



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

April 28, 2016

Mr. George Lippard III,  
Vice President  
Nuclear Operations  
South Carolina Electric & Gas Company  
Virgil C. Summer Nuclear Station  
Post Office Box 88, Mail Code 800  
Jenkinsville, SC 29065

**SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION - NRC INDEPENDENT SPENT FUEL  
STORAGE INSTALLATION INSPECTION REPORT NOS. 05000395/2016009  
AND 07201038/2016001**

Dear Mr. Lippard:

On March 26, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Virgil C. Summer Nuclear Station and the NRC inspectors discussed the results of this inspection with Mr. George Lippard and other members of your staff on March 29 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 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 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. 50-395 and 72-1038  
License Nos. NPF-12

Enclosure:  
IR 05000395/2016009 and 07201038/2016001  
w/Attachment: Supplementary Information

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DATE	4/21/2016	4/21/2016	4/25/2016	4/21/2016	4/ 26/2016	4/25/2016	
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**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos: 50-395 and 72-1038

License Nos: NPF-12

Report Nos: 05000395/2016009 and 07201038/2016001

Licensee: South Carolina Electric & Gas (SCE&G) Company

Facility: Virgil C. Summer Nuclear Station

Location: P.O. Box 88  
Jenkinsville, SC 29065

Dates: January 25, 2016 – March 26, 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  
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Criticality, Shielding & Risk Assessment Branch (CSRAB)  
Brendan Collins, Reactor Inspector, Region II, DRS, EB3  
Jonathan Lizardi, Construction Inspector, RII, Division of Construction  
Inspection

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

Enclosure

## **SUMMARY OF FINDINGS**

IR 05000395/2016009 and 07201038/2016001; Virgil C. Summer Nuclear Station, 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 fuel, including the preparation for loading of spent fuel from the spent fuel pool (SFP) to its placement at the ISFSI using the Holtec HI-STORM FW MPC Storage System. Upon completion of the dry run demonstrations on March 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 on the ISFSI on March 26, 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 (CoC), and Technical Specification (TS) requirements.

## REPORT DETAILS

### Summary of Facility Activities

The South Carolina Electric & Gas (SCE&G) Company selected the Holtec International Storage Module (HI-STORM) Flood/Wind (FW) Multi-Purpose Canister (MPC) Storage System for storage of spent fuel at Unit 1 of the Virgil C. Summer Nuclear Station 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) 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. SCE&G elected to use Amendment 0 to the CoC, which became effective on June 13, 2011.

Demonstrations of loading, processing, and moving spent fuel from the SFP to the ISFSI, using the Holtec system, were conducted from January 26, 2016 to March 16, 2016, for the NRC. During this period, the inspectors performed an evaluation to determine if the ISFSI 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 March 21 – 26, 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 SCE&G programs were adequate for continued operation, and maintenance of the ISFSI once the ISFSI was loaded.

### 4OA5 Other Activities

#### .1 V. C. Summer Nuclear Station Independent Spent Fuel Storage Installation Activities

##### .1.1 Preoperational Test Program

###### a. Inspection Scope (Inspection Procedure 60854)

The CoC for the Holtec system for the storage of irradiated 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. The NRC conducted an onsite inspection to observe the licensee's demonstration of the required activities. The inspection consisted of field observations, interviews with licensee personnel, and review of licensee documentation.

Per CoC No.1032, Condition 9, Preoperational Testing and Training Exercise, "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 multi-purpose canister (MPC). The dry run may be performed in an alternate step sequence from the actual procedures, but all steps must be performed."

From January 26 – March 16, 2016, the inspectors observed several dry run activities. Specifically, welding demonstrations were observed during the last week of January. MPC fluid operations and cask drying operations, including de-watering, forced helium dehydration, and helium backfilling were observed February 9-12. From March 1-3, the inspectors observed “dry operations”, including transporting the HI-TRAC VW (Variable Weight), from the decon pit (DCP) to the “stack up” position on top of the HI-STORM FW; 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 Fuel 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 March 15-16, the inspectors observed “wet operations,” including transferring the HI-TRAC VW containing the MPC from the DCP into the cask loading pit (CLP) simulate the loading of the MPC with spent fuel using a dummy fuel assembly (including independent verification), and transporting the loaded HI-TRAC VW out of the CLP to the DCP where the welding, de-watering, drying and helium backfilling operations take place. Additionally, health physics technicians decontaminated and surveyed the HI-TRAC VW for unexpected dose rates. The inspectors noted that all activities were done in conjunction with draft ISFSI procedures developed by SCE&G. Minor revisions to the procedures were approved and incorporated prior to the initial movement of 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, safety aspects of the activities, and Quality Assurance (QA) hold points. 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, respectively, of a given step 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.

.1.2 Control of Heavy Loads

a. Inspection Scope (Inspection Procedure 60854)

The licensee had modified the existing crane in the Fuel Handling Building so that it was single-failure proof; it was certified and documented by the manufacturer to conform to the requirements of NUREG-0612 and NUREG-0554. The crane had been inspected in October 2014 by NRC inspectors in preparation for use in the dry cask storage project (NRC Inspection Reports 05000395/2014009 and 07201038/2014002 (Agencywide Document Accession Management System (ADAMS) Accession No. ML14325A539).

The inspectors reviewed work orders associated with maintenance of the crane since October 2014 to ensure that the crane, hooks, and wire rope were inspected, tested, and maintained in accordance with the ASME Code, NUREG-0554, NUREG-0612, and the crane manufacturer's recommendations. The inspectors observed the licensee perform movements of heavy loads inside of the fuel handling building in the course of the dry runs and initial loading campaign, and noted appropriate supervisory oversight and radiological protection practices.

b. Findings

No findings were identified.

.1.3 Welding

a. Inspection Scope (Inspection Procedure 60854)

The NRC inspectors observed and evaluated the performance of the welders and associated nondestructive examination (NDE) personnel contracted to perform the welding operations on the MPC to determine if they were qualified and working to approved procedures. The inspectors observed the welding equipment setup and welding on a mockup. The majority of the welding was done with an Automated Welding System (AWS) using the gas shielded arc welding (GTAW) process on the cask mockup lid-to-shell weld. The use of manual GTAW welding was also discussed and demonstrated on the drain/vent port cover plates. A visual examination (VT-1) and dye penetrant testing (PT) on the welds was observed by the inspectors and the inspectors compared the welding and NDE procedures to their respective work practices for compliance to applicable codes and standards. The inspectors also reviewed welding procedure documentation, welder performance qualifications, and NDE procedures and NDE personnel qualifications to verify that the respective Code and procedural requirements were met.

During the initial loading campaign, the inspectors observed preparations for welding the lid of the MPC and noted that contractor personnel were knowledgeable of their work activities and worked closely with licensee personnel. Rigging and handling of the shield bell, welding machine, and associated equipment were performed in a safe manner



during the processing of the first MPC. The individuals were knowledgeable of procedural requirements and followed approved rigging and lifting practices.

The inspectors concluded that the capability to adequately weld and perform NDE on MPCs was sufficiently demonstrated on the mockup and further verified during the first loading campaign; and that personnel were qualified to perform their assigned functions.

b. Findings

No findings were identified.

.1.4 Review of Evaluations

a. Inspection Scope (Inspection Procedures 60856 and 60857)

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. SCE&G holds a general license for operation of its ISFSI.

SCE&G documented the results of the required evaluations in "VCS Unit 1 10 CFR 72.212 Evaluation Report," Revision 0. 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 SCE&G draft "VCS Unit 1 10 CFR 72.212 Evaluation Report," Revision 0, during the team inspection from March 1-3, 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 V. C. Summer Nuclear Station 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 Virgil C. Summer Nuclear Station 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 did not identify any concerns that would contradict the conclusion made by SCE&G.

#### 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)," require 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 5.3 of the 10 CFR 72.212 report provided the evaluation of meeting the dose requirements of 10 CFR 72.104. The V. C. Summer Nuclear Station ISFSI pad is located within the plant's protected area, with a minimum distance to the nearest owner-controlled boundary of approximately one mile (1,600 meters). The ISFSI will contain a maximum of 98 HI-STORM FW MPC-37 canisters. The report described the results of calculations that show the annual offsite dose contribution from direct radiation, to the closest (at 1760 meters) permanent resident due to the ISFSI to be 0.0135 mrem. The estimated annual dose due to power generation at VCSNS Units 1, (as well as 2 and 3 when operation begins) is less than 2 mrem. Therefore, the total annual dose to the closest real individual is within the 10 CFR 72.104(a) limit of 25 mrem.

#### Independent Spent Fuel Storage Installation Pad Parameters

In accordance with 10 CFR 72.212(b)(5)(ii), SCE&G 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 5.2 of the SCE&G 72.212 report contained a summary of the analysis performed by Holtec International for SCE&G.

The SCE&G ISFSI storage pad is designed to adequately support both static and dynamic loads of 98 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 V. C. Summer site or enveloped the site-specific characteristics of the SCE&G 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 0°F).

#### 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 SCE&G complied with the conditions of the CoC for preoperational testing and training exercise of the HI-STORM FW MPC Storage System at SCE&G. Appendix 1 of the SCE&G 72.212 report, entitled "HI-STORM FW MPC Storage System Certificate of Compliance Evaluation," contains a tabulation of the applicable conditions for the HI-STORM FW MPC Storage System and SCE&G. The inspectors reviewed the implementation of several of these conditions at SCE&G and verified that they had been performed, or were captured, in the procedures established for the HI-STORM FW MPC loading at SCE&G.

#### 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 to perform 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 SCE&G 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, SCE&G 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 SCE&G were identified in the 72.212 report. The inspectors verified that these changes were screened using the SCE&G 72.48 screening process, concluding 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 Fuel Handling Building to its designated storage position in the ISFSI was evaluated by SCE&G 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 SCE&G FSAR. Additionally, SCE&G 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 do 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 SCE&G ISFSI in accordance with the general license provisions of 10 CFR Part 72, Subpart K.

b. Findings

No findings were identified.

.1.5 Quality Assurance Program (QAP)

a. Inspection Scope (Inspection Procedure 60854)

Per CoC No. 1032, Condition 3, Quality Assurance (QA), activities at the ISFSI shall be conducted in accordance with a Commission-approved 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 Appendix B to Part 50. 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, Quality Assurance Program, to its ISFSI activities.

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 applicable sections of the licensee's QAP, procedures, and documentation related to nonconformance items, corrective actions, control of measuring and test equipment, handling and storage controls, and procurement control to verify adequate implementation of the licensee's QAP for the ISFSI activities.

The inspectors reviewed licensee self-assessments, QA observations, and baselining trip reports. The inspectors noted that these documents were self-critical and identified various issues to be addressed in support of ISFSI operational readiness. The inspectors noted that audit findings were entered into the licensee's corrective action program.

The inspectors reviewed a sample of the licensee's condition and nonconformance reports to verify that the licensee was adequately implementing its 10 CFR Part 50 corrective action program as it pertained to the ISFSI program and related activities. 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. The inspectors noted that ISFSI-related issues were identified at a low safety threshold, and corrective actions implemented in a timely manner.

The inspectors noted that QA personnel attended the dry run briefings and were actively engaged in field activities, and verified that hold points, technical specifications, and work order requirements were implemented in accordance with approved procedures and related work documents. Calibration records for selected instruments were reviewed to verify that calibrations were current.

The inspectors reviewed the QAP to determine whether the licensee had any material or equipment that required special handling or storage and, if so, that adequate procedures and controls were in place. The licensee had established controls for procurement and receipt of items. The inspectors reviewed the "Quality Plan for the Receipt of Holtec Major Components and Ancillary Devices Associated with Dry Cask Storage," Revision 1, and ES-361; "Receipt Inspection," Revision 12, which incorporated applicable requirements from the FSAR. The inspectors verified that QAP-classified equipment, structures, systems and components were identified in the appropriate safety class in accordance with FSAR requirements. A number of licensee documents, including drawings, and receipt and procurement documentation, was reviewed to determine if the safety classification of items important-to-safety was adequately translated and specified in those documents. The inspectors also observed the HI-STORM FW storage overpacks to be used for future loading to verify that there were no apparent structural indications, such as visible cracks, on their walls or damage to screen plates on the vents.

b. Findings

No findings were identified.

.1.6 Procedures and Technical Specifications

a. Inspection Scope (Inspection Procedure 60854)

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), 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 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.

.1.7 Training and Qualifications

a. Inspection Scope (Inspection Procedure 60854)

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, Subpart I, "Training and Certification of Personnel," and CoC No. 1032, Amendment 0, Condition 9, "Pre-Operational Testing and Training Exercise," 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 CoC, Amendment 0, and referenced documents were current.

The inspectors interviewed training personnel regarding the training and qualification of personnel performing ISFSI-related activities. Overview training was provided by the licensee to personnel with ISFSI-related responsibilities. Several training modules were specifically developed for the ISFSI activities, including a general overview of the ISFSI project and job/task-specific modules that covered activities such as preparation and loading of the MPC, design and licensing basis, licensing Part 72, and off-normal conditions.

The inspectors noted that activities such as forced helium dehydration, helium backfilling, and welding of the MPC lid were to be performed by qualified contractor personnel with previous experience in these task areas. Based on discussions with licensee personnel, the inspectors verified that the licensee had evaluated the training and qualification of contractor personnel to perform their intended functions.

The inspectors reviewed selected training modules and noted that they were comprehensive and adequately covered training aspects of a given task. The inspectors noted that the licensee designated individuals as qualified to perform a given task based upon successful completion of the required training modules.

Based on field observations and discussions with personnel during initial cask loading activities, the inspectors concluded that the individuals conducting ISFSI activities were properly trained and qualified to perform their assigned functions.

b. Findings

No findings were identified.

.1.8 Radiation Protection

a. Inspection Scope (Inspection Procedure 60854)

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 MPC," and 10 CFR 72.106, "Controlled area of an ISFSI or MPC," 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 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 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 had been established for the first Holtec cask 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.

## .1.9 Fuel Characterization and Verification

### a. Inspection Scope (Inspection Procedure 60854)

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 in the MPC. The inspectors reviewed documents associated with the qualification, characterization, and selection of fuel assemblies for storage at the ISFSI. Technical Specifications require that selected fuel assemblies be visually inspected, 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 TS requirements. The inspectors reviewed documentation of visual fuel examinations performed for the 37 fuel assemblies to be loaded into the MPC, which was subsequently loaded into the HI-STORM FW MPC overpack and placed on the ISFSI pad to verify that the examinations were performed in accordance with approved procedures.

Examinations were performed in accordance with approved procedures. The inspectors noted that the selected fuel assemblies met all the appropriate TS requirements for placement into a MPC for dry storage. Supporting documentation adequately characterized the selected fuel assemblies for loading into a MPC.

The licensee had developed a cask loading plan in accordance with approved procedures. Licensee documentation supported the proper characterization of fuel assemblies to be loaded into a Holtec MPC, and was in compliance with design parameters specified in the CoC.

### b. Findings

No findings were identified.

## .1.10 Records

### a. Inspection Scope (Inspection Procedure 60854)

Title 10 CFR 72.72 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.



Additional general license requirements dealing with the review of the reactor emergency plan, quality assurance program, 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 licensee had established records for SNM accountability. The inspectors reviewed procedures REP-100.003, "Special Nuclear Material Physical Inventory," REP-100.004, "Special Nuclear Material Reporting," and REP-100, "Special Nuclear Material Physical Inventory Program Administration and Organization," which tracked the locations at which the fuel assemblies are stored in the SFP. The inspectors observed that the licensee had initiated Condition Report (CR) 16-00453 to track the development and submittal of a site-specific decommissioning plan to the NRC in accordance with 10 CFR 70.30(a).

The inspectors also reviewed procedure HPP-2036-200, "MPC-37 Loading at VC Summer," which outlined the steps for identifying the fuel assemblies to be loaded, placing the fuel assemblies into the MPC, and verifying that the MPC had been correctly loaded. The inspectors reviewed a copy of the CoC and its referenced documents (i.e., TSS, FSAR, and the NRC SER) to verify that these documents were maintained in accordance with 10 CFR 72.212(b)(11). The inspectors noted that the licensee had made the required 90-day notification to the NRC prior to loading their first cask on the ISFSI, and had established procedural requirements to register each cask with the NRC within 30 days after loading, per procedure SAP-1410, "Dry Fuel Storage Program Manual."

The inspectors reviewed selected referenced records and procedure changes related to the emergency preparedness, fire protection, training, health physics, and quality assurance programs 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, with respect to coordination with offsite organizations that may be called upon to respond during a major fire at the plant.

b. Findings

No findings were identified.

.1.11 Initial Loading of the MPC/HI-STORM FW

a. Inspection Scope (Inspection Procedure 60855)

From March 21-26, the inspectors observed activities associated with moving spent fuel from wet storage in the spent fuel pool to dry storage on the ISFSI pad. The previously performed Dry Runs had proven to be an effective representation of the actual activities and no significant differences were noted by the inspectors and no significant issues were encountered by the licensee during the evolution. The inspectors noted that all activities were done in accordance with approved ISFSI procedures developed by SCE&G 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 maintained the work package/procedure in his possession throughout the performance of the evolution, and procedural steps were carefully followed. Throughout the loading 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.

b. Findings

No findings were identified.

4OA6 Meetings

.1 Exit Meeting Summary

The results of the inspection were discussed at an exit meeting conducted on March 29, 2016, via telephone with Mr. George Lippard, V. C. Summer Nuclear Station Site Vice President of Nuclear Operations, and other members of the staff.

ATTACHMENT: Supplementary Information

## **SUPPLEMENTARY INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

D. Bryon, Reactor Engineering Engineer  
B. Dalick, Nuclear Licensing Engineer  
T. Ellison, Project Lead for Dry Storage  
J. Harrington, Project Manager  
W. Herwig, Reactor Engineering Supervisor  
G. Lippard, V. C. Summer Nuclear Station Site Vice President of Nuclear Operations  
M. Moore, Nuclear Licensing  
R. Russell, Design Engineering  
B. Thompson Nuclear Licensing Manager  
J. Thompson, Health Physics Supervisor  
R. Williamson, Emergency Protection Manager  
S. Zarandi, General Manager, Nuclear Support Services

#### **Holtec International**

J. Sloan, Dry Cask Storage Operations Supervisor  
L. Johnson, Dry Cask Storage Operations Supervisor

#### **NRC**

J. Reece – V. C. Summer Senior Resident Inspector  
E. Coffman, – V. C. Summer Resident Inspector

### **LIST OF REPORT ITEMS**

#### **Opened and Closed**

None.

## **DOCUMENTS REVIEWED**

### **SCE&G Documents**

#### **Procedures**

Engineering Services Specification SP-0850, Design, Fabrication, Delivery, Fabrication, and Implementation of a Spent Fuel Dry Storage System, Revision 4  
EMP-165.002, Fuel Building Crane Preventative Maintenance, Revision 7  
ES-361, Receiving Inspection, Revision 12  
GMP-100.026, Crane Operations and Rigging, Revision 5, Change A  
GMP-102.001, Primary Inspection of Rigging, Equipment, Revision 9, Change B  
HSP-315, Packaging Shipping Storage of Fabricated and Finished Products, Revision 7  
MMP-165.005, Static and Dynamic Load Testing of Miscellaneous Hoist, Cranes and Lifting Devices, Revision 11  
MMP-165.007, Fuel Handling Building Crane XRC0003 Maintenance, Revision 11  
Reactor Engineering Procedure (REP)-100, Special Nuclear Material Physical Inventory Program Administration and Organization, Revision 3  
REP-100.003, Special Nuclear Material Physical Inventory, Revision 3  
REP-100.004, Special Nuclear Material Reporting, Revision 1  
REP-0301, Dry Storage Fuel Characterization, Revision 0  
REP-0302, Dry Storage Fuel Selection Package, Revision 1  
VCS Emergency Plan Procedure VC1-EPAP-0108, Emergency Action Level Reference Manual - Unit 1, Revision 0  
VCS Emergency Plan Procedure VC1-EPP-0108, Emergency Action Level Technical Basis Document – Unit 1, Revision 0  
VCS Fuel Handling Procedure (FHP)-602, Limitations and Precautions for Handling New and Partially Spent Fuel Assemblies, Revision 20  
FHP-609, Fuel Transfer, Inspections and Reconstitution, Revision 5  
FHP-0613, Spent Fuel Cask Handling and Loading, Revision 1, (Deleted)  
VCS Health Physics Procedure (HPP) 2036-200, MPC-37 Loading at V C Summer, Revision 2  
VCS HPP-2036-300, MPC-37 Sealing, Drying and Backfilling, Revision 6  
VCS HPP-0408, Fuel Movement Control, Revision 9, Change C  
VCS HPP-0430, Radiological Controls for Dry Cask Loading and Storage, Revision 1  
VCS Station Administrative Procedure (SAP)-0107, 10CFR50.59 and 10CFR72.48 Review Process, Revision 6  
VCS-SAP-0139, Radiological Controls for Dry Cask Loading and Storage, Revision 3  
VCS-SAP-0999, Corrective Action Program, Revision 13, Change A  
VCS-SAP-1314, Supplemental Personnel Management, Revision 6  
VCS-SAP-1410, Dry Fuel Storage Program Manual, Revision 0

#### **Drawings**

E-520-012, Overhead Crane and Hoist Location/Load Path Plan at Elevation 463'-0", Sheet 5, Revision 0  
ERC 50790C-53, Fuel Handling Building – Elevation View- Cask Loading Equipment General Arrangement during Stackup, Revision B

#### **Corrective Action Documents**

Condition Report (CR)-14-00750, SCE&G Construction Specification 850 Rev. 1, Section 3.3.6  
“Cask/Canister Lifting Yoke and Yoke Adapter” is not in agreement with Holtec Purchase Specification 3702 with respect to the Dynamic Load Factor

- CR-14-00951, QA-AUD-201403 identified that the procedural controls required for the processing of Amendments to the HOLTEC C-of-C have not been addressed in current Nuclear Licensing Procedures
- CR-14-00953, QA-AUD-201403 identified that SAP 1165 Rev. 1 Change D, "Processing and Disposition of 10CFR21 Items" does not specifically address the 10 CFR 72 ISFSI project.
- CR-14-05545, "Decon Pit Pedestal / Ancillary Device #728" was shipped and offloaded without a shipping release being provided per Engineering Services procedures and guidelines.
- CR-14-05790, While performing MMP0165.007-XCR0003 PM 1413685-001, 125-ton lower limit switch did not energize before main block came in contact with FH 436 floor.
- CR-14-06522, Upon receipt of the repaired ISFSI Lift Yoke Bracket from Holtec, we identified that the bolt holes on the bracket did not match the template that we originally used to make the bolt holes on the bracket.
- CR-15-00506, Two Pool Lid Bolts Were Damaged during Attempted Installation
- CR-15-01399, While hanging the lift yoke in the Fuel Handling Building, it was noticed that the bracket holding the lift yoke was pulling away from the grout and wall.
- CR-15-01588, While drilling primary holes in the FHB 436' Train Bay for the southern plate of the LPT restraint under Work Order #1313369 step 087 (ISFSI), an incorrect hole was drilled resulting in a rebar being cut through.
- CR-15-03066, To track the completion of Design Calculation DC09640-037 as part of the First ISFSI Cask Campaign. This calculation determines the cask temperature monitoring RTD uncertainty.
- CR-15-04132, Documentation for work orders 1313369-114 and 1313369-118 has inadvertently been misplaced and can't be found.
- CR-15-04420, Request for Engineering evaluation and concurrence on condition of cables that have been pulled on the ISFSI pad previously and prior to final positioning and cutting for future use.
- CR-15-05055, CR-15-03321, which identified a non-conformance condition, was not evaluated by Engineering as required and Corrective Action was not properly categorized as a level 2 in accordance with SAP-0999 Rev. 13 Change A.
- CR-15-05163, While operating the fuel handling building overhead crane (XCR0003) the operator heard a noise, looked up and noticed a wire hanging from the East side of the crane.
- CR-15-05272, This CR is written to document the Direct Final Rule for Revision 1 to CoC 1032, Amendment 0, on the List of Approved Spent Fuel Storage Casks: Holtec International, HI-STORM Flood/Wind Multipurpose Storage
- CR-15-06489, NPS request Civil to perform work activities in the ISFSI area that involves welding. A work order has been initiated.
- CR-15-06673, On a recent benchmarking trip to Brown's Ferry Nuclear Station, water intrusion was discovered in MPCs which were stored outside (inside HI-STORM FW overpacks) and was a potential issue with the Holtec FW system.
- CR-16-00056, QA-AUD-201514 Corrective Action Program Audit Team recommendations/editorial corrections.
- CR-16-00087, Tripping Hazard/ In the new zones in the ISFSI yard, copper plates have been installed along the zones with cables attached to them.
- CR-16-00453, During the review of the ISFSI open action items it was noted that in order to comply with 10 CFR 72.30 the station needs to develop and submit a site-specific decommissioning funding plan prior to using the ISFSI.
- CR-16-00493, During the execution of Work Order # 1601092 Step 1, the FHB Crane (XCR003 125-Ton Hook) made what can be described as a groaning sound with some mechanical vibrations while lifting an empty MPC in the vertical direction (approximately 24,000 lbs).

CR-16-00643, ECR 50790 (ISFSI Mod)...This CR is to identify four holes being drilled to attach the grating to the north seismic restraint exceeded the allowable depth on the Engineered drawing by 1/8" to 3/16".

CR-16-00764, Issued to document insights and recommendations that were identified by the peer evaluator from Susquehanna Nuclear Station (Talen Energy) during the station Nuclear Licensing Audit, QA-AUD-201602.

CR-16-00854, The project construction team misunderstood the procedural requirement to obtain an Excavation Permit, believing that the ECR provided the necessary information to perform the excavation and precluded the requirement for an Excavation Permit.

CR-16-00872, During an EP drill on 2/17/16, it was noted that multiple problems existed with the FEP (023 series) drawings in the Simulator. Drawing 023-052 has the ISFSI Pad and new buildings shown outside of the yard, implying that they are outside of the Protected Area.

CR-16-00885, NRC Resident Inspectors and other NRC-Badged personnel were not added to new access levels created by the Integrated Spent Fuel Storage Installation (ISFSI).

CR-16-01451, Worker performing Grinding without Using HEPA Vacuum for FME Control

CR-16-01465, Linear Indication Noted at Toe of Weld.

Field Condition Report (FCR) 2036-02, Two Bolts Damaged due to Misalignment during the Connection of the HI-TRAC VW to the Pool Lid.

Quality Assurance Audit (QA-AUD) 201502, ISFSI Surveillance

QA-AUD 201509, Plant Support Engineering

Quality Assurance Surveillance (QA-SUR) 201602, ISFSI

Quality Control Observation (OBV)-VCS1-2015-101291: Safety

OBV-VCS1 -2015-102068, Classroom – LOR

OBV-VCS1-2016-107826, Procedure Use and Adherence

OBV-VCS1-2016-107831, Pre Job Brief

OBV-VCS1-2016-107834, Procedure Use and Adherence

Self-Assessment (SA)15-OM-01, ISFSI Inspection – Pre-operational Testing, Revision 1

#### Calculations

VCSNS Calculation DC02160-017, Evaluation of Underground Utilities for the Used Fuel Storage Project, Revision 2

VCSNS Calculation DC04160-014, Evaluation of Effects of Tracked VCT Fire on HI-STORM FW System, (Holtec Calculation HI-2135677), Revision 6

VCSNS Calculation DC04160-016, Evaluation of Radiation Dose Rate for V.C. Summer-Unit 1 ISFSI, (Holtec Calculation No. HI-2114902), Revision 3

VCSNS Calculation DC04160-017, V. C. Summer HI-STORM FW Explosion Analysis, Revision 1, (Holtec Report No. HI-2125217), Revision 1

VCSNS Calculation DC04160-021, Site-Specific Tornado Missile Analysis for HI-STORM FW System, (Holtec Calculation HI-2135869), Revision 3

VCSNS Calculation DC04160-022, HI-STORM FW CoC Radiation Protection Program Dose Rate Limits, Revision 1

VCSNS Calculation DC04160-028, Determination of Component Limit, Decay Heats, and Gamma Sources for Use with the Holtec HI-STORM FW, Revision 1

VCSNS Calculation DC04160-029, VCS1 – Holtec HI-STORM FW Amendment 0 MPC 37 Cask Model, Revision 1

VCSNS Calculation DC04160-030, Holtec HI-STORM FW Amendment 0 MPC 37 Cask Model, Revision 1

VCSNS Calculation DC04160-031, Cask Loader Database Initialization and Component Characterization for Dry Cask Storage through Cycle 21, (TransWare Calculation, SCE-VCS-001-A-002), Revision 1

Other

10CFR 72.48 Screening/Evaluation Database # 1053, 10/06/2014

Benchmarking Browns Ferry Nuclear Station's Dry Cask Storage (DCS) Project, dated August 9 – August 15, 2015

Benchmarking Callaway Nuclear Station's Dry Cask Storage (DCS) Project, dated November 3, 2014 – November 5, 2014

Benchmarking Vogtle Nuclear Station ISFSI, dated August 15, 2014

Certificate of Compliance 1032 for Spent Fuel Storage Casks

Component Completion Record (CCR) -102-002, Revision 2

DOC-104-336-010, COC-15383-001, FHD Instrumentation for VC Summer, Revision 1

Engineering Change Order (ECO) # 10, Revision 1

Engineering Change Request (ECR) 50797, Operations and Documentation Upgrade for Used Fuel Storage, Revision 0 (including SCE&G 50.59 and 72.48 Screens)

Engineering Services Technical Report TR02160-007 Haul Path Evaluation Report, Revision 0

Engineering Services Technical Report TR02160-010, ISFSI On-Site Dose Rate Evaluation, 2/08/2016

Engineering Services Technical Report TR04160-001 VCS Unit 1 10 CFR 72.212 Evaluation Report, Draft

Engineering Services Technical Report TR07800-015, Evaluation of Fire and Explosion Hazards for ISFSI, Revision 0

General Employee Training, Dry Fuel Storage Overview, ISFSI-01, Revision 0

Letter from NRC to SCE&G, subject: Virgil C. Summer Nuclear Station, Unit 1 - Issuance of Amendment to Revise Emergency Action Levels to a Scheme Based on NEI 99-01, Revision 6, dated April 13, 2015

Letter RC-13-0121, Notification of Intent to Apply Previously Approved 10 CFR Quality Assurance Program to Independent Spent Fuel Storage Installation (ISFSI) activities, September 20, 2013

Letter RC-14-0181, 90-Day Notification Pursuant to 10 CFR 72.212(b)(1) of Intent to Load Spent Fuel Under a General License, November 12, 2014

NUREG-CR-6407 (INEL-95/0551), Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety

Purchase Order NU-02SR756003, Revision 2

Quality Plan for the Receipt of Holtec Major Components and Ancillary Devices Associated With Dry Cask Storage, Revision 1

Radiation Emergency Plan, EP-100, Revision 65

RC-130163, V. C. Summer Unit 1 Quality Assurance Program Description, Revisions 1 and 2

Receiving Inspection Report (RIR) # M27684, MPC-37 SN 002 Receiving Report

Safety Evaluation Report Docket No. 72-1032 Holtec International HI-Storm Flood/Wind System Certificate of Compliance No. 1032

User manual of BEACON code for fuel burnup determination.

VC Summer 10CFR72.48 Screener/Evaluator Initial Training Attendance Records

VC Summer Nuclear Station's Health Physics Dry Cask Fuel Loading and Storage ALARA Plan,

VC Summer Radiation Protection Working Group, 2/8/2016

VC Summer Spent Fuel Dry Cask Loading Campaign Dry-Run Pre-Job Briefing Sheets

VCSNS Technical Report TR07800-015, Evaluation of Fire and Explosion Hazards for ISFSI, (CB&I Stone & Webster Report 1371830010-R-M-007)

V. C. Summer Unit 1 Quality Assurance Program Description, RC-13-0163, Revision 1

Virgil C. Summer Nuclear Station Final Safety Analysis Report (FSAR), February 2015

## **Holtec International**

### **Procedures**

HPP-2036-100, MPC Pre-Operation Inspection, Revisions 1 and 3  
 HPP-2036-200, MPC-37 Loading at VC Summer, Revisions 2 and 5 (including SCG&E 50.59 and 72.48 Screens)  
 HPP-2036-300, MPC-37 Sealing, Drying, and Backfilling, Revisions 4 and 7  
 HPP-2036-400, MPC-37 Stackup (Transfer), Revisions 1 and 3  
 HPP-2036-500, HI-STORM FW Movements, Revisions 1 and 3  
 HPP-2036-600, MPC Unloading at VC Summer, Revisions 0 and 2  
 HPP-2036-700, Responding to Abnormal Conditions, Revisions 1 and 2

### **Drawings**

6494, HI STORM FW Assembly, Revision 7  
 6505, MPC 37 Enclosure Vessel, Revision 11  
 6506, Assembly, MPC 37 Fuel Basket, Revision 11  
 6508, Assembly, Lid, HI-STORM Ø 113 B.C., Revision 5  
 6514, HI-TRAC VW MPC 37, Revision 6

### **10 CFR 72.48 Screenings/Evaluations**

72.48 Screening/Evaluation Number 1021, Revision 0  
 72.48 Screening/Evaluation Number 1036, Revision 0  
 72.48 Screening/Evaluation Number 1050, Revision 1  
 72.48 Screening/Evaluation Number 1053, Revision 1  
 72.48 Screening/Evaluation Number 1067, Revision 0  
 72.48 Screening/Evaluation Number 1074, Revision 0  
 72.48 Screening/Evaluation Number 1076, Revision 0  
 72.48 Screening/Evaluation Number 1091, Revision 0  
 72.48 Screening/Evaluation Number 1095, Revision 1  
 72.48 Screening/Evaluation Number 1120, Revision 0  
 72.48 Screening/Evaluation Number 1136, Revision 0

### **Personnel Qualifications**

L. Johnson, Dry Cask Storage Loading Supervisor  
 B. Rhodes, Dry Cask Storage Subject Matter Expert

### **Other**

CoC 1032, Amendment 0, Appendix B, Sections 3.4.1, 3.4.2, 3.4.4, 3.4.5, and 3.4.10  
 CoC 1032, Amendment 0, CoC Conditions 1 and 2  
 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.  
 Holtec Canister Welding System Instruction Manual, Revision 0  
 Holtec Personnel Training Qualification Records  
 Holtec TIG "G" Weld Head Operations and Maintenance Manual, Revision A

## **PCI Energy Services**

### **Procedures**

General Quality Procedure (GQP)-1.0, PCI Energy Services General Quality Procedure: Project Organization and Documentation, Revision 19



GQP-7.1, PCI Energy Services General Quality Procedure: Procurement, Receipt, Storage and Issue of ASME III Subsection NCA 3800 Weld Materials, Revision 7  
 GQP-7.2 PCI Energy Services General Quality Procedure: Procurement, Receipt, Storage and Issue of ASME III Subsection NCA 3800 Weld Materials, Revision 6  
 GQP-8.1, PCI Energy Services General Quality Procedure: Process Traveler, Revision 18  
 GQP-9.0, PCI Energy Services General Quality Procedure: Training, Qualification, Examination, and Certification of NDE Personnel in accordance with SNT-TC-1A and CP-189, Revision 15  
 GQP-9.2, PCI Energy Services General Quality Procedure: High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding (50°F - 350°F), Revision 8  
 GQP-9.6, Visual Examination of Welds, Revision 14  
 GQP-12.0, PCI Energy Services General Quality Procedure: Control of Measuring & Test Equipment, Revision 19  
 GQP-15.0, PCI Energy Services General Quality Procedure: Nonconforming Items, Revision 18  
 GQP-17.0, PCI Energy Services General Quality Procedure: Quality Records, Revision 14  
 General Welding Standard (GWS)-1, ASME Applications, Revision 1  
 PI-CNSTR-OP-VCS-H-01, Closure Welding of Holtec Multi-Purpose Canisters – HI-STORM FW at VC Summer Station, Revision 1  
 PI-CNSTR-OP-VCS-H-01, Closure Welding of Holtec Multi-Purpose Canisters – HI-STORM FW, Revision 2  
 Welding Control Procedure (WCP)-3, Weld Material Control, Revision. 2  
 WCP-5, Weld and Base Metal Repair, Revision 0

#### Other

8 MC-GTAW, ASME Section IX Welding Procedure Specification (Machine GTAW), Revision 15  
 8 MN-GTAW, ASME Section IX Welding Procedure Specification (Manual GTAW), Revision 5  
 ASME Section IX Welder Performance Qualification (Annan)  
 ASME Section IX Welder Performance Qualification (Quick)  
 ASME Section IX Welder Performance Qualification (Waters)  
 ASME Welder Maintenance Log (Annan)  
 ASME Welder Maintenance Log (Quick)  
 ASME Welder Maintenance Log (Waters)  
 Procedure Qualification Record (PQR) 062, Revision 3  
 PQR 063, Revision 3  
 PQR 600, Revision 6  
 PQR 864, Revision. 2  
 PQR 899, Revision 4  
 NDE PT Level II Personnel Certificate (Bradin), dated 8/14/2015  
 NDE VT Level II Personnel Certificate (Bradin), dated 8/14/2015  
 Vision Examination Report (Bradin), dated 6/24/15  
 Weld Procedure Specification PCI 8, MC-GTAW, Revision 15  
 Weld Procedure Specification PCI 8, MN-GTAW, Revision 5

#### **Leak Testing Specialists, Inc.**

Certification Record (Valentine)  
 Visual Acuity Record (Valentine), dated 2/2/2015  
 MSLT-MPC-HOLTEC, Leak Testing, Revision VC Summer-00

**Liburdi Dimetrics Corporation**

Gold Track VI, Gold Track VP P300 Tube and Pipe Welders Maintenance and Service Manual

**SCANA Services, Inc.**

NU-02SR761008, Purchase Order (Welding Wire/Rod), dated 1/12/16

**TransWare**

TransWare Calculation, SCE-VCS-001-A-002, Cask Loader Database Initialization and  
Component Characterization for Dry Cask Storage through Cycle 21, 11/16/2015

## **LIST OF ACRONYMS**

°F	degrees Fahrenheit
ADAMS	Agencywide Document Accession Management System
ALARA	As Low As is Reasonably Achievable
ASME	American Society of Mechanical Engineers
AWS	Automated Welding System
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
CLP	Cask Loading Pit
CR	Condition Report
DCP	Decon Pit
FSAR	Final Safety Analysis Report
FW	Flood/Wind
GTAW	Gas Tungsten Arc Welding
HI-STORM	Holtec International Storage Module
HI-TRAC	Holtec International Transfer Cask
ISFSI	Independent Spent Fuel Storage Installation
LPT	Low Profile Transporter
MPC	Multi-Purpose Canister
mrem	millirem
MSRI	Monitored Retrievable Storage Installation
NDE	Non-Destructive Examination
NMSS	Office of Nuclear Materials Safety and Safeguards
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PT	Penetrant Test
QA	Quality Assurance
QAP	Quality Assurance Program
SAR	Safety Analysis Report
SCE&G	South Carolina Electric & Gas
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
TS	Technical Specification
VCS	V. C. Summer
VCT	Vertical Cask Transporter
VT-1	Visual Test -1 (ASME NDE for cracking of welds)
VW	Variable Weight