

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, DC 20555-0001

May 2, 2011

NRC INFORMATION NOTICE 2011-10: THERMAL ISSUES IDENTIFIED DURING
LOADING OF SPENT FUEL STORAGE CASKS

ADDRESSEES

All holders of and applicants for an independent spent fuel storage installation license under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste" and Part 72 Certificate of Compliance holders.

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to inform addressees of an incident that occurred during the loading of spent fuel storage canisters at the Byron Generating Station. The NRC expects that recipients will review the information for applicability to their facilities and take actions, as appropriate, to avoid similar problems. Suggestions contained in this IN are not NRC requirements; therefore, no specific action or written response is required.

DESCRIPTION OF CIRCUMSTANCES

On August 28–29, 2010, a Holtec HI-STORM 100 spent fuel storage system multipurpose canister (MPC) containing fuel assemblies and located within a transfer cask was left unattended for the evening. A cooling system, which circulated water in the annulus between the canister and transfer cask to keep cladding temperatures below allowable limits, was found to be inoperable the next morning. The NRC conducted a reactive team inspection at the Byron Generating Station in September 2010 and issued Inspection Report Nos. 05000454/2010007, 05000455/2010007, and 07200068/2010002 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103140226). Issues that arose as a result of the reactive team inspection were also addressed during a scheduled design and quality assurance inspection at Holtec, International, who holds the HI-STORM 100 Certificate of Compliance (CoC), from October 25 to 29, 2010 (Inspection Report No. 72-1014/10-201, ADAMS Accession No. ML110450157).

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DISCUSSION

The inspection reports referenced above provide detailed summaries of the incident as well as findings and observations, underlying implications, and other information. As a result of the inspections and subsequent reviews and technical analyses, the NRC identified several potential issues related to the incident:

- (1) There were no means to prevent or mitigate air ingress into the canister containing fuel assemblies, which could cause fuel oxidation, if certain failures of the vacuum drying system occurred, such as a hose rupture between the vacuum pump and canister or valve failure. Drying systems typically are classified as not important to safety when there is appropriate operator attendance to address system failures because operator actions, such as backfilling the canister with helium or returning the fuel assemblies to the spent fuel pool, can mitigate the event.
- (2) Cladding temperatures could exceed CoC technical specification limits if the annulus cooling system is inoperable for an extended period of time. As stated above, vacuum drying equipment, including the annulus cooling system often used to cool the canister during vacuum drying, typically has been classified as not important to safety when there is appropriate operator attendance to address system failures. With operators in attendance, failure of the cooling system to provide proper cooling can be mitigated by operator action so as to prevent cladding temperatures from reaching the allowable limits.
- (3) The CoC technical specifications for vacuum drying were non-conservative for the particular heat load of spent fuel being loaded.
- (4) CoC technical specifications typically mandate that helium backfilling should occur if a vacuum drying time limit has been reached, in order to prevent fuel cladding from reaching temperature limits. Thermal analyses determine the permissible vacuum drying time period based on a canister decay heat load and a known, initial temperature of the fuel assemblies. However, in the event that backfilling of helium is required because the vacuum drying time limit is reached, the CoC Final Safety Analysis Report (FSAR) and technical specifications did not address the need for a new vacuum drying time limit for the subsequent vacuum drying attempt.
- (5) The CoC FSAR and technical specifications specified the total canister fuel assembly decay heat above which annulus cooling would be required during the vacuum drying process in order to keep cladding temperatures below allowable limits, but did not address necessary requirements for annulus cooling when the decay heat of an individual fuel assembly reached a limiting condition for operation (LCO).
- (6) While the operating procedures section of the CoC FSAR allowed the use of either helium or nitrogen during the canister blowdown operation, no evaluation was performed by the licensee to justify the use of nitrogen.

CONTACT

This IN requires no specific action or written response. Please direct any questions about this matter to one of the technical contacts listed below.

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