UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE RD. SUITE 210
LISLE, IL 60532-4352

May 11, 2017

Mr. David A. Kraft, Director
Nuclear Energy Information Service
3411 W. Diversey Avenue, #13
Chicago, IL 60647-1245

Dear Mr. Kraft:

This is the response of the U.S. Nuclear Regulatory Commission (NRC) to the letter dated April 12, 2017, from you to me. In your letter, you request the NRC assist you with questions pertaining to reactor decommissioning. Your questions and the NRC's responses follow below.

1. You state that the "NRC has maintained that there is no need to keep the wet spent nuclear fuel (SNF) pools at decommissioned reactor sites, either for emergencies or normal transfer operations of SNF into/out of dry casks. NRC has maintained that portable 'hot cells' would be the method used to conduct such transfers, should they be needed."

   Question 1(a): "Currently, who are the vendors/manufacturers of such portable hot cells in the U.S.? Please provide URLs to their corporate sites if you have them, since we will want to research the tech-specs for these units, something you may not have available. If you do, please provide them."

   Response: The NRC does not require "portable hot cells" for the transfer of SNF nor does it maintain a list of manufacturers. We believe you are asking about a system used to handle spent fuel assemblies (or canisters) loaded in a dry storage cask absent a spent fuel pool. For consistency, the NRC has used the generic term "dry transfer system (DTS)" for a system to transfer spent fuel assemblies or canisters.

   The NRC regulations in Title 10 of the *Code of Federal Regulations* (CFR) 72.122(b) and 72.122(c) state that dry cask storage systems must be designed to withstand earthquakes, floods, tsunamis, fires, tornadoes, projectiles, temperature extremes, and other unusual or accident scenarios, and must continue to perform their safety functions without the need to repackage the fuel into a new system. Additionally, 10 CFR 72.122(l) specifies that "storage systems must be designed to allow ready retrieval of spent fuel, high-level radioactive waste, and reactor-related greater than class C waste for further processing or disposal."

   Interim Staff Guidance (ISG)-2, "Fuel Retrievability in Spent Fuel Storage Applications," Revision 2, provides guidance to NRC reviewers for determining whether a cask system is designed to allow ready retrieval of spent fuel as required by 10 CFR 72.122(l) during applicant licensing, and NRC inspectors use ISG-2 and Inspection Procedures IP60853, IP60854, IP60855, and IP60856 during inspections to verify that licensees comply with 10 CFR 72.122(l). ISG-2 defines ready retrievable as "the ability to safely remove the spent fuel from storage for further processing or disposal." ISG-2 states that retrievability is not applicable during accident conditions. ISG-2 can be found in the NRC's Agencywide Documents Access and Management System (ADAMS) at Accession No. ML16117A080.

Three methods that can be used by applicants in their designs to demonstrate retrievability are discussed in ISG-2. These options are: (A) remove individual or canned spent fuel assemblies from wet or dry storage, (B) remove a canister loaded with spent fuel assemblies from a storage cask/overpack, or (C) remove a cask loaded with spent fuel assemblies from the storage location.

An NRC reviewer or inspector must find reasonable assurance that a specific licensee or general licensee, respectively, satisfies at least one of the options above to demonstrate compliance with the retrievability requirements of 10 CFR 72.122(l). The requirements for a Certificate of Compliance (CoC) holder, or applicant, are contained in 10 CFR 72.236(m) which states: "to the extent practicable in the design of spent fuel storage casks, consideration should be given to compatibility with removal of the stored spent fuel from a reactor site, transportation, and ultimate disposition by the Department of Energy."

In the Generic Environmental Impact Statement (GEIS) for Continued Storage of Spent Nuclear Fuel (NUREG-2157; ML14196A105), the NRC states that the timing of repository availability is not yet known. Consequently, the GEIS analyzed the environmental impact over three timeframes: (A) a short-term timeframe, which includes 60 years of continued storage after the end of a reactor's licensed life for operation; (B) an additional 100-year timeframe (60 years plus 100 years) to address the potential for delay in repository availability; and (C) an indefinite timeframe to address the possibility that a repository never becomes available. The GEIS discusses an assumed method of transferring spent fuel generically referred to as a DTS in timeframes (B) and (C).

Question 1(b): "How many such hot cells actually exist at this time?"

Response: As stated previously, the NRC does not require, nor maintain a list of manufacturers of, DTSs for the transfer of spent nuclear fuel. Additionally, Section 2.1.4 of the GEIS states that "there are no dry transfer systems (DTSs) at U.S. nuclear power plant sites today." Although the NRC has not received an application for a DTS, Section 2.1.4 contains additional information pertaining to previous design proposals. Title 10 CFR 72.122(l) ensures that NRC-approved dry cask storage systems will be retrievable as explained in ISG-2.

Question 1(c): "Where are they currently located?"

Response: As stated above, the NRC does not require, nor maintain a list of manufacturers of, DTSs for the transfer of spent nuclear fuel. Additionally, Section 2.1.4 of the GEIS states that "there are no dry transfer systems (DTSs) at U.S. nuclear power plant sites today." In the GEIS, construction of a DTS is considered a continued storage activity for the long-term and indefinite timeframes if the fuel is not moved and remains on site.

Question 1(d): "By what methods are they transported to sites in need? How long would it take one to get to Zion, if needed there?"

Response: The GEIS analysis assumptions are summarized in Section 1.8.3. The GEIS assumes that the licensee uses a DTS to be constructed onsite during long-term and indefinite storage timeframes to move the spent fuel to a new dry cask every 100 years.

Question 1(e): "Are there different performance criteria for the hot cells for transfer of "high-burnup" fuel as opposed to "normal" SNF?"

Response: The NRC does not require a DTS, nor has it received an application for a DTS. If an application is received, the applicant must demonstrate to the NRC that the design meets the regulatory requirements.

2. You state that "Given the absence of a permanent, deep-geologic disposal facility for high-level radioactive waste (HLRW), the NRC's revised "waste confidence" plan - now labeled "continued storage of spent nuclear fuel" - seems to allege that if necessary, reactor SNF can and will remain onsite in dry casks "for at least 60 years beyond the licensed life for operation of that reactor." However, the dry casks' licenses and probably actual physical capability to function, will expire prior to that milestone, requiring re-packaging even under normal operating, non-accident conditions. This will necessitate re-packaging of the SNF from old into new dry casks."

   Question 2(a): "How will these required SNF transfers be achieved in the absence of spent fuel pools?

   Response: Please refer to the responses to Question 1 above and the GEIS on the assumptions surrounding the possible long-term and indefinite storage of spent fuel at an Independent Spent Fuel Storage Installation (ISFSI).

   The staff also notes that the NRC currently has requirements for renewal of specific licenses of ISFSIs and CoCs of dry storage systems in 10 CFR 72.42 and 10 CFR 72.240, respectively. In order for the NRC to approve storage renewals, licensees or CoC holders need to demonstrate that any aging effects on ISFSIs and dry storage systems can be safely managed and addressed, so that those systems will continue to store spent fuel safely for the requested period of extended operation. A licensee or CoC holder requesting renewal must submit a renewal application that includes time-limited aging analyses that demonstrate that the dry storage systems will continue to safely store fuel for the requested period of extended operation. Renewal applications must also include an aging management program (AMP) for management of aging issues that could adversely affect ISFSIs and dry storage systems. The AMPs include monitoring and inspections in the requested period of extended operation to identify degradation before it can affect the ability of a dry storage system to safely store spent fuel. The AMPs also include details on how the licensee will assess monitoring data and inspection findings to determine what corrective actions should be taken, including repairs, replacement, or other mitigation measures.

   The staff has renewed five ISFSI licenses for dry storage, for a total storage period of 60 years at each ISFSI, without the prescribed need to repackage the spent fuel. If the licensee identifies degradation that needs to be addressed to ensure that the dry storage system continues to safely store spent fuel, the licensee must take corrective actions. These actions would not necessarily involve replacement of the dry storage system and repackaging in a new system, and could include further assessment and inspection or in-place repairs to components.

   The NRC inspects licensees' implementation of AMPs in the period of extended operation to verify that licensees are taking appropriate actions to maintain the ISFSIs and dry storage systems to ensure that they will continue to store spent fuel safely in the period of extended operation. The NRC will also inspect licensees' periodic assessments of AMP effectiveness

and any adjustments licensees have made to AMPs to respond to operating experience and verify AMPs are effective for addressing aging effects in the period of extended operation.

Question 2(b): If hot cells are to be used, how many will be required for the U.S. reactor fleet of 116 reactors over that time period."

Response: Please refer to the previous answers above and the GEIS on the assumptions surrounding the possible long-term and indefinite storage of spent fuel at an ISFSI. As stated above, in terms of assumptions for analyzing the generic environmental impacts of long-term and indefinite storage, the GEIS assumes that each ISFSI will have a DTS constructed onsite for the purposes of repackaging dry fuel storage canisters in the long-term and indefinite scenarios.

Please feel free to contact Ms. Prema Chandrathil with any further questions. Ms. Chandrathil can be reached at 630-829-9663.

Sincerely,

/RA/

John (Jack) B. Giessner, Director
Division of Nuclear Materials Safety

Letter to David Kraft from John Giessner dated May 11, 2017

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