UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

November 10, 2016

Mr. Joseph W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street, LP 3R
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) INSPECTION REPORT NOS. 05000390/2016010, 05000391/2016010 AND 07201048/2016001

Dear Mr. Shea:

On October 4, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Watts Bar Nuclear Plant and the NRC inspectors discussed the results of this inspection with Mr. Paul Simmons and other members of your staff on October 5 via a telephone exit meeting. Inspectors documented the results of this inspection in the enclosed inspection report.

This inspection involved a review of the preoperational demonstrations (the dry runs) and loading activities associated with the movement of spent fuel into the Independent Spent Fuel Storage Installation (ISFSI) as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspection covered many aspects associated with the preparation, movement, and placement of spent fuel into the ISFSI facility, and consisted of field observations, extensive examination of procedures and documents, and interviews with Watts Bar Nuclear Plant personnel. The inspectors reviewed dry run preparations and determined that they were thorough, and that individuals were appropriately trained and qualified in the performance of ISFSI-related tasks. The inspectors observed sound, conservative decision-making practices throughout the performance of the dry runs and the initial loading of spent fuel into the ISFSI facility.

The NRC inspectors did not identify any findings or violations of more than minor significance.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public inspections, exemptions, requests for withholding," of the NRC's "Rules of Practice," a copy of this letter, its Enclosure, and your response (if any), will be available electronically for public inspection in the NRC's Public Document Room, or from the Publicly Available Records (PARS)

component of the NRC's Agencywide Documents Access and Management System (ADAMS), which is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Shakur A. Walker, Chief
Engineering Branch 3
Division of Reactor Safety

Docket Nos. 50-390, 50-391, and 72-1048
License Nos. NPF-90, NPF-96

Enclosure:
IR 05000390/2016010, 05000391/2016010,
and 07201048/2016001 w/Attachment:
Supplementary Information

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-390, 50-391, and 72-1048
License Nos:	NPF-90, NPF-96
Report Nos:	05000390/2016010, 05000391/2016010, and 07201048/2016001
Licensee:	Tennessee Valley Authority (TVA)
Facility:	Watts Bar Nuclear Plant, Units 1 and 2
Location:	Spring City, TN 37381
Dates:	July 25, 2016 – October 4, 2016
Team Leader:	Robert Carrion, Senior Reactor Inspector, Region II, Division of Reactor Safety (DRS), Engineering Branch 3 (EB3)
Inspectors:	Earl Love, Senior Transportation and Storage Safety Inspector, Office of Nuclear Materials Safety and Safeguards (NMSS), Division of Spent Fuel Management (SFM), Inspections & Operations Branch (IOB) Jon Woodfield, Transportation and Storage Engineer, NMSS, SFM, IOB Zhian Li, Senior Criticality and Shielding Engineer, NMSS, SFM, Criticality, Shielding & Risk Assessment Branch (CSRAB) Robert Williams, Senior Reactor Inspector, Region II, DRS, EB3 Bhasker Tripathi, Senior Structural Engineer, NMSS, SFM, CSRAB
Approved by:	Shakur A. Walker, Chief Engineering Branch 3 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000390/2016010, 05000391/2016010, and 07201048/2016001; Watts Bar Nuclear Plant, Units 1 and 2, spent fuel pre-loading demonstration and initial loading of spent fuel into the Independent Spent Fuel Storage Installation (ISFSI).

This report covers onsite inspection and in-office review by regional and Headquarters-based inspectors of activities related to the dry cask storage of spent nuclear fuel, including the preparation for loading of spent fuel from the spent fuel pool to its placement at the ISFSI using the Holtec HI-STORM FW MPC Storage System. Upon completion of the dry run demonstrations on September 16, 2016, the licensee began activities to begin the transfer of spent fuel to the onsite ISFSI. The licensee successfully placed its first loaded HI-STORM FW (HI-STORM#029/MPC#017) at location B2 on the ISFSI pad on October 5, 2016.

The inspectors reviewed the preoperational loading activities to confirm that personnel had been trained, equipment had been tested, and station programs and procedures had been developed and were adequate to safely load spent fuel into the ISFSI. The inspectors also observed selected portions of the initial spent fuel transfer to the ISFSI to confirm that these activities were performed safely, in accordance with the approved procedures, the Certificate of Compliance, and technical specification requirements.

REPORT DETAILS

Summary of Facility Activities

The Tennessee Valley Authority (TVA) selected the Holtec International Storage Module (HI-STORM) Flood/Wind (FW) Multi-Purpose Canister (MPC) Storage System for storage of spent fuel at the Watts Bar Nuclear (WBN) Plant Independent Spent Fuel Storage Installation (ISFSI). The HI-STORM FW MPC Storage System has been reviewed and approved by the Nuclear Regulatory Commission (NRC) and Certificate of Compliance (CoC) number 1032 issued, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72.238, to Holtec International (i.e., the CoC holder). The HI-STORM FW MPC Storage System, CoC 1032, is included in the list of NRC-approved casks provided in 10 CFR 72.214, and is therefore acceptable for use in accordance with the general license provisions of Part 72, Subpart K. TVA elected to use Amendment 0, Revision 1, to the CoC, which became effective on April 25, 2016.

Demonstrations of loading, processing, and moving spent fuel from the spent fuel pool (SFP) to the ISFSI using the Holtec system, were conducted from July 26, 2016 to September 16, 2016, for the NRC. During this period, the inspectors performed an evaluation to determine if the ISFSI operations personnel had been trained, the equipment had been tested, and the procedures had been developed to the extent necessary to safely load spent fuel into dry storage at the site's ISFSI. During the period from September 25 – October 4, 2016, NRC inspectors observed activities associated with the initial loading of spent fuel into dry storage to ensure that those activities were performed safely, in accordance with approved procedures, within the technical specifications (TS) limits, and to determine if the TVA programs were adequate for continued operation, and maintenance of the ISFSI once the ISFSI was loaded.

4OA5 Other Activities

.1 Watts Bar Nuclear Plant ISFSI Activities - Pad Design/Construction (Inspection Procedure (IP) 60854)

a. Inspection Scope

As part of the ISFSI, the licensee planned and constructed a reinforced concrete pad to support up to 80 loaded HI-STORM FW MPCs. The dimensions of the above-ground ISFSI pad are 180.5'L x 147.5'W x 3.0' thick and it was constructed using concrete with compressive strength (f'_c) of 3,000 pounds per square inch (psi) and ASTM Grade 60 reinforcing steel of yield strength (F_y) of 60 kips per square inch (ksi). The principal function of the storage pad is to provide a stable foundation upon which the Dry Cask Storage System (DCSS) will be stored. The ISFSI pad was designed to meet the requirements of ACI 318-05*, Building Code Requirements for Structural Concrete*, to resist the seismic forces from the free-standing casks during a safe shutdown earthquake. The inspectors reviewed the design prior to construction to ensure that it included loads and load combinations specified in NUREG-1536, *Standard Review Plan for Spent Fuel Dry Storage Systems at a General License Facility*; NUREG-1567, *Standard Review Plan for Spent Fuel Dry Storage Facilities*; and ACI 318-05. The inspectors noted that at approximately ten feet below grade level, there is an approximately 20-foot thick layer of silt/sand; a potential for liquefaction which could lead to ground failure during a seismic event. A vibro-stone column ground improvement technique was proposed (and implemented) for foundation support and

liquefaction mitigation under the ISFSI pad. The inspectors reviewed the details of the ground improvement; supplemental specifications; Quality Assurance (QA)/testing; means and methods addressed in the U. S. Wick Drain report, dated 2/9/15, for the vibro-stone columns; and the methods used to improve the subgrade, and determined them to be adequate and consistent with those that have been used at other ISFSI locations in the United States. The inspectors also verified that the ISFSI pad design methodology complied with ACI 318-05, and confirmed that the ISFSI pad design was consistent with IP 60856, and had reasonable assurance that the pad would meet the structural requirements of 10 CFR Part 72.212(b)(5)(ii).

b. Findings

No findings were identified.

.2 Watts Bar Nuclear Plant ISFSI Activities – Dry Run Activities

.2.1 Preoperational Test Program (IP 60854)

a. Inspection Scope

The CoC for the Holtec system used for the storage of irradiated spent fuel requires the licensee to conduct preoperational testing to demonstrate the loading, closure, and transfer of the cask system prior to the first loading of spent fuel assemblies. Specifically, CoC No.1032, Condition 9, *Preoperational Testing and Training Exercise*, states, "A dry run training exercise of the loading, closure, handling, unloading, and transfer of the HI-STORM FW MPC Storage System shall be conducted by the licensee prior to the first use of the system to load spent fuel assemblies. The training exercise shall not be conducted with spent fuel in the MPC. The dry run may be performed in an alternate step sequence from the actual procedures, but all steps must be performed."

From July 26 – September 16, 2016, NRC inspectors conducted onsite inspections to observe the licensee's demonstrations of the required dry run activities. The inspections consisted of field observations, interviews with licensee personnel, and review of licensee documentation. Specifically, MPC fluid operations and cask drying operations, including de-watering, forced helium dehydration, and helium backfilling, were observed July 26 – 28. From August 30 – September 2, the inspectors observed "dry operations," including transporting the HI-TRAC VW (Variable Weight) from the cask work area (CWA) on the refueling floor to the "stack up" position on top of the HI-STORM FW in the Auxiliary Building rail bay; transferring the MPC with a dummy load of the same weight as the actual load into and out of the HI-STORM FW from/to the HI-TRAC VW; placing the lid on the HI-STORM FW; and moving the low profile transporter (LPT) bearing the loaded HI-STORM FW outside of the Auxiliary Building where the HI-STORM FW was transferred to the Vertical Cask Transporter (VCT) and transported along the designated heavy haul path to the ISFSI pad. From September 15 – 16, the inspectors observed "wet operations," including transferring the HI-TRAC VW containing the MPC into the cask loading area (CLA) in the SFP; simulating the loading of the MPC with spent fuel using a dummy fuel assembly (including independent verification); placing the lid onto the MPC; and transporting the loaded HI-TRAC VW out of the CLA to the CWA where the welding, de-watering, drying and helium backfilling operations take place. In addition, health physics technicians decontaminated and surveyed the HI-TRAC VW for unexpected dose rates. The inspectors noted that all activities were done in accordance

with draft ISFSI procedures developed by TVA and Holtec. Minor revisions to the procedures were approved and incorporated prior to the initial movement of actual spent fuel.

The licensee conducted a pre-job briefing each day, prior to the day's demonstration, with personnel involved with the dry run activities. The briefings were comprehensive and effectively covered all key aspects of the evolution, including procedural adherence expectations and safety aspects of the activities. The inspectors noted that procedure compliance was adhered to during the performance of the activities. Radiological conditions were simulated and appropriate measures were implemented to provide a degree of realism, including simulated radiological postings to prepare workers for the radiological conditions that could be encountered during the actual transfer of active spent fuel. The inspectors interviewed cognizant personnel to verify their knowledge of procedural requirements and responsibilities. The inspectors also noted that activities were performed in a deliberate, methodical manner. The responsible supervisor maintained the work package/procedure in his possession throughout the performance of the activity, and procedural steps were carefully followed.

The licensee demonstrated the capability to safely place the MPC into the HI-TRAC VW. Rigging, movement, and placement of the MPC into the HI-TRAC VW, and subsequently into the HI-STORM FW, were performed in a controlled manner with effective coordination and communication observed among individuals involved in the activity. Throughout the entire dry run exercise, the work package was periodically reviewed by the inspectors to verify compliance with procedures and related work documents. The inspectors noted that procedure steps were "circled and slashed," or otherwise notated by the responsible supervisor to signify initiation and completion of a given step, respectively, and that work order documents were followed.

The ISFSI project personnel were qualified to perform their assigned functions and were knowledgeable of their responsibilities. Procedures and work-related documentation were accurate and procedural compliance was demonstrated by workers in the field.

b. Findings

No findings were identified.

.2.2 Control of Heavy Loads (IP 60854)

a. Inspection Scope

The inspectors reviewed the licensee's heavy loads program as it related to ISFSI operations, including approved procedures, inspection, testing, and maintenance documentation associated with the crane, wire rope, slings, etc. The inspectors also reviewed the responsibilities of employees, including operators and riggers, who participate in the lifting, handling, and movement activities, including personnel training/certification and planning of lifts for compliance to American Society of Mechanical Engineers (ASME) Code standards.

The inspectors verified that the licensee had recently upgrade its Auxiliary Building crane to single-failure proof and that the modified crane was certified and documented by the manufacturer to conform to the requirements of NUREG-0612, *Control of Heavy Loads*

at Nuclear Power Plants, and NUREG-0554, *Single-Failure-Proof Cranes for Nuclear Power Plants*. The inspectors reviewed the results of the licensee's functional tests to verify compliance with the NUREG requirements, and noted the crane's 125-ton capacity. The inspectors also reviewed the results of the factory acceptance test and selected crane design features for compliance to the NUREG requirements, and determined that, for those features reviewed, the crane met the single-failure proof criteria established by the NRC. The inspector noted that the crane, slings, hooks, and wire rope had been inspected, load tested, maintained, and operated in accordance with the applicable ASME Codes B30.2-2011, *Overhead and Gantry Cranes* and ASME B30.9-2006, *Slings*; as well as NUREG-0554 and NUREG-0612.

The inspectors walked down the Auxiliary Building to directly observe the material condition of the crane and its components (i.e., bridge, trolley, rails, limit switches, rail stops, etc.), and interviewed the ISFSI Program Manager to discuss the planned sequence to be employed during the MPC loading and transfer activities in and around the Auxiliary Building, especially the SFP.

The inspectors observed the licensee perform movements of heavy loads inside of the Auxiliary Building during the course of the dry runs and initial loading campaign and noted appropriate supervisory oversight.

b. Findings

No findings were identified.

.2.3 Procedures and Technical Specifications (IP 60854)

a. Inspection Scope

The CoC for the Holtec HI-STORM FW MPC Storage System, in conjunction with the associated TSs (Appendix A to CoC No. 1032, Amendment 0, Revision 1), specifies requirements to ensure the safe handling and storage of spent nuclear fuel. The inspectors confirmed that copies of the CoC and referenced documents were current.

The inspectors reviewed a series of licensee procedures and documentation to confirm that the TS requirements were incorporated into ISFSI work-related documents and work packages. The licensee and Holtec developed procedures to address:

- Preparing the HI-TRAC VW / MPC to receive spent fuel assemblies,
- Placing the MPC into the HI-TRAC VW,
- Moving the HI-TRAC VW / MPC into the SFP to receive spent fuel assemblies,
- Removing the HI-TRAC VW / MPC from the SFP for welding, de-watering, drying, and helium backfilling,
- Transferring the MPC from the HI-TRAC VW to the HI-STORM FW MPC storage overpack,
- Preparing the HI-STORM FW MPC storage overpack for transport to the ISFSI, and
- Retrieving the MPC from the HI-STORM FW MPC storage overpack.

The procedures were comprehensive and adequately addressed key aspects of the evolutions. The procedures contained sufficient detail to support safe handling and movement of the MPC, HI-TRAC VW, and HI-STORM FW MPC storage overpack. The inspectors noted that the procedures covered all aspects of dry spent fuel handling, loading, and storage requirements, as required by the TSs. The inspectors also verified that there were adequate procedures to monitor the thermal performance of the HI-STORM FW MPC Storage Systems.

b. Findings

No findings were identified.

.2.4 Review of Evaluations (IPs 60856 and 60857)

a. Inspection Scope

A general license for the storage of spent fuel in an ISFSI at power reactor sites is granted per 10 CFR 72.210, *General license issued*. Per 10 CFR 72.212, *Conditions of general licenses issued under 72.210*, the holder of the general license is required to perform written evaluations prior to use (specifically under 72.212(b)(5)) to establish that the ISFSI design can be used at that site, and that site operations can accommodate operation of an ISFSI. TVA holds a general license for operation of its ISFSI at WBN.

TVA documented the results of the required evaluations in the *Watts Bar Nuclear Plant Independent Spent Fuel Storage Installation 10 CFR 72.212 Evaluation Report for the HI-STORM FW System*. The inspectors reviewed the technical report and various referenced supporting documents to evaluate the licensee's compliance with the requirements of 10 CFR 72.212. The inspectors also conducted interviews with cognizant licensee personnel.

10 CFR 72.212 Report

The inspectors reviewed a copy of the TVA draft *Watts Bar Nuclear Plant Independent Spent Fuel Storage Installation 10 CFR 72.212 Evaluation Report for the HI-STORM FW System*, during the team inspection from August 3 to September 2, 2016. The final approved report was made available to the inspectors just prior to the initial loading campaign. Based on the review, the inspectors assessed that, overall, the report was comprehensive and adequately addressed the areas required to be evaluated under 10 CFR 72.212(b)(1) through (8), and (10) through (14). The 10 CFR 72.212 evaluation report was found to be acceptable; it contained sufficient objective evidence that the written evaluations confirmed that the conditions set forth in the CoC had been met, the ISFSI pad had been designed to support the stored load of the casks, and the requirements of 10 CFR 72.104 had been met for the radiological impact to members of the public.

Fire and Explosion Analysis of Hauling and Storage

The inspectors reviewed the supporting documents referenced in the 10 CFR 72.212 evaluation report, including the fire hazards analysis for the VCT; the fire hazards analysis for spatial separation requirements for combustion sources for the WBN ISFSI; and the evaluation of the thermal effects of the combustion of onsite gasoline and diesel

fuel storage tanks on spent fuel transport to, and storage at, the ISFSI. The inspectors verified that the calculations and analysis had been completed, including the specifications of the WBN ISFSI and HI-STORM FW MPC Storage System, and contained conservative assumptions; and identified any required operational restrictions based on the results of the calculations. The inspectors reviewed the calculation and analysis documents and performed a walkdown of the haul path and ISFSI pad and did not identify any concerns that would contradict the conclusions made by TVA.

HI-STORM FW MPC and Independent Spent Fuel Storage Installation Dose Limits

Title 10 CFR 72.104, *Criteria for radioactive materials in effluents and direct radiation from an ISFSI or Monitored Retrievable Storage Installation (MSRI)*, requires that the annual dose equivalent to any real individual, located beyond the controlled area, must not exceed 25 millirem (mrem) to the whole body, 75 mrem to the thyroid, and 25 mrem to any other critical organ, as a result of exposure to direct radiation from ISFSI operations. Section 8.2.2 of the 10 CFR 72.212 report provided the evaluation of meeting the dose requirements of 10 CFR 72.104. The WBN ISFSI pad is located within the plant's protected area and will contain a maximum of 80 HI-STORM FW MPC-37 canisters when fully loaded. The report described the results of calculations that show the annual dose contribution from direct radiation 800 meters from the ISFSI pad (conservatively taken and well within the site boundary) to be 1.55 mrem. The estimated annual dose due to power generation at WBN Units 1 and 2 is 8.26 mrem. In addition, the maximum annual dose at the site boundary due to the refueling water storage tanks, the primary water storage tanks, the condensate storage tanks, and the tritiated water storage tank, all of which contain water that is radioactive and thus, are sources of onsite and offsite exposures from direct radiation, has been calculated to be. 0.0124 mrem. Therefore, the estimated total annual dose at the site boundary is 9.8224 mrem to the whole body and 4.1224 mrem to the thyroid. Therefore, the calculated total values for annual dose to any real individual who is located beyond the controlled area are shown to be well below the limits established by 10 CFR 72.104(a).

Independent Spent Fuel Storage Installation Pad Parameters

In accordance with 10 CFR 72.212(b)(5)(ii), TVA is required to make a finding that the ISFSI pad and area can support the static and dynamic loads of the number of fully loaded HI-STORM FW MPC Storage Systems that will be placed on its ISFSI pad, considering the amplification of earthquakes through soil structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion. Section 7 of the *Watts Bar Nuclear Plant Independent Spent Fuel Storage Installation 10 CFR 72.212 Evaluation Report for the HI-STORM FW System* contained a summary of the analysis performed by Holtec International for TVA.

The TVA ISFSI storage pad is designed to adequately support both static and dynamic loads of 80 loaded Holtec HI-STORM FW MPC Storage Systems. The ISFSI pad design meets the requirements of 10 CFR Part 72, the HI-STORM FW Final Safety Analysis Report (FSAR), and CoC No. 1032. Therefore, the requirements of 10 CFR 72.212(b)(5)(ii) are met.

Site-Specific Parameters

Title 10 CFR 72.212(b)(6) requires general licensees to review the Safety Analysis Report (SAR) referenced in the CoC, and the related NRC Safety Evaluation Report (SER), prior to use of the general license to determine whether or not the reactor site parameters (including analyses of ambient temperature and temperature extremes, flooding, effects of tornados, earthquake intensity and seismic acceleration, lightning, snow and ice loads, and burial under debris) are enveloped by the cask design bases considered in these reports.

The inspectors determined that the licensee performed a review, documented in the 10 CFR 72.212 report, of the reactor site parameters that are evaluated in the certification of the design of the HI-STORM FW MPC Storage System, to ensure compliance with the requirements of 10 CFR 72, Subpart K, *General License for Storage of Spent Fuel at Power Reactor Sites*. The inspectors determined that the applicable reactor site parameters were evaluated for acceptability with the bounding values specified in the HI-STORM FW MPC SAR, and the NRC SER. The evaluations demonstrated that the design features for the HI-STORM FW MPC Storage System either enveloped the site-specific characteristics of the WBN site or enveloped the site-specific characteristics with administrative controls on the implementation of the HI-STORM FW MPC Storage System (e.g., limiting use of the HI-TRAC VW to working area ambient temperatures greater than or equal to 0ºF).

Conformance to the Conditions of the Certificate of Compliance

Title 10 CFR 72.212(b)(5)(i) requires the general licensee to perform written evaluations, before use, which establish that the cask, once loaded with spent fuel, will conform to the terms, conditions, and specifications of a CoC. The inspectors reviewed how TVA complied with the conditions of the CoC for preoperational testing and training exercise of the HI-STORM FW MPC Storage System at TVA. Attachment A of the Watts Bar 72.212 report, entitled *CoC 1032, Amendment 0, Revision 1 Evaluation*, contains a tabulation of the applicable conditions for the HI-STORM FW MPC Storage System at WBN. The inspectors reviewed the implementation of several of these conditions and verified that they had been performed, or were captured, in the procedures established for the HI-STORM FW MPC loading at WBN.

10 CFR 72.48 Screening and Evaluation

Holtec is authorized by 10 CFR 72.48 to make changes to the NRC-approved CoC for the HI-STORM FW MPC Storage System, provided that those changes are reviewed to determine if the changes would hinder or prevent a structure, system, or component (SSC) of the HI-STORM FW MPC Storage System from performing its design function as described in the HI-STORM FW MPC FSAR. Holtec has made changes to the HI-STORM FW MPC FSAR using this authority and has screened them for impacts to the SSCs. The inspectors verified that TVA also reviewed these changes for impacts to the SSCs and agreed that none of the changes required prior NRC approval (i.e., a CoC amendment).

Likewise, TVA is granted authority to make changes to the HI-STORM FW MPC system design, or FSAR description, in accordance with the provisions of 10 CFR 72.48. The site-specific changes made to the HI-STORM FW MPC Storage System by TVA were

identified in the 72.212 report. The inspectors verified that these changes were screened using the TVA 72.48 screening process and concluded that none of the changes adversely impacted the HI-STORM FW MPC SSCs.

10 CFR 50.59 Screening and Evaluation

Movement of the loaded HI-STORM FW MPC Storage System from the Auxiliary Building to its designated storage position in the ISFSI was evaluated by TVA to determine the potential for this activity to impact Part 50 reactor SSCs which are important to safety. The licensee designed the heavy haul path to support the weight of the VCT to carry a loaded HI-STORM FW MPC Storage System. Underground conveyances were either relocated or analyzed, to provide assurance that reactor SSCs considered important to safety would continue to perform their intended safety function, as described in the WBN FSAR. In addition, WBN restricted movement of the VCT to the heavy haul path. The inspectors confirmed that the operation of the ISFSI and associated changes to the Part 50 facility, were reviewed by the licensee in accordance with the provisions of 10 CFR 50.59(c), and a determination made that they did not involve a change to the facility's TS, or a license amendment, pursuant to 10 CFR 50.90. Therefore, the licensee determined that prior NRC approval, in the form of a license amendment or change to the TS, was not required. Accordingly, the licensee determined that it was in compliance with the requirements of 10 CFR 72.212(b)(8) for operation of the WBN ISFSI in accordance with the general license provisions of 10 CFR Part 72, Subpart K.

b. Findings

No findings were identified.

.2.5 Quality Assurance Program (IP 60854)

a. Inspection Scope

Per CoC No. 1032, Condition 3, *Quality Assurance*, activities at the ISFSI shall be conducted in accordance with a Commission-approved Quality Assurance Program (QAP) that satisfies the applicable requirements of 10 CFR Part 72, Subpart G, *Quality Assurance*; and which is established, maintained, and executed with regard to the storage system. The provisions of 10 CFR 72.140(d), *Previously-approved programs*, accept a QAP previously approved by the Commission which satisfies the requirements of 10 CFR 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants*. The inspectors noted that the licensee had provided the required notification to the NRC of its intent to apply its previously-approved 10 CFR 50, Appendix B, QAP to its ISFSI activities by letter dated June 6, 2016.

The involvement and role of QA was evaluated to ensure that sufficient independence was established to verify that the ISFSI program was effectively developed and implemented to support the safe operation of the ISFSI facility. The use of the condition reporting program in support of ISFSI activities was also evaluated. The inspection consisted of field observations, interviews with licensee personnel, and review of licensee documentation.

The inspectors reviewed the licensee's control of measuring and test equipment to verify that measures were established to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality were properly controlled, calibrated, and adjusted at specific periods to maintain accuracy within required limits. The inspectors also verified that the referenced measuring and testing devices were incorporated into a maintenance scheduling system. Inspectors also reviewed recent calibration records to verify that the calibrations were current and performed on a schedule that complied with the frequency set forth by the maintenance scheduling system. The inspectors reviewed QAP and procurement documents to determine whether the licensee had any material or equipment that required special handling or storage and, if so, that procedures and controls were in place to ensure adequate storage of that material or equipment. In addition, the inspectors performed a walkdown of the canister and lid storage area to verify that the surfaces to be welded were being stored in a manner to prevent damage, rusting, or weathering.

The inspectors reviewed QAP documents and procedures related to non-conformances to verify that measures were established to control materials, parts, or components that do not conform to their requirements in order to prevent their inadvertent use or installation. The inspectors also reviewed QAP documents and procedures to verify that measures were established to ensure that procurement of material, equipment, and services was adequately controlled, conformed to procurement documents, and required that the documentation to be maintained for the life of the ISFSI.

The inspectors reviewed licensee documents, including the FSAR and CoC, to verify that structures, systems, and components of the HI-STORM FW cask system were identified as important to safety (ITS) in accordance with NUREG/CR-6407, *Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety.* The inspectors also verified that any ancillary equipment was appropriately classified as ITS.

The inspectors reviewed licensee self-assessments. The results of the audited areas were documented and tracking items were identified for unresolved items. The inspectors reviewed corrective action documents to verify that the licensee was adequately implementing its 10 CFR Part 50 corrective action program as it pertained to the ISFSI program and activities. In addition, the inspectors reviewed the corrective actions related to issues concerning ISFSI activities to verify that resolution was appropriate, the issue was properly documented, and that appropriate levels of management were notified.

b. Findings

No findings were identified.

.2.6 Records (IP 60854)

a. Inspection Scope

Title 10 CFR 72.72, *Material balance, inventory, and records requirements for stored materials,* requires that a licensee keep records showing the receipt, inventory (including location), disposal, acquisition, and transfer of all special nuclear material (SNM). In addition, 10 CFR 72.212(b) requires that a licensee maintain a copy of the CoC, and

documents referenced therein, for each cask model used for storage of spent fuel, until use of the cask model is discontinued; and that a copy of the 10 CFR 72.212 Evaluation Report shall be retained until spent fuel is no longer stored under the general license issued under 10 CFR 72.210, *General license issued*. Records and procedural requirements for the general license holder are described in 10 CFR 72.212(b)(1), (2), and (11). The inspection consisted of a review of licensee documentation and verification of retention requirements.

The inspectors reviewed licensee submittals to the NRC to verify that adequate notifications of the licensee's intent to load casks were made at least 90 days prior to the first storage of spent fuel. The inspectors noted that the licensee had established procedural requirements to register each cask with the NRC within 30 days after loading. The inspectors also reviewed the licensee's material inventory program and verified the transfer of spent fuel to the ISFSI, including the amount of SNM stored in each cask, had been incorporated into the program. In addition, the inspectors verified that the licensee had submitted a decommissioning plan to the NRC pursuant to 10 CFR 72.30(a) and that the retention requirements of records, such as the CoC, FSAR and SER, were being implemented in accordance with 10 CFR 72.212(b)(11).

Additional general license requirements dealing with the review of the reactor emergency plan, QAP, training program, and radiation protection program must also be satisfied pursuant to 10 CFR 72.212(b)(10). Records and procedural requirements for the general license holder are described in 10 CFR 72.212(b)(11), (12), (13), and (14).

The inspectors reviewed selected referenced records and procedure changes related to emergency preparedness, fire protection, training, health physics, and the QAPs to determine if their effectiveness had been impacted by ISFSI activities. The inspectors interviewed cognizant personnel to confirm that they were knowledgeable of the impact of ISFSI-related activities. For instance, the inspectors interviewed emergency preparedness management staff, to assess coordination efforts with offsite organizations that may be called upon to respond during a major fire at the plant.

b. Findings

No findings were identified.

.2.7 Training and Qualifications (IP 60854)

a. Inspection Scope

The licensee's training program was reviewed to verify that appropriate training requirements were identified for ISFSI-related tasks and that personnel were qualified to perform ISFSI-related activities. The licensee's training program was also reviewed to verify that the required elements described in 10 CFR 72.44, the FSAR, and Condition 9 of the CoC, were incorporated into the ISFSI training program to ensure the safe handling and storage of spent nuclear fuel. The inspection consisted of a review of licensee documentation and interviews with cognizant personnel. The NRC inspectors confirmed that copies of the CoC and referenced documents were current.

The inspectors interviewed training personnel regarding the training and qualification of personnel performing ISFSI-related activities, and to verify that overview training was provided to personnel with ISFSI-related responsibilities. The inspectors reviewed selected training modules and noted that they adequately covered training aspects of a given task. The inspectors noted that the licensee used its current 10 CFR Part 50-approved program to implement the training requirements for ISFSI-related activities. The inspectors also noted that the licensee designated individuals qualified to perform a given task were based upon successful completion of the required training modules. The inspectors reviewed selected names from the qualification matrix and reviewed training records to verify that the individuals observed in the field were qualified for the tasks that they were performing. In addition, the inspectors verified that the training modules identified the expected dose rates and radiological conditions during loading activities.

b. Findings

No findings were identified.

.2.8 Radiation Protection (IP 60854)

a. Inspection Scope

The licensee's radiation protection program was evaluated to verify that the elements of 10 CFR 72.126, "*Criteria for radiological protection*," had been incorporated into procedures for ISFSI-related tasks and that they were effectively implemented by licensee personnel. Compliance with 10 CFR 72.104, "*Criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS*," and 10 CFR 72.106, "*Controlled area of an ISFSI or MRS*," was reviewed. The inspectors evaluated the effectiveness of the licensee's plans and preparations for controlling radiological activities by direct observation, by reviewing documents, and by interviewing individuals with radiation protection responsibilities.

The inspectors reviewed the licensee's radiation protection program, including documents associated with the operating procedures of the ISFSI, the radiation protection program of the loading campaign, and radiation protection program for an individual at the controlled area boundary of the ISFSI.

The inspectors reviewed the licensee's As Low As is Reasonably Achievable (ALARA) work plan and dose estimate for loading the first Holtec MPC. Based on discussions with licensee personnel and a review of documentation, the inspectors determined that an appropriate dose goal limit had been established for the first MPC loading. The inspectors noted that the dose estimate for the initial cask loading was in reasonable agreement with estimated dose values noted in the Holtec FSAR. The ALARA work plan adequately addressed the use of temporary shielding at key steps of the evolution, and that adequate contamination control and dose reduction measures were incorporated into the ALARA work plan. The inspectors noted that applicable procedures specified the need to perform radiological surveys at critical steps of the loading sequence, and when handling and transporting the loaded canister. Verification steps were incorporated into approved procedures to ensure that dose rates and contamination levels were in compliance with applicable limits specified by the TSs.

b. Findings

No findings were identified.

.2.9 Fuel Characterization and Verification (IP 60854)

a. Inspection Scope

The CoC for the Holtec dry cask storage system specified the parameters that must be met in order to allow spent fuel to be stored at the ISFSI. The inspectors evaluated licensee programs to verify that spent fuel assemblies selected for storage met the applicable requirements of the CoC. The inspection consisted of interviews with licensee personnel and review of documentation.

The inspectors reviewed the licensee's process for selecting and verifying fuel assemblies for placement into the MPC. The inspectors reviewed documents associated with the qualification, characterization, and selection of fuel assemblies for storage at the ISFSI. The WBN specific fuel and operation characteristics were included in the fuel characterization and selection processes. The CoC requires that selected fuel assemblies be independently identified, be free of cladding defects, and be within specified limits for such parameters as fuel enrichment, burn-up, and decay heat output. The inspectors discussed the fuel selection process with licensee personnel and determined that individuals were knowledgeable of the requirements. The licensee had developed a cask loading plan in accordance with approved licensee procedures. The inspectors reviewed documentation of the visual examinations performed on the 37 fuel assemblies loaded into the first MPC (which was subsequently loaded into the HI-STORM FW overpack and placed on the ISFSI pad), to verify that the examinations were performed in accordance with approved procedures. The inspectors noted that the licensee's documentation supported the proper characterization of the fuel assemblies loaded into the MPC, and that it was in compliance with design parameters specified in the CoC for the selected fuel assemblies. The inspectors reviewed the supporting documentation for all eight of the scheduled MPC loadings of this loading campaign.

b. Findings

No findings were identified.

.3 Watts Bar Nuclear Plant Independent Spent Fuel Storage Installation Activities – Initial Loading Activities of the MPC/HI-STORM FW (IP 60855)

a. Inspection Scope

From September 26 – October 4, 2016, the inspectors observed selected activities associated with moving spent fuel from wet storage in the SFP to dry storage on the ISFSI pad. The previously performed Dry Runs had proven to be an effective representation of the actual activities. While no significant radiological differences were noted by the inspectors, two industrial/equipment issues were encountered by the licensee during the evolution. The first was having to change the moisture/separator filters twice due to boron clogging the filters (due to a higher-than-normal boron concentration in the SFP as a result of the plant's tritium program). The second issue was with the chiller when it failed to cool as expected. Troubleshooting eventually

identified the problem to be an incorrect glycol/water ratio. The inspectors noted that the MPC was continuously monitored while the issues were resolved. Once these issues were resolved, the loading activities continued with no significant additional issues. The inspectors noted that all loading activities were done in accordance with approved ISFSI procedures developed by TVA/Holtec and that minor revisions to the procedures as a result of observations made during the dry runs had been incorporated prior to the initial movement of spent fuel. The licensee conducted a pre-job briefing prior to each shift with personnel involved with the shift's loading activities. The briefings were comprehensive and effectively covered all key aspects of the evolution, including procedural adherence expectations, safety aspects of the activities, and QA hold points. The inspectors noted that procedure compliance was adhered to during the performance of the loading activities. Radiological conditions were constantly monitored to ensure the safety of personnel working on the loading activities. The responsible supervisor ensured the procedural steps in the work package/procedure were carefully followed throughout the performance of the evolution. The work package was periodically reviewed by the inspectors to verify compliance with procedures and related work documents. The inspectors noted that procedure steps were "circled and slashed," or otherwise notated, by the responsible supervisor to signify initiation and completion, respectively, of a given step; and that work order documents were followed, just as had been done during the dry runs. The presence of licensee supervision was noted during the loading activities. In addition, the inspectors noted that the licensee generated a list of "Lessons Learned" during the loading of the initial MPC and planned to incorporate that information into the appropriate procedures to improve future MPC loadings.

b. Findings

No findings were identified.

4OA6 Meetings

Exit Meeting Summary

The results of the inspection were discussed at an exit meeting conducted on October 5, 2016, via telephone with Mr. Paul Simmons, Site Vice President, and other members of the staff.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
G. Arent, Licensing
S. Conners, Plant Manager
B. Cupp, Corporate Nuclear Fuels
Z. Martin, Corporate Nuclear Fuels
E. McCoy, Aux Building Crane Upgrade
D. Reed, Project Manager, Spent Fuel
P. Simmons, Site Vice President
J. Sterchi, Fire Protection
R. Stroud, Licensing
M. White, Emergency Preparedness
P. Williams, Nuclear Operations/Fire Protection
A. Whitener, Fuel Selection

Holtec International
K. Montgomery, Dry Cask Storage Operations Supervisor
A. Johnson, Dry Cask Storage Operations Supervisor
S. Turner, ISFSI Project Manager

NRC
J. Nadel, Senior Resident Inspector, Watts Bar Unit 1
J. Hamman – Resident Inspector, Watts Bar Unit 1

LIST OF ITEMS OPENED, CLOSED, DISCUSSED AND UPDATED

Opened and Closed

None

DOCUMENTS REVIEWED

Licensee Documents

Procedures

Abnormal Operating Instruction 0-AOI-30.1, Plant Fires, Revision 0002
0-SI-79-2, Dry Cask Storage Log, Revision 0001
Technical Requirements Instruction, 0-TRI-271-3, Auxiliary Building Crane Interlock Test, Revision 5
Common Technical Procedure NFTP-100FW, Fuel Selection for Dry Cask Storage - Holtec FW Design, Revision 0002
Emergency Plan Implementing Procedure (EPIP)-1, Emergency Plan Classification Logic, Revision 0046
NPG-SPP-05.2.1, Operational ALARA Planning and Controls, Attachment 2 - ALARA Plan 16-012, 2016 Spent Fuel Storage Campaign, Revision 0004
NPG-SPP-18.4.6, Control of Fire Protection Impairments, Revision 0008
NPG-SPP-18.4.7, Control of Transient Combustibles, Revision 0008
NPG-SPP-18.4.8, Control of Ignition Sources (Hot Work), Revision 0006
TVA-TSP-18.721, Rigging, Revision 0013
TVA-TSP-18.721A, Rigging Manual, Revision 0003
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Radiological Emergency Plan, NP-REP, Appendix C, Page C-3, Revision 110

Specifications

PS-3200, Procurement Specification for the HI-STORM FW Multi-Purpose Rigging System, Revision 3
PS-3211, Procurement Specification for the Loaded MPC 37/89 Lift Sling, Revision 2
PS-3702, Procurement Specification for the HI-TRAC VW Lift Yoke, Revision 5
PS-3723, Procurement Specification for the HI-TRAC VW Lift Lugs, Revision 4

Calculations

CDQ0000792013000357, HI-STORM FW Cask Handling Weights at WBN, HI-2135734, Revision 001
CDQ0000792014000632, Calculation Package on the Seismic Stability Analysis of Watts Bar HI-STORM/HI-TRAC Stack Using NRC-Concurred Methodology, HI-2135902
CDQ0000792014000647, Vertical Cask Transporter Stability on the Haul Path and the ISFSI Pad at Watts Bar Nuclear Plant, HI-2146169
CDQ0002712015000665, 125/10 Ton Auxiliary Building Crane - Compilation of Vendor Calculations to Document Overall Crane Compliance with CMAA #70 and NUREG-0554 FOR Main Hoist Lifts up to and including 125 Tons. Aux Hoist Lifts Are CMAA #70 Compliant but Not Single-Failure-Proof, Revision 001
CDQ0002712015000727, 125/10-Ton Auxiliary Building Bridge Crane Seismic Analysis, Revision 001
CDQ0006912014000558, Watts Bar Nuclear Plant Haul Path – Underground Utility Evaluation, HI-2135818
CDQ0006912014000633, Dynamic Analysis of Loaded HI-STORM on LPT at Watts Bar, HI-2135883
CDQ0006912014000573, Structural Analysis of ISFSI Pad at WBN
CDQ0006912014000638, Watts Bar Nuclear Plant Haul Path – Rail Slab, HI-2146034
EDQ0002712015000765, WBN 125/10 Ton Auxiliary Building Crane Software Quality Assurance Documentation, Revision 000

NDQ0000782015000760, Thermal Response of the Hi-Storm Under Flood Condition and Design Basis for Post Flood Restoration Measures
NDQ0000792015000729, WBN Site Boundary Normal and Off-Normal Doses Including ISFSI, Revision 000
NDQ0000792015000734, Occupational Dose Rates around the HI-STORM FW System for WBN, HI-2135814
NDQ0000792015000763, ISFSI and Haul Route Fire Hazard Hazards Analysis Calculation, HI-2146051, Revision 001
PFE-2682, Watts Bar Fuel Characterization Study, Revision 0
WBN Auxiliary Building Bridge Crane - NUREG 0554 Tabulation for Calculation CDQ0002712015000665, Revision 1
WCG-1-124, Seismic Crane Load on A5 and A11 Line Walls, Revision 3

Maintenance Instructions (MIs)
0-MI-0.045, Control of Heavy Loads in Critical Lifting Zones, Revision 0006
0-MI-57.028, Shift Inspection of Polar, Auxiliary, Turbine Building 200-Ton and Turbine Building 15-Ton Cranes, Revision 0007
0-MI-271.001, Auxiliary Building Crane Annual Inspection, Revision 0000, Effective Date 07-21-2016
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Drawings
0-47W-455-7, ISFSI Post-Flood Restorative Actions Hi-Storm
44W-411-5, NUREG-0612 Overhead Handling System Locations – El. 757.0, Revision 5

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DCN 62328, Implement an ECP Licensing Documentation to Facilitate a 10CFR72 Subpart K General License in accordance with Holtec CoC 1032
DCN 63842, Upgrade 125/10-Ton Aux Building Crane to Make It Single-Failure-Proof for Cask Handling, Revision A
DCN 64175, Upgrade Control System for the 125/10-Ton AB Crane In Support of the Dry Cask Mod, Revision A

Condition Reports (CRs)
CR 1028723, Replacement valve not sterilized
CR 1064621, No ISFSI licensing basis document directory in BSL
CR 1070778, Unauthorized safety signs placed on secure fence
CR 1122157, Review Licensing and Design Basis documents for 10CFR72 impacts
CR 1152048, Need to clarify RE role regarding performing QC inspections
CR 1129655, Revise REP Appendix C and WBN EPIP-1 to include a new EAL 7.5 Spent Fuel Storage
CR 1186142, Evaluate EPIP-6, -7, and -13 regarding ISFSI
CR 1204329, SPP-18.4.7 references the wrong drawing for addressing ISFSI controls

Other Documents
ASC Industries, Ltd, Main Hoist Wire Rope Certifications and Cut Sheets
Certificate of Compliance for Spent Fuel Storage Casks Number 1032, Amendment 0, Revision 1, effective date April 25, 2016 (including Appendices A and B)
CNL-15-212, Triennial Decommissioning Funding Plans for Independent Spent Fuel Storage Installations (ISFSIs)

CNL-16-153, Initial Decommissioning Funding Plan for Watts Bar Nuclear Plant Independent Spent Fuel Storage Installation (ISFSI), 09/28/16
Dry Cask Storage Instruction WBN-0-VI-DCS-079-001.0, Holtec Vendor Instruction for HI-STORM FW Cask Loading, Revisions 0000 and 0001
Dry Cask Storage Instruction WBN-DCS-100.1 FW HI-STORM FW Initial Inspection, Revision 0000
Dry Cask Storage Instruction WBN-DCS-100.4 VW, HI-TRAC Annual Visual Inspections and Maintenance, Revision 0000
Dry Cask Storage Instruction WBN-DCS-100.11 FW ISFSI and HI-STORM FW Annual Inspection and Maintenance, Revision 0000
Dry Cask Storage Instruction WBN-DCS-100.13FW, Inspection of Special Lifting Devices for Dry Cask Storage, Rev. 0000
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Dry Cask Storage Instruction, WBN-DCS-200.1 FW Dry Cask Preparations, Revision 0000
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EGT024.009, Initial 72.48 Training, Revision 0
EGT327.152A, ISFSI Project Overview for WBN, Revision 00
Final Safety Analysis Report on the HI-STORM FW System (HI-STORM FW MPC Storage System FSAR), Holtec Report No. HI-2114830, Docket 72-1032, Revision 2, June 24, 2013, and Revision 2.1, May 31, 2016
HI-2167097, Dry Run Plan for WBN, Revision 0
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MMQ034.001, Basic Rigging Qualifications, Revision 6
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Technician Operator Certification for: T. Bunch, M. Dupree, A. Holley
TVA Form 17671, High Hazard Lift Plan, 11-17-2014
TVA Form 17672, Operator's Overhead Crane Preoperational Inspection, 12-18-2012
TVA Form 17775, Overhead Crane Monthly Inspection, 7-2003
TVA Form 20403, TVA Rigging Plan, 01-12-2011
TVA Radiological Emergency Plan (Appendix C of EPIP-1, Revision 0046)
TVA Letter to NRC, Notice of Intent to Apply the Previously Approved Quality Assurance Plan to Spent Fuel Storage Activities, and to Store Spent Fuel at an Independent Spent Fuel Storage Installation (ISFSI), dated 6/6/2016
TVA Watts Bar Aux Crane Commissioning Test Procedure, Simmers # SP74050, Approved Final Released Revised 7-11-16
TVA-NQA-PLN89-A, Nuclear Quality Assurance Plan (NQAP) (Quality Assurance Program Description), Rev. 32
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WBN QA Observations: 76237, 76367, 76368, 76682, 76886, 77186, 77445, 77512, 77632, 77697, 77783, 77821, 77824, 77879, 77891, 77900, 77927, 78011

Holtec Documents

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HPP-2246-400, TVA Watts Bar Procedure for MPC (FW) Transfer, Revisions 2, 3, and 4
HPP-2246-500, TVA Watts Bar Procedure HI-STORM (FW) Movements, Revisions 2, 3, and 5
Holtec Report HI-2135836, Liquefaction Analysis for Proposed WBN ISFSI Pad, Revision 1, 1/20/2014
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Doc-103-006, HI-TRAC Documentation Package
Doc-104-224-052, VW Mating Device Grout Pour Surveillance & Load Testing, dated 9-1-15
Doc-104-107-051, HI-TRAC VW Lift Lug Load Test, dated 9-11-15
Doc-104-107-053, HI-STORM FW Lifting Bracket Load and Functional Test, dated 7-2-15
Doc-104-117-055, Factory Acceptance Test for the Watts Bar Lift Yoke Extension, dated 10-8-15
Doc-104-209-057, MPC FW Lift Cleat Load Test Record, dated 10-19-15

Simmers Crane Design & Services Co. Documents

Aux Bldg Crane – New Main Hoist Wire Rope Replacement Procedure per Simmers letter dated June 21, 2016
Aux Building Unit 0 Crane Alignment & Runway Survey, January 14, 2015
Bridge Structure, Revision 1
Drawing 74050-B04, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane Bridge Layout, Revision 0
Drawing 74050-B11, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane G1 Bridge Girder Longitudinal Stiffeners, Revision 2
Drawing 74050-B12, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane G2 Bridge Girder Longitudinal Stiffeners, Revision 2
Drawing 74050-B14, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane Bridge Girder Weld Map, Revision 0
Drawing 74050-H01, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane Aux Hoist Hook Beam and Bushing Details, Revision 2
Drawing 74050-H02, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane Main Hoist Modification Details, Revision 8
Drawing 74050-H04, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane Main Hoist Hook Arrangement, Revision 2
Drawing 74050-H05, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane Main Hoist Hook, Trunnion, and Hook Nut Details, Revision 1
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Drawing 74050-H07, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane Aux Hoist Modification Details, Revision 4

Drawing 74050-L01, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane Drawing Legend, Revision 1
Drawing 74050-T01, TVA – Watts Bar Nuclear Plant Unit 1 & 2 Aux Building 125/10-Ton Crane Trolley Arrangement, Revision 3
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NRC NUREG/CR-6407, *Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety,* February 1996
NRC NUREG/CR-6865, *Parametric Evaluation of Seismic Behavior of Freestanding Spent Fuel Dry Cask Storage Systems*, February 2005
NRC Safety Evaluation Report Docket No. 72-1032 Hi-STORM FW MPC Storage System Holtec International, Inc. Certificate of Compliance No. 1032, Revision No. 1 to Amendment 0

LIST OF ACRONYMS

ACI	American Concrete Institute
ADAMS	Agencywide Document Accession Management System
ALARA	As Low As is Reasonably Achievable
ASME	American Society of Mechanical Engineers
ASTM	American Society for the Testing of Materials
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
CLA	Cask Loading Area
CR	Condition Report
CST	Condensate Storage Tank
CWA	Cask Work Area
DCSS	Dry Cask Storage System
f'_c	Concrete Compressive Strength
FSAR	Final Safety Analysis Report
FW	Flood/Wind
F_y	Reinforcing Steel Yield Strength
HI-STORM	Holtec International Storage Module
HI-TRAC	Holtec International Transfer Cask
ISFSI	Independent Spent Fuel Storage Installation
ITS	Important to Safety
LPT	Low Profile Transporter
MPC	Multi-Purpose Canister
mrem	millirem
MSRI	Monitored Retrievable Storage Installation
NMSS	Office of Nuclear Materials Safety and Safeguards
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
psi	pounds per square inch
PT	Penetrant Test
PWST	Primary Water Storage Tank
QA	Quality Assurance
QAP	Quality Assurance Program
RWST	Refueling Water Storage Tank
SAR	Safety Analysis Report
SER	Safety Evaluation Report
SFP	Spent Fuel Pool
SFST	Division of Spent Fuel Storage and Transportation
SNM	Special Nuclear Material
SSC	System, Structure, or Component
SSE	Safe Shutdown Earthquake
TS	Technical Specification
TVA	Tennessee Valley Authority
TWST	Tritiated Water Storage Tank
VCT	Vertical Cask Transporter
VSC	Vibro-Stone Column
VW	Variable Weight
WBN	Watts Bar Nuclear