisions in 10 CFR Part 72 to Omaha Public Power District (OPPD) on July 19, 2006, to enable OPPD to use a light weight transfer cask (TC) and to allow the use of an earlier start time for vacuum drying in conjunction with the Standardized NUHOMS® Storage System, CoC No. 1004, at the FCS. The need for the exemption was

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identified during an NRC inspection of the licensee's preparation for a dry cask storage campaign. The inspection included a review of the 10 CFR 72.48 evaluation that supported the dry cask storage campaign. Interactions with the NRC led OPPD management to the determination that submittal of an exemption request was the optimum path forward for use of the light weight TC at the FCS. Significant resources were expended by the staff, OPPD, and the cask vendor to support the issuance of the exemption.

The Commission issued a Staff Requirements Memorandum (SRM) on this issue. The SRM, dated August 31, 2006, "Use of Unshielded Transfer Casks in Spent Fuel Movement," (Agencywide Documents Access and Management System (ADAMS) Accession No. ML062430470) directs the staff, among other things, to develop a generic communication related to the OPPD exemption. This RIS was developed, in part, to respond to the Commission's SRM.

SUMMARY OF ISSUE

Facts of the Scenario

Transnuclear Inc., (TN) prepared an evaluation, pursuant to 10 CFR 72.48, to add a light weight TC designated as the OS197L to the generally-licensed Standardized NUHOMS[®] Horizontal Modular Storage System for Irradiated Nuclear Fuel. The TC is used for loading and unloading fuel into a canister and moving a loaded dry-shielded canister (DSC) from the spent fuel pool to the horizontal storage module (HSM). The TC serves as a lifting device, and provides shielding and protection from potential hazards during DSC loading and closure operations and transfer to the HSM. TN developed the OS197L to expand the capability of the NUHOMS[®] system to plants with reduced crane capacities.

OPPD intended to incorporate TN's 10 CFR 72.48 evaluation through the 10 CFR 72.212 process to use the OS197L TC for spent fuel loading operations at the FCS. The NRC staff identified several issues associated with TN's 10 CFR 72.48 evaluation during the pre-operational inspection of OPPD. Continued communications between NRC, TN, and OPPD, led OPPD to request an exemption from NRC requirements to enable the use of the OS197L TC and allow an earlier start time for vacuum drying.

OS197L TC Background

The OS197L TC utilized reduced radiological shielding that included the elimination of all the lead shielding associated with previous versions of the TC. The redesigned OS197L TC was intended to require a crane with a 75 ton capacity for the heaviest lift. The TC that the OS197L TC replaced (designated as the OS197 TC) required a 100 ton crane capacity for the lift. Because the OS197L TC has less shielding (including the elimination of all the lead shielding) than the OS197 TC, the OS197L TC surface dose rates were higher than the OS197 TC with lead shielding. To reduce personnel doses, crane operations associated with the OS197L TC were done remotely and supplemental shielding was provided in the decontamination area where the DSC was welded, and on the transfer trailer that was used to transport the OS197L TC to the HSM. The supplemental shielding used in the decontamination area is shown in Figure 1. The supplemental shielding provided on the decontamination area is shown in Figure 2.

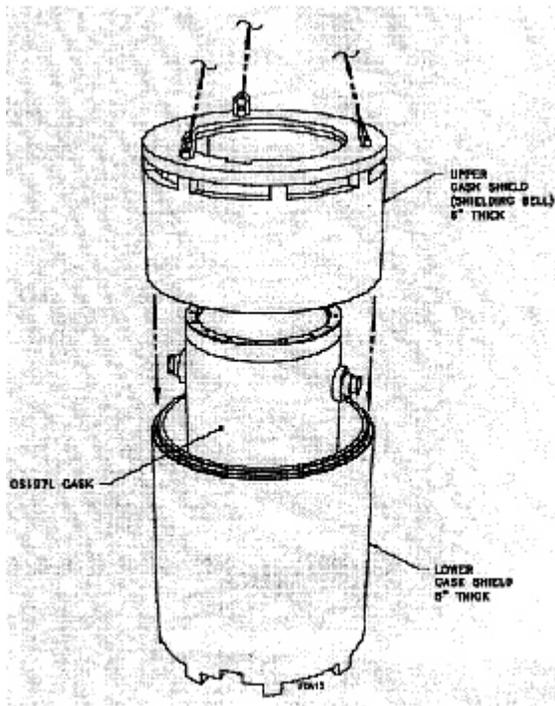


Figure 1 - Supplemental Shielding in Decontamination Area

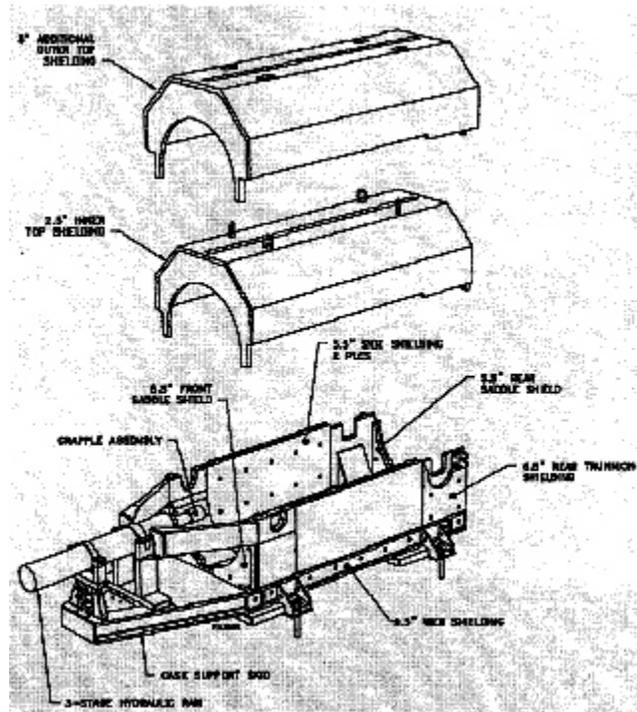


Figure 2 - Supplemental Shielding on Transfer Trailer

Change to Sequence of Operations

The Final Safety Analysis Report (FSAR) for the Standardized NUHOMS® design allows draining up to 750 gallons of water from the DSC, before the DSC leaves the spent fuel pool, to reduce the weight on the crane. The DSC is then placed in the decontamination area where the inner top cover plate is welded. During the welding process, approximately 750 gallons of water remained in the DSC. After the welding is completed, and the weld examinations are successfully performed, the remaining water in the DSC is removed and vacuum drying begins. TN's 10 CFR 72.48 evaluation noted that unlike what was described in an earlier version of the FSAR, most of the water from the DSC was to be removed before the DSC leaves the spent fuel pool. This change reduced the load on the crane. TN also evaluated welding the DSC inner top cover plate with the DSC in the drained condition.

Exemption

TN's 10 CFR 72.48 evaluation was signed March 31, 2006. The staff started an inspection at OPPD on April 3, 2006, and, as part of the inspection, reviewed TN's 10 CFR 72.48 evaluation. Due to NRC questions during the inspection, OPPD management submitted an exemption request as the optimal path forward for use of the light weight TC at the FCS. In general, the NRC's issues with TN's 10 CFR 72.48 evaluation involved questions related to technical specification (TS) requirements for the TC surface dose rates, and vacuum drying

times. The NRC also questioned the thermal analysis of the OS197L TC on the transfer trailer with the additional shielding and whether this constituted a change in method of analysis as defined in 10 CFR 72.48(c)(2)(viii).

OPPD requested the exemption in a June 9, 2006, letter (ADAMS Accession No. ML061650157). On July 19, 2006, the NRC staff granted OPPD an exemption pursuant to 10 CFR 72.7 (ADAMS Accession No. ML062000153). The exemption had the following four conditions: 1) limited OPPD to loading four DSCs, 2) limited the decay heat level per DSC to no more than 11 kilowatts, 3) limited the cooling time of the fuel that OPPD intended to load to a minimum of 16.2 years, and 4) substituted TS dose rate limits with new calculated limits based on a specified condition of the supplemental shielding. These conditions helped to alleviate the staff's concerns regarding high dose rates and fuel temperatures potentially experienced during fuel transfer activities.

Other Inspection Issues

In addition to reviewing the 10 CFR 72.48 evaluation for the use of the OS197L TC, the NRC pre-operational inspection conducted at OPPD reviewed the auxiliary building crane and crane support structure, the FCS 10 CFR Part 50 programs related to dry fuel storage, and the heavy load testing program. The inspection report is available in ADAMS (Accession No. ML062000421). The inspection report documents resolution of issues associated with the overhead crane and the support structure for the crane. These issues were resolved without the need for a licensing action and are, therefore, outside the scope of the exemption. The staff believes that there is insight associated with the review and this insight is contained in the discussion below.

Insight Gained

The Commission, in its SRM dated August 31, 2006, noted the "exemption issued for Fort Calhoun Station's transfer of spent fuel to dry storage should not be viewed as establishing a precedent that encourages future exemption requests for transferring spent fuel to dry cask storage when a crane does not have sufficient capacity to lift and transfer the approved transfer cask." The Commission also directed that the staff communicate to stakeholders the insight gained as a result of lessons learned from the exemption request. Below is a listing of some of the insight.

Planning Insight

- Long lead times (on the order of 5 years) are needed when planning for an ISFSI at a site. These long lead times are needed to identify large plant modifications that may be needed (e.g., crane upgrades), and licensing actions that may be needed to support the ISFSI (e.g., 10 CFR Part 50 licensing changes, 10 CFR Part 72 cask vendor CoC amendments). For example, CoC amendments involve rulemaking to codify the amendment in 10 CFR Part 72. Depending on the complexity of the amendment request, this process can take from 10 months to 30 months. This time does not account for the time that it would take a CoC holder to prepare the amendment request.

Because 10 CFR 72.48 evaluations can help to identify needed CoC amendments they should be done early in the process.

- Good planning can avoid the need for exemption requests, which can be time consuming. In the case of the OPPD exemption, significant resources were expended by OPPD, the NRC, and TN to resolve the issue in a time frame to support OPPD's dry cask storage campaign. For the NRC, staff had to be reassigned from other high-priority work. The staff believes identifying issues early in the process allows for a more efficient use of NRC resources. This is also consistent with the Commission's SRM dated August 31, 2006. This SRM provides the Commission's expectation that issues like those associated with the OPPD exemption, "to the extent practicable and appropriate, be resolved well in advance of fuel movement through the normal licensing processes."
- Utilities should allow sufficient time and provide adequate resources to ensure that the overhead crane and supporting structure meet licensing basis requirements prior to beginning the dry fuel storage loading program. Typically, the loads imposed by lifting dry fuel storage components are at or near the maximum rating of the crane. Many cranes used for movement of dry fuel storage components were licensed 20 or more years ago, and the utility should develop an early understanding of the licensing basis of the crane with respect to fuel cask handling. When utilities have found the licensing or design basis of the existing crane inadequate for cask loading operations, many utilities have upgraded their crane design pursuant to 10 CFR 50.59 or modified the crane design and licensing basis through the license amendment process (e.g., Humboldt Bay, ADAMS Accession No. ML053000192; San Onofre Unit 1, ADAMS Accession No. ML0335301760; Indian Point Unit 2, ADAMS Accession No. ML053000051; and River Bend, ADAMS Accession No. ML053410490). NRC RIS 2005-025, "Clarification of NRC Guidelines for Control of Heavy Loads," provides information relevant to heavy load handling programs.
- The overhead crane should be in good working order and properly maintained in accordance with manufacturer recommendations.
- Frequent and early discussions with the NRC in the licensee planning process are recommended.
 - The staff recommends that 10 CFR Part 72 general and specific licensees keep the respective NRC regional management responsible for inspection of ISFSIs informed of its plans and any potential issues. The respective NRC regional management should be the general and specific licensee's primary point of contact for issues related to implementation schedules and inspections. Unique issues and changes needed to support the use of a CoC at a particular site should be identified to NRC regional management early in the process (e.g., use of a transfer cask with reduced shielding).
 - For issues involving licensing actions, the Division of Spent Fuel Storage and Transportation (SFST) is the general and specific licensee's primary point of

contact. The staff recommends that general licensees coordinate needed CoC rulemaking actions through the 10 CFR Part 72 certificate holder. SFST is the primary point of contact for 10 CFR Part 72 certificate holders.

Operational Insight

- Changes that are introduced to alter the sequence of operations can affect TS conditions. As previously noted, TN's 72.48 evaluation involved a change in the sequence of operations that drained the bulk of the water from the DSC earlier in the process than was prescribed in an earlier version of the FSAR. This change was made to reduce the load on the crane.

The time limit established for the vacuum drying TS in the Standardized NUHOMS[®] 32PT DSC was selected to ensure that the maximum cladding temperature was within the acceptable limit of 752°F during vacuum drying. The vacuum drying time limit also ensured that the cladding temperature met the thermal cycling criteria of 117°F during drying, helium backfilling, and transfer operations. The Standardized NUHOMS[®] safety analysis report (SAR) for the 32PT DSC noted in chapter M.4.7.1, that the transient thermal analysis is based on an initial temperature of the DSC basket and fuel of 215°F based on the boiling temperature of the fill water. A change in sequence of operations that allowed the temperature of the fuel cladding to increase beyond the initial temperature of 215°F, assumed in the basis of the SAR, would result in a shorter vacuum drying time than that specified in the TS.

OPPD ultimately sought an exemption to the vacuum drying TS due to this change to the sequence of operations. An exemption was granted to start the clock associated with the vacuum drying TS at the time that the initial 750-gallon drain down from the DSC was achieved. By seeking an exemption to begin the start of the vacuum drying time clock at the initial 750-gallon drain down, OPPD ensured that the 215°F initial fuel clad temperature assumption in the Standardized NUHOMS[®] SAR was bounded.

- The NRC guidelines for control of heavy loads ensure the safe handling of heavy loads in areas where a load drop could impact stored spent fuel, fuel in the reactor core, or equipment that may be required to achieve safe shutdown or permit continued decay heat removal. The handling requirements were not specifically intended to ensure that the fuel inside the TC is maintained in a safe condition. Handling system malfunctions may result in extended and unforeseen delays in the movement of the TC. The long-term decay heat removal required for safety of the fuel and the occupational exposure controls necessary for safety of the workers were considered by OPPD in light of the potential delays caused by handling system malfunctions.

Licensing Insight

- The NRC holds the specific and general licensee responsible for meeting applicable portions of regulatory requirements as defined in 10 CFR 72.13, regardless of any expertise that may be added to supplement the licensee staff. The NRC acknowledges that contractors may be used to perform work including 10 CFR 72.48 evaluations and

provide contractor-supplied equipment (e.g., transfer cask, transfer trailer). However, the ultimate responsibility for the safe operation of the ISFSI (including contractor-supplied equipment) is the specific and general licensee's.

- Compliance with the 10 CFR Part 72 CoC is required. The CoC is analogous to a 10 CFR Part 50 license and contains TSs to which the general licensee must adhere. Cask vendors who identify that the TSs for a CoC could be more clear and concise can request CoC amendments.
- The inspection of TN's 10 CFR 72.48 evaluation, which ultimately led OPPD to seek an exemption, provided insight regarding 10 CFR 72.48 guidance. The insight is related to changes in method of evaluation and documentation. One of the requirements for which OPPD was granted an exemption was 10 CFR 72.48(c)(2)(viii). This requirement involves changes that result in a departure from a method of evaluation described in the FSAR. Guidance in this area is contained in Regulatory Guide (RG) 3.72, "Guidance for Implementation of 10 CFR 72.48, Changes, Tests, and Experiments." This RG endorses Appendix B, "Guideline for 10 CFR 72.48 Implementation," dated March 5, 2001, to NEI 96-07, "Guidelines for 10 CFR 50.59 Evaluations," as providing methods acceptable to the NRC staff for complying with the provisions of 10 CFR 72.48. The guidance involving change to a method of evaluation described in the FSAR can be found in section B.4.3.8 of Appendix B of NEI 96-07.

The regulations require a written evaluation which provides the bases for the determination a license or CoC amendment is not required. Section B.5 of Appendix B of NEI 96-07 provides guidance in this area and states in part:

The importance of the documentation is emphasized by the fact that experience and engineering knowledge (other than models and experimental data) are often relied upon in determining whether evaluation criteria are met. Thus the basis for the engineering judgment and the logic used in the determination should be documented to the extent practicable and to a degree commensurate with the safety significance and complexity of the activity.

The NRC plans to work with Nuclear Energy Institute to revise the guidance associated with 10 CFR 72.48 evaluations to reflect lessons learned from the OPPD inspection and other inspections.

- The staff will continue processing exemptions in accordance with the requirements contained in 10 CFR Part 72. As stated in its SRM dated August 31, 2006, the Commission directed that "the staff should make it clear that exemption requests will continue to be reviewed based on their technical merits and the standards in 10 CFR 72.7." Nevertheless, licensees and CoC holders should be aware that they can make processing of an exemption request more timely by limiting exemption requests to what is absolutely needed. Furthermore, limiting the scope of an exemption request can help to expedite processing. As discussed above, OPPD proposed conditions associated with its exemption that were eventually adopted by the staff.

One of the conditions proposed limiting the exemption to 4 casks, thereby limiting the exemption to what was absolutely needed. Two of the conditions associated with limiting the decay heat, and maximizing the cooling time for the fuel to be loaded, increased the available margin. This is an example of limiting the scope of the exemption request. Taken together these actions allowed the staff to shorten its review time.

BACKFIT DISCUSSION

This RIS requires no action nor written response and is, therefore, not a backfit. Consequently, the staff did not perform a backfit analysis.

FEDERAL REGISTER NOTIFICATION

A notice of opportunity for public comment on this RIS was not published in the *Federal Register* because this RIS is informational and pertains to a staff position that does not represent a departure from current regulatory requirements and practice.

CONGRESSIONAL REVIEW ACT

NRC has determined that this action is not subject to the Congressional Review Act (5 U.S.C. §§801-808).

PAPERWORK REDUCTION ACT STATEMENT

This RIS does not contain information collections and, therefore, is not subject to the requirements of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.).

CONTACT

This RIS requires no specific action nor written response. If you have any questions about this summary, please contact the individual listed below or the appropriate regional office.

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Enclosure: "List of Recently Issued NMSS Generic Communications"
Note: NRC generic communications may be found on the NRC public website at <http://www.nrc.gov>, under Electronic Reading Room/Document Collections.

Recently Issued NMSS Generic Communications

Date	GC No.	Subject	Addressees
09/14/06	RIS-06-20	Guidance for Receiving Enforcement Discretion When Concentrating Uranium at Community Water Systems	All community water systems (CWSs), in U.S. Nuclear Regulatory Commission (NRC) non-Agreement States, that during the treatment of drinking water, may accumulate and concentrate naturally-occurring uranium in media, effluents, and other residuals, above 0.05 percent by weight.
09/14/06	RIS-06-19	Availability of Guidance on Radioactive Seed Localization	All NRC medical licensees.
08/31/06	RIS-06-18	Requesting Exemption from the Public Dose Limits for Certain Caregivers of Hospital Patients	All NRC medical licensees.
07/20/06	RIS-06-11	Requesting Quality Assurance Program Approval Renewals Online by Electronic Information Exchange	All 10 CFR Part 71 quality assurance program and certificate holders.
04/23/06	RIS-06-10	Use of Concentration Control for Criticality Safety	All licensees authorized to possess a critical mass of special nuclear material.
01/26/06	RIS-02-15, Rev. 1	NRC Approval of Commercial Data Encryption Products For the Electronic Transmission Of Safeguards Information	All authorized recipients and holders of sensitive unclassified safeguards information (SGI).
01/24/06	RIS-06-01	Expiration Date for NRC-Approved Spent Fuel Transportation Routes	The U.S. Nuclear Regulatory Commission (NRC) licensees who transport, or deliver to a carrier for transport, irradiated reactor fuel (spent nuclear fuel (SNF)).
01/13/06	RIS-05-27, Rev. 1	NRC Timeliness Goals, Prioritization of Incoming License Applications and Voluntary Submittal of Schedule for Future Actions for NRC Review	All 10 CFR Parts 71 and 72 licensees and certificate holders.
07/10/06	IN-06-13	Ground-Water Contamination Due to Undetected Leakage of Radioactive Water	All holders of operating licenses for nuclear power and research and test reactors including those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor and those authorized by Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) Part 72 licenses to store spent fuel in water-filled structures.
07/06/06	IN-06-12	Exercising Due Diligence When Transferring Radioactive Materials	All materials licensees.
06/12/06	IN-06-11	Applicability of Patient Intervention in Determining Medical Events for Gamma Stereotactic Radiosurgery and Other Therapy Procedures	All medical licensees.
03/31/06	IN-06-07	Inappropriate Use of a Single-parameter Limit as a Nuclear Criticality Safety Limit	All licensees authorized to possess a critical mass of special nuclear material.
03/21/06	IN-02-23, Supl. 1	Unauthorized Administration of Byproduct Material for Medical Use	All medical licensees.

Date	GC No.	Subject	Addressees
01/19/06	IN-06-02	Use of Galvanized Supports and Cable Trays with Meggitt Si 2400 Stainless-Steel-jacketed Electrical Cables	All holders of operating licenses for nuclear reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel; and fuel cycle licensees and certificate holders.