UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

December 22, 2006

Docket Nos. 05000354
07200048

License Nos. NPF-57

William Levis
Senior Vice President and Chief Nuclear Officer
PSEG Nuclear LLC-N09
Hope Creek Generating Station
P.O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: INSPECTIONS 05000354/2006010 AND 07200048/2006010, PSEG NUCLEAR LLC-N09, HOPE CREEK GENERATING STATION, HANCOCKS BRIDGE, NEW JERSEY

Dear Mr. Levis:

On November 9, 2006, the United States Nuclear Regulatory Commission (NRC) completed an inspection at the above address of activities authorized by the above listed NRC licenses. The inspection was an examination of your licensed activities as they relate to activities associated with the Independent Spent Fuel Storage Installation (ISFSI) dry run and initial loading of spent fuel in the ISFSI facility. The inspection period began on May 17, 2006. The findings of the inspection were discussed with Mr. George Barnes and other members of your staff on October 19, 2006 at the conclusion of the dry run inspection.

Within the scope of this inspection one Non-Cited Violation was identified. However, because of the low safety significance and the timeliness and effectiveness of corrective actions, this violation is being treated as a Non-Cited Violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

No reply to this letter is required. Your cooperation with us is appreciated.

Sincerely,

/RA/

Mark Roberts, Branch Chief
Decommissioning Branch
Division of Nuclear Materials Safety

cc w/encl:
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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Inspection No.	05000354/2006010 07200048/2006010
Docket No.	05000354 07200048
License No.	NPF-57
Licensee:	PSEG Nuclear, LLC
Location:	P.O. Box 236 Hancocks Bridge, NJ 08038
Inspection Dates:	May 17, 2006 through November 9, 2006
Inspectors:	Robert Prince, Health Physicist Decommissioning Branch (DB) Division of Nuclear Materials Safety (DNMS) John Nicholson, Health Physicist DB, DNMS Frank Jacobs, Safety Inspection Engineer Division of Nuclear Material Safety and Safeguards Office of Spent Fuel Storage and Transportation Ray Kellar, P.E., Health Physicist Region IV
Approved By:	Mark Roberts, Branch Chief DB, DNMS

Enclosure

EXECUTIVE SUMMARY

NRC Inspection Report Nos. 05000354/2006010 and 07200048/2006010

This inspection included aspects of licensee activities regarding the preoperational testing program (the NRC Dry Run) for safely loading spent fuel from the spent fuel pool (SFP) into a dry cask storage system and transferring the spent fuel to the Independent Spent Fuel Storage Installation (ISFSI). The NRC Dry Run included the loading, closure, handling, and transfer activities associated with the HI-STORM 100 Cask System. The first loading and transfer of spent fuel was also observed, following successful completion of the NRC Dry Run.

Public Service Electric and Gas (PSEG) selected the Holtec HI-STORM 100 dry cask storage system as the storage system for the spent fuel. The Holtec HI-STORM 100 dry cask storage system (DCSS) is licensed by the Nuclear Regulatory Commission (NRC) as Certificate of Compliance (CoC) No. 1014. The Hope Creek ISFSI consists of three reinforced concrete storage pads located at the ISFSI complex. The Holtec DCSS includes a Multi-purpose Canister (MPC) which holds 68 fuel assemblies, a HI-TRAC transfer cask and the HI-STORM overpack. The MPC is placed into a HI-TRAC transfer cask to provide shielding for protection of workers during transfer operations and during the drying, helium backfilling and welding of the MPC. The MPC is loaded with spent fuel, drained of water, vacuum dried, filled with helium gas and sealed by welding. The MPC is then moved from the cask preparation area while in the HI-TRAC and placed into the HI-STORM overpack located in the Reactor Building truck bay. The HI-STORM with the loaded MPC is transported from the plant to the ISFSI and placed in a designated location on a selected ISFSI pad.

The licensee demonstrated the ability to safely stack the HI-TRAC onto the HI-STORM and subsequently transport the loaded HI-STORM to the ISFSI. Additional preoperational exercises demonstrated the licencee’s ability to place the MPC into the HI-TRAC and to load fuel assemblies into the MPC. Individuals were qualified to perform their assigned functions and were knowledgeable of their responsibilities. Procedures and work-related documentation were accurate with strict procedural compliance demonstrated by workers in the field.

The licensee performed an extensive review of the dry cask storage program to ensure compliance with the requirements of 10 CFR 72 Subpart K. The licensee had documented the required evaluations and developed an extensive set of procedures to control ISFSI-related work activities. Evaluations had been completed to demonstrate that the design features for the HI-STORM 100 cask system were enveloped by the site specific characteristics of the Hope Creek site.

The licensee had developed a cask loading plan in accordance with approved procedures. Licensee documentation supported the proper characterization of the first 68 fuel assemblies to be loaded into the first MPC and were in compliance with design parameters specified in the CoC.

The inspector concluded that the capability to adequately weld and perform Non-Destructive Examination (NDE) of an MPC was demonstrated by the mockup work. Welding activities associated with MPC closure were performed in accordance with approved procedures. Personnel were qualified to perform their assigned functions.

The heavy loads program at Hope Creek met regulatory requirements. The condition of the polar crane was found to be satisfactory. Recent operational issues associated with the polar crane had been captured, researched and resolved by the licensee prior to commencing loading operations. No deficiencies were identified with the testing, inspection, or maintenance portions of the licensee's heavy loads program. The lifting and movement of heavy loads were performed in accordance with approved procedures. Work evolutions were strictly controlled and performed in a safe manner.

The licensee demonstrated the capability to perform drain-down, vacuum drying, and helium backfilling of an MPC. Procedures and processes were sufficient in achieving the required limits specified in the Technical Specifications, ensuring minimal water content of loaded MPCs, and that an inert atmosphere is present to support the safe storage of spent fuel assemblies.

The Nuclear Oversight department provided effective independent review of ISFSI activities. Quality Control (QC) and quality assurance (QA) efforts were appropriately incorporated into ISFSI activities. QC personnel were actively engaged in field activities and verified that hold points, Technical Specifications (TS), and work order requirements were implemented in accordance with approved procedures and related work documents. The identification and tracking of issues was implemented in accordance with the licensee's corrective action program, with the proper review and evaluation of action items performed prior to initial loading of spent fuel in the ISFSI facility.

The licensee implemented an effective program to identify personnel training requirements associated with the ISFSI program. Appropriate training modules were developed for the various tasks. Individuals were properly trained and qualified to perform their assigned functions. The licensee utilized extensive practice sessions and on-the-job training sessions to verify readiness of individuals to perform their assigned functions.

The licensee safely loaded and transferred the first MPC containing spent fuel to the ISFSI facility. Work activities were performed in a safe manner and met the requirements of Technical Specifications. Spent fuel loaded into the MPC was properly characterized. The MPC was properly sealed, tested, surveyed and inspected, and met the requirements of the CoC. The licensee self-identified an incident in which personnel failed to follow approved procedures during the vacuum drying process.

REPORT DETAILS

Summary of Facility Activities

Preparations for loading spent fuel from the Hope Creek SFP to the Holtec International HI-STORM 100 dry cask storage system were initiated during this inspection period. Upon completion of the dry run demonstrations, in October 2006, the licensee began the transfer of Hope Creek spent fuel to the onsite ISFSI. Hope Creek staff completed loading of the first MPC on November 7, 2006. Three additional MPC's are scheduled for loading as part of the initial fuel campaign. The next fuel loading campaign is scheduled for 2008.

I. Preoperational Test Program

a. Inspection Scope

The CoC for the Holtec HI-STORM 100 dry cask storage system 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 several onsite inspections to observe the licensee's demonstration of the activities required by the CoC. The inspector observed field activities including the handling and movement of the HI-STORM storage cask, the HI-TRAC transfer cask, the transporter and auxiliary equipment. Pre-job briefings and "two-minute" drill field briefings were observed by the inspector. The work package for the dry run activities was reviewed. In addition the inspector interviewed cognizant personnel and reviewed licensee documentation.

b. Observations and Findings

The CoC for the HI-STORM dry cask storage system includes a requirement to demonstrate certain specific activities prior to loading the first MPC. These requirements are specified in Section 10 of the CoC as follows:

1. Moving the MPC and the transfer cask into the SFP.

2. Preparation of the HI-STORM 100 Cask System for loading.

3. Selection and verification of specific fuel assemblies to ensure type conformance.

4. Loading specific assemblies and placing assemblies into the MPC (using a dummy fuel assembly), including appropriate independent verification.

5. Remote installation of the MPC lid and the removal of the MPC transfer cask from the SPF.

6. MPC welding, NDE inspections, pressure testing, draining, moisture removal (by vacuum drying or forced helium dehydration, as applicable), and helium backfilling. (A mockup may be used for this dry-run exercise).

7. Operation of the supplemental cooling system.

8. Transfer cask upending/downending on the horizontal transfer trailer or other transfer device, as applicable to the site's cask handling arrangement.

9. Transfer of the MPC from the transfer cask to the overpack.

10. Placement of the HI-STORM 100 Cask System at the ISFSI.

11. HI-STORM 100 Cask System unloading, including cooling fuel assemblies, flooding MPC cavity, removing MPC lid welds. (A mockup may be used for this dry-run exercise).

An assessment of the licensee's readiness to conduct dry cask storage activities was performed and is discussed below. Specific items noted above, are discussed elsewhere in this inspection report. The equipment and procedures utilized to open a sealed MPC have been successfully demonstrated by the contractor at another site utilizing the same methods and procedures that would be employed at Hope Creek in the unlikely event that the need arose to open a previously sealed MPC.

Several onsite inspections were performed by the NRC to observe the various phases of the preoperational test plan. The licensee developed procedures, personnel training and qualification programs, and conducted practice sessions as part of the preoperational program.

On September 12, 2006, the inspector observed activities associated with the movement of the HI-STORM into the reactor building truck bay. Work activities were adequately performed and security and radiological control measures established to support entry into the reactor building truck bay. Personnel were knowledgeable of their responsibilities. Work activities necessary to transport the HI-STORM into the truck bay were performed in a controlled and deliberate manner. Personnel were trained in the operation and use of the HI-STORM transport equipment.

The inspector attended a pre-job briefing on September 13, 2006, for the movement of the HI-TRAC from the 201' elevation of the reactor building and placement of the HI-TRAC onto the HI-STORM in the reactor building truck bay. The pre-job briefing adequately covered the tasks to be perform, including safety aspects of handling heavy loads, individual responsibilities, the use of three-way communications, the use of two-minute drills, and details associated with the communication procedure to be employed between the signalman and the crane operator. The work package for dry run activities was comprehensive and contained the applicable procedures associated with the scope of the dry run tasks. The work package was maintained by the field supervisor who ensured that the requirements of the work package were strictly followed. Cognizant personnel routinely confirmed work order steps throughout the performance of the task. “Two-minute drills” were routinely conducted prior to the performance of a critical evolution. These briefing sessions covered key aspects of the upcoming task and the responsibilities of work crew members and served to focus attention of work crew members on important aspects of the evolutions just prior to performing a given task. The inspector discussed specific tasks with cognizant personnel throughout the performance of field activities. Individuals were knowledgeable of their responsibilities, of procedure requirements, the operation of equipment, and CoC requirements. Movement of the HI-TRAC on the 201' elevation was performed in accordance with approved procedures. Safe load path requirements were strictly followed.

The licensee demonstrated the capability to safely place the HI-TRAC onto the HI-STORM, place an MPC into the HI-TRAC and transfer an MPC into a HI-STORM. Rigging, movement and placement of the MPC into the HI-TRAC was performed in a controlled manner with good coordination and communication observed among individuals involved in the activity. Placement of the HI-TRAC into the cask pit area of the SFP was performed in a controlled manner and effective controls established to maintain SFP water level while the HI-TRAC was placed into and removed from the SFP. The inspector observed fuel handlers place a dummy fuel assembly into several different MPC storage cells while the HI-TRAC was underwater in the cask pit loading area of the SFP. This activity was performed as a final verification to confirm that MPC storage cells were properly sized for the safe storage of spent fuel assemblies.

c. Conclusions

The licensee demonstrated the ability to safely stack the HI-TRAC onto the HI-STORM and subsequently transport the loaded HI-STORM to the ISFSI. Additional preoperational exercises demonstrated the licencee’s ability to place the MPC into the HI-TRAC and to load fuel assemblies into the MPC. Individuals were qualified to perform their assigned functions and were knowledgeable of their responsibilities. Procedures and work-related documentation were accurate with strict procedural compliance demonstrated by workers in the field.

II. Review of Evaluations

a. Inspection Scope

The inspector evaluated the licensee’s compliance with the requirements of 10 CFR 72.212 and 10 CFR 72.48. The inspection consisted of interviews with cognizant personnel and review of licensee documentation.

b. Observations and Findings

The licensee is required as specified in 10 CFR 72.212(b)(1)(I) to notify the NRC of the intent to store spent fuel at an ISFSI at least 90 days prior to the first storage of spent fuel. PSEG notified the NRC on April 28, 2006, of their intent to use the Holtec HI-

STORM 100 cask system in accordance with CoC Number 1014. This letter met the requirements for the 90-day notification.

A written evaluation is required per 10 CFR 72.212(b)(2)(I), prior to use, to establish that the conditions of the CoC have been met. PSEG documented its written evaluation to confirm the ISFSI is within the licensed scope in “Hope Creek Generating Station Independent Spent Fuel Storage Installation 10 CFR 72.212 Evaluation Report”, dated August 2, 2006. The licensee had performed written evaluations which confirmed that the conditions set forth in the CoC had been met, the HI-STORM storage pads had been designed to support the stored load of the casks, and the requirements of 72.104 had been met. Applicable reactor site parameters, such as fire and explosions, tornados, wind-generated missile impacts, seismic qualification, lightning, flooding, and temperature, had been evaluated for acceptability with the bounding values specified in the Holtec Safety Analysis Report (SAR) and the NRC Safety Evaluation Report (SER).

A 50.59 evaluation of the construction and operation of the ISFSI and plant interfaces had been performed to demonstrate that changes to plant TS or a license amendment were not required. Physical security had been evaluated and determined to satisfy the requirements of 73.55 and 72.212(b)(5). The existing Protected Area for the Hope Creek and Salem stations was expanded to incorporate the ISFSI facility. The Holtec system design parameters enveloped the reactor site parameters described in the Hope Creek Final Safety Analysis Report (FSAR), including analysis of earthquake intensity and tornado-generated missiles.

The inspector reviewed selected referenced records and procedure changes related to the security, emergency preparedness, training, health physics, and quality assurance programs. The inspector interviewed cognizant personnel to confirm that they were knowledgeable of the impact of ISFSI-related activities. The emergency Plan was revised to include ISFSI-related Emergency Action Levels (EALs). The inspector interviewed a Hope Creek Shift Technical Advisor on September 27, 2006, concerning the availability and knowledge of the EALs associated with ISFSI operations. The Shift Technical Advisor readily retrieved the EAL chart and demonstrated awareness of the ISFSI EALs. Discussions with the Security Manager indicated that response plans had been established in the event of an ISFSI-related security threat and such actions evaluated with regards to ensuring the maintenance of established security response measures for the operating units. The expanded PA area included appropriate intrusion detection and monitoring equipment and arrangements made for the performance of routine patrols. Radiation Protection procedures included appropriate measures to verify compliance with specified radiation levels specified in the CoC for loaded HI-STORMs stored at the ISFSI. Plans had been established to ensure that future dry cask storage activities would be incorporated into surveillance schedules and independently evaluated by the Hope Creek oversight organization. The emergency plan, quality assurance program, radiological safety program, and training program had been evaluated and their effectiveness were determined not to be decreased by ISFSI activities.

c. <u>Conclusions</u>

The licensee performed an extensive review of the dry cask storage program to ensure compliance with the requirements of 10 CFR 72 Subpart K. The licensee had documented the required evaluations and developed an extensive set of procedures to control ISFSI-related work activities. Evaluations had been completed to demonstrate that the design features for the HI-STORM 100 cask system were enveloped by the site-specific characteristics of the Hope Creek site.

III. Fuel Characterization and Verification

a. Inspection Scope

The CoC for the Holtec HI-STORM 100 dry cask storage system specifies the parameters that must be met in order to allow spent fuel to be stored at the ISFSI. The inspector evaluated licensee programs to verify that spent fuel assemblies selected for storage met the applicable requirements of the CoC. Documents associated with the qualification, characterization, and selection of fuel assemblies for storage at the ISFSI were reviewed. The inspection consisted of interviews with cognizant personnel and review of licensee documentation.

b. Observations and Findings

During the period of September 26-28, 2006, the inspector reviewed the licensee's process for selecting and verifying fuel assemblies for placement in the first MPC. Technical Specifications require that selected fuel assemblies be 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 inspector discussed the fuel selection process with cognizant personnel and determined that individuals were knowledgeable of the TS requirements. The licensee procedures for the selection and characterization of fuel assemblies adequately addressed the applicable requirements of the CoC and associated TS. Fuel assembly burn-up values and decay heat output values were determined utilizing accepted industry codes. The inspector noted that the selected fuel assemblies met all the appropriate TS requirements for placement into an MPC for dry storage. Supporting documentation adequately characterized the selected fuel assemblies for loading.

c. Conclusions

The licensee had developed a cask loading plan in accordance with approved procedures. Licensee documentation supported the proper characterization of the first 68 fuel assemblies to be loaded into the first MPC and were in compliance with design parameters specified in the CoC.

IV. Welding and Nondestructive Testing

a. Inspection Scope

The inspector observed and evaluated the welding and NDE processes on May 17, 2006, to determine whether the Hope Creek staff and the licensee's contractor had developed the capability to properly weld and perform NDE on the type of MPC to be used for storage of spent fuel at the Hope Creek ISFSI. The inspector examined the welding equipment, observed welding in progress on an MPC mockup cover, observed visual weld examination and dye penetrant testing, and evaluated the helium leak-testing methodology. In addition, welder qualification records, selected welding and NDE procedures, and applicable work instructions and supporting documents were reviewed.

b. Observations and Findings

The licensee utilized the services of a dedicated contractor welding and nondestructive examination team experienced in the MPC type to be used by the licensee. Contractor personnel had performed similar services for other licensees, including welding and NDE on this MPC design.

The inspection included verification that the activities were accomplished in accordance with the commitments and requirements contained in the SAR, the NRC's Safety Evaluation Report, the CoC, the licensee's QA program, and 10 CFR Part 72. The inspector discussed the work steps and plans with those involved and reviewed various controlling procedures and the work package to verify their adequacy. The inspector noted that approximately 50 gallons of water would be drained from a loaded MPC, the MPC purged prior to welding, and that adequate provisions had been made to monitor hydrogen concentrations prior to welding and while performing welding activities.

The inspector verified that the licensee reviewed applicable contractor welding procedures that included machine welding, manual, and tac welding processes. This review included confirmation that code requirements were appropriately specified in welding procedures. Licensee personnel reviewed qualification records of contractor personnel and individual certification and training records. Certification of contract welders were verified to be current. Weld travelers were reviewed and confirmed accurate by cognizant licensee personnel. The inspector noted that QC hold points were appropriately identified in welding procedures.

The pre-job briefing was thorough and covered applicable industry operating experience associated with welding of dry cask storage canisters. The briefing also covered the work package requirements, individual responsibilities, safety aspects, and related procedures. The inspector noted an opportunity to provide industry data relating to anticipated dose rates during specific stages of the dry run. In addition, the licensee concluded that the pre-job briefing did not meet PSEG expectations and issued Notification 20285608 to address the issue. The basis for this conclusion was failure to mention emergency phone numbers and actions to take in the event of a plant emergency, in addition to failure to communicate industry available data concerning anticipated radiological conditions. The inspector noted that these issues were adequately addressed at pre-job briefings conducted throughout subsequent dry run sessions.

The inspector observed contractor personnel install the welding machine on the MPC mockup, perform pre-operational equipment checks and the completion of the root pass weld. The examination of the root pass was successfully completed in accordance with approved procedures with no indications identified. The individual performing the dye penetrant test was knowledgeable of the process and performed the activities in a methodical manner in accordance with approved procedures.

The licensee utilized the services of an experienced dedicated contractor to provide leak testing services. Contractor personnel had performed helium leak testing services for other licensee on the MPC type to be used by the licensee . A representative from the leak testing firm provided an overview of the helium leak testing equipment and procedure. The inspector confirmed that the leak test equipment was within the current calibration period.

c. Conclusions

The inspector concluded that the capability to adequately weld, leak test, and perform NDE of an MPC was demonstrated by the mockup work. Welding activities associated with MPC closure were performed in accordance with approved procedures. Personnel were qualified to perform their assigned functions.

V. Heavy Loads Program

a. Inspection Scope

The heavy loads program was reviewed to ensure that the crane and lifting devices utilized for DCSS activities were in conformance with license basis requirements. The heavy loads program includes administrative procedures, maintenance and operation of the polar crane, crane operator training, ANSI N14.6 special lifting devices, and use of slings. The operating and maintenance procedures for the Hope Creek reactor building polar crane, along with historic crane related documentation, were reviewed and compared to selected licensing basis requirements. The recommendations from the original crane vendor's technical manual were reviewed. The crane licensing basis requirements included: NUREG-0554 - "Single-Failure-Proof Cranes for Nuclear Power Plants;" NUREG-0612 - "Control of Heavy Loads at Nuclear Power Plants;" and American Society of Mechanical Engineers (ASME) B30.2 - "Overhead and Gantry Cranes." The special lifting devices used for lifting the DCSS components were compared to selected requirements contained in ANSI N14.6 - "American National Standard for Radioactive Materials - Special Lifting Devices for Shipping Containers Weighing 10,000 pounds or More." The licensee's program for the use and control of slings was compared to the requirements of ASME B30.9 - "Slings." The inspection consisted of interviews with cognizant personnel, review of licensee documentation, and field observations, including a walkdown of the Hope Creek polar crane.

b. Observations and Findings

During preparation for the crane inspection a search was conducted to locate documentation of the NRC's previous review for the Hope Creek single-failure-proof polar crane. The inspectors found two instances where the NRC SER documented that the Hope Creek polar crane was considered "single-failure-proof." The first instance was located in Supplement 1, Section 9.1.5 and the second was in Supplement 3, Section 15.7.5. The NRR Hope Creek Project Manager confirmed that sufficient documentation was present to conclude the NRC had reviewed and determined that the Hope Creek polar crane met single-failure-proof requirements.

The Hope Creek polar crane had been manufactured by Paceco to meet the requirements of the Crane Manufacture's Association of America (CMAA) Specification #70. The crane's designated rated load was specified to be 150 tons, which included a maximum critical load of 130 tons along with an allowance for impact loading of 15 percent or 20 tons. The original polar crane 125-percent rated load test (187.5 tons) had been conducted on December 14, 1982. The 100-percent crane full travel test (150 tons) consisting of crane hoist, trolley and bridge movement had been conducted on December 13, 1982. An additional 100-percent (150 tons) travel test of the crane hoist, trolley and bridge had been conducted on February 5, 1984. These load tests satisfied the requirements of Chapter 2-2 of ASME B30.2.

ASME B30.2, Chapter 2-2 and 2-3 specify requirements for frequent crane inspections, periodic crane inspections, crane preventative maintenance, crane lubrication, and requirements for crane operator physicals and training. Attachment 5 of licensee Procedure HC.MD-PM.KF-0004 included frequent inspection requirements to perform daily inspections of the upper limit device and verification that crane systems, including the hook and wire rope were operating properly. Periodic crane inspections were performed less often, but were more comprehensive in scope. Procedures HC.MD-PM.KF-0004 and HC.MD-ST.KF-0001 included periodic maintenance and inspection requirements for detection of deformed or cracked members; loose or missing bolts or nuts; cracked or worn sheaves; and a complete wire rope inspection. The lubrication points and type of lubrication specified in licensee Procedure HC.MD-PM.KF-0002 were consistent with vendor recommendations. The crane vendor also recommended that the main load block be examined and periodic maintenance performed after immersion in water. The licensee issued revision 2 to procedure HC.MD-PM.KF-0004(Q), Polar Crane Annual preventive Maintenance, detailing these inspection requirements. Crane operator medical evaluations and training requirements were specified in Procedure MA-AA-716-022. Medical records for selected crane operators were verified to be current. The inspectors determined that the licensee was performing crane inspections and maintenance, as well as maintaining crane operator medical requirements in accordance with ASME B30.2.

The loads suspended from single-failure-proof cranes are subject to a small potential drop during a load transfer event or while engaging the brakes during an uncontrolled decent. Calculation 328426 (001) determined that the maximum vertical displacement of a load in the event of a failure of a crane component would be 10.4 inches. The licensee included a requirement in crane operational Procedure MA-HC-716-021 to maintain a minimum lift height of 11 inches between the bottom of the load and the floor. This lift height requirement was sufficient to preclude damage to the load during analyzed vertical load displacements.

NUREG-0554, Section 2.4 provided alternate methods for satisfying brittle fracture material property requirements associated with ferritic load carrying members of single-failure-proof cranes. Hope Creek elected to specify the minimum operating temperature for the crane as 60 degrees Fahrenheit (°F). This was based on licensee Specification 10855-M-063, that stated materials for structural members essential to structural integrity are impact tested unless exempted by the provisions of Paragraph AM-218 of the ASME Code, Section VIII, Division 2. Paragraph AM-218 provided an allowance to use ASTM A 537 Class 1 steel without performing impact tests, as long as the design stress intensity was less than 6,000 pounds per square inch (psi). The licensee provided evidence that steel used in the polar crane structural members were fabricated from ASTM A 537 Class 1 steel. The only portion of the crane identified with a design stress intensity greater than 6,000 psi was the main hoist drum plate. The licensee provided impact test results taken from the main hoist drum plate that had been performed at 0 °F. The impact test results were acceptable based on the required minimum Charpy impact test values of 20 ft-lbs per ASTM Table-211.1. Additionally, NUREG-0554 referenced paragraph ND-2300 of the ASME Code, Section III, which exempted impact testing of SA-537 Class 1 normalized steel over 5/8 inches thick when the lowest service temperature that the crane would be exposed to was greater than -30 °F. The minimum operating temperature or lowest service temperature specified for the Hope Creek crane was administratively limited to 60 °F. Therefore, the inspectors determined that the normalized ASTM A 537 Class 1 steel used in the structural members of the Hope Creek polar crane met the requirements of NUREG-0554.

NUREG-0554, Section 2.5 required that during a seismic event, the crane must be able to withstand the seismically induced pendulum and swing load effects. As part of this evaluation, the licensee considered if the transfer cask, when suspended from the crane, could impact plant operations during a Safe Shutdown Earthquake (SSE) seismic event. Calculation A-5-DCS-CDC-4006 evaluated the possibility that the transfer cask could impact the side of the cask loading pit during a SSE while in the SFP. The calculation determined that the maximum horizontal displacement of the transfer cask while suspended at the SFP level during a SSE would be six inches. The licensee calculated that the clearance available in the cask loading pit was 14.5 inches, which is greater than the maximum horizontal displacement of six inches. Therefore, the cask would not impact the cask loading pit walls during an SSE seismic event.

The licensee developed procedure NC.MD-PM.DCS-0013(Q), Dry Cask Storage Special Lifting Device Annual Inspection, to specify the inspection requirements associated with special lifting devices used for dry cask storage activities. The procedure guidance incorporated appropriate industry standards and regulatory guidance associated with recertification inspections for special lifting devices. Individuals were observed inspecting rigging equipment and special lifting devices prior to use in accordance with approved procedures. The inspector confirmed that selected slings used in the handling of dry cask storage components were inspected and entered into the licensee's rigging inventory and inspection program. Inspection tags were current and cognizant personnel knowledgeable of inspection requirements and the actions to take in the event that inspection dates were not current and the need to identify and remove any rigging device that failed inspection.

In preparation for use of the Hope Creek polar crane for dry fuel storage, a vendor had been engaged to compare crane documentation against the requirements of NUREG-0554, NUREG-0612, CMAA #70 and ASME B30.2. The vendor's Report (No. H-1-KF-SEE-1704) for the Hope Creek polar crane was issued to the licensee on January 3, 2003. The report provided evidence that the crane was acceptable for use as a single-failure-proof crane during the loading of spent fuel storage casks.

A list of the crane deficiencies that had been entered into the licensee corrective action program during the past five years were reviewed. Selected deficiencies that had been documented in PSEG Work Orders received additional evaluation by the inspectors. A number of problems were recently encountered with the polar crane during the pre-operational demonstrations and internal dry-runs. A comprehensive list of these problems was tabulated and evaluated by the licensee. The inspectors reviewed the licensee's evaluation of the crane issues, and the corrective actions implemented to ensure that reliability issues were adequately addressed. The inspector noted that corrective measures included the replacement of faulty relays, sensitivity adjustments to the "deadman" switch, and use of monitoring equipment to evaluate crane performance. The measures that were taken by the licensee to improve the reliability of the polar crane were determined by the inspector to provide adequate protection against an uncontrolled dry fuel cask load excursion.

The polar crane is supported by concrete corbels which run 360 degrees around the reactor building dome. The crane was directly supported on rails, which are attached to the concrete corbels by anchor bolts. Documentation of the supporting structure, including the concrete corbels, rails, and anchor bolts was reviewed by the inspectors. In 1993, Work Order 910325071 documented discovery and repair of 21 crane rail anchor bolts that were found to be loose. Prior to starting the dry fuel loading campaign, the licensee inspected the anchor bolt rail torque using Work Order 60064498 and confirmed that all the bolts were properly torqued. Work Order 60063932 had been created to check the anchor bolt torque after the completion of the dry fuel loading campaign.

A walkdown of the polar crane was performed on September 14, 2006. The inspectors reviewed the general condition of the crane and inspected the condition of the accessible portions of crane structural members including portions of the crane bridge trucks. The trolley and bridge functions were exercised during the inspection. The condition of the main hoist wire rope was also observed. No deficiencies were noted during the crane walkdown.

Movement of the HI-STORM from the reactor building receiving door to the egress pad was accomplished without the HI-STORM lid installed. This was due to height restrictions associated with the receiving door and the available headroom inside the equipment airlock area. The 72.48 Screening (CP 80088459) specified that the HI-STORM with the lid removed, is administratively controlled to prevent movement outside of the reactor building during times when severe weather can occur. The movement from the building was controlled in accordance with licensee Procedure HC.OP-AB.MISC-001, to verify that evidence of hurricane winds, tornados, or severe weather was not in the “area” before movement of the HI-STORM from the reactor building. The inspectors determined that the amount of time required to place the lid on a loaded HI-STORM and return the cask to an analyzed condition had not been evaluated relative to the amount of time that would be available between the declaration of a severe weather alert and the severe weather reaching the site. The licencee revised Procedure NC.MD-PM.DCS-0004(Q) requiring that the control room be contacted to confirm that a severe weather watch did not exist prior to moving a loaded HI-STORM outside the protection afforded by the equipment airlock. Licensee personnel stated that prior to moving a loaded HI-STORM out of the truck bay that a determination would be made on a case-by-case basis to evaluate if inclement weather could reach the site before the HI-STORM lid could be installed. If sufficient time was not available to place the lid onto the HI-STORM before potential inclement weather could reach the site then the HI-STORM would not be moved outside. Cognizant personnel conservatively estimated that the time required to install the lid after the HI-STORM exited the truck bay to be approximately two hours. The inspector noted that administrative controls associated with opening the truck bay door, that included limitations based on wind gusts, provided additional controls to ensure that a loaded HI-STORM would not be exposed to severe weather conditions prior to installation of the lid. No safety concerns were identified.

The 72.48 Screening (CP 80088459) also stated that the lift of the lid over the loaded HI-STORM DCSS required a single failure proof lift (or equivalent safety factors) when installing the HI-STORM lid. The HI-STORM lid lift bracket and Vertical Cask Transporter are designed to the requirements of ANSI N14.6. The original load test information and ANSI N14.6 recertification documentation for the lift yoke, MPC lift cleats, HI-STORM lift brackets, and the Vertical Cask Transporter header beam were reviewed and determined to be satisfactory. The original load test for the HI-TRAC trunnions was conducted on February 14, 2006, and therefore did not require ANSI N14.6 recertification. The licensee had recently implemented Procedure HC.MD-PM.DCS-0013(Q), to include requirements for inspections of ANSI N14.6 equipment prior to the start of dry fuel loading campaigns. The special lifting equipment reviewed for dry fuel storage operations met the requirements of ANSI N14.6.

c. Conclusions

The heavy loads program at Hope Creek met regulatory requirements. The condition of the polar crane was found to be satisfactory. Recent operational issues associated with the polar crane had been captured, researched, and resolved by the licensee prior to commencing loading operations. No deficiencies were identified with the testing, inspection, or maintenance portions of the licensee’s heavy loads program. The lifting and movement of heavy loads were performed in accordance with approved procedures. Work evolutions were strictly controlled and performed in a safe manner.

VI. Vacuum Drying and Helium Backfill Operations

a. Inspection Scope

The licensee was required to drain the MPC, vacuum dry the MPC, and backfill the canister with helium. The inspection consisted of a review of the licensee's equipment and procedures, field observations, and interviews with cognizant personnel. The inspector observed the pre-job briefing that covered the vacuum drying and helium backfill activities.

b. Observations and Findings

On July 17, 2006, NRC inspectors reviewed the vacuum drying and helium backfilling sequence. The vacuum drying sequence involves draining water from the MPC, vacuum drying the MPC, backfilling the MPC with helium, and helium leakage testing. The licensee utilized a vacuum drying system (VDS) to perform these activities. The VDS is a modular system equipped with a control panel to operate pumps, manipulate valve positions, and display overall equipment configuration while in operation. Licensee procedures provided adequate instructions for operating the VDS which is utilized for pumping down the MPC, vacuum drying the MPC, and backfilling the MPC with helium.

The pre-job briefing was thorough and adequately covered such items as the governing work procedures, individual responsibilities, operating experience, radiological conditions, safety aspects, and pertinent sections of relevant procedures and the CoC. In addition, those aspects of the tasks that would be different from those encountered when handling a loaded MPC were summarized. The licensee provided simulated radiological conditions based on industry experience. The inspector noted that the licensee provided these simulated radiation levels during the actual performance of the dry run to promote as low as reasonably achievable (ALARA) awareness. A QC inspector observed the activity and was active in suggesting improvements or enhancements to performance. Procedure steps were strictly followed. The field supervisor maintained strict procedural compliance throughout the evolution.

The inspector noted that individuals were knowledgeable of their assigned duties, demonstrated adequate knowledge of system components, valve operation, and associated equipment and instrumentation. Individuals were aware of the key parameters associated with vacuum drying and helium backfill operations when questioned by the inspector. Three way communication and self-checking techniques were utilized by individuals during the performance of the work activities. Appropriate sign-offs and requirements to perform a peer check were incorporated at key steps in work documents.

The licensee demonstrated the capability, using a mockup, to drain an MPC, and to perform drying and helium backfilling of an MPC during the preoperational tests. The technique for the helium leak testing of the final closure welds was demonstrated by a contract specialist. The vacuum drying process was performed in accordance with approved procedures. The required vacuum pressure was achieved and the pressure maintained well within the limits for holding time as required by TS. Helium backfilling operations were also performed in accordance with approved procedures and achieved the helium backfill pressure limits required by TS. Individuals performing leak test activities were qualified to perform the NDE and were knowledgeable of the requirements for performing helium leak tests along with the TS acceptance criteria.

The licensee performed a post-job critique. The inspector noted that the critique was self-critical and thorough and that several observations were noted by individuals to improve performance of specific tasks.

c. Conclusions

The licensee demonstrated the capability to perform drain-down, vacuum drying, and helium backfilling of an MPC. Procedures and processes were sufficient in achieving the required limits specified in the Technical Specifications, ensuring minimal water content of loaded MPCs, and that an inert atmosphere is present to support the safe storage of spent fuel assemblies.

VII. Self Assessment Program

a. Inspection Scope

The involvement and role of the Nuclear Oversight group associated with ISFSI activities was evaluated. The scope of the inspection was to ensure that sufficient independent involvement by Nuclear Oversight was established to verify that the ISFSI program was effectively developed and implemented to support the safe operation of the ISFSI facility. The inspector interviewed the lead Nuclear Oversight representative covering dry run activities. The inspector reviewed several surveillances performed by QC staff. The use of the corrective action program in support of ISFSI activities was also evaluated. The inspection consisted of field observations, interviews with cognizant individuals, and review of licensee documentation.

b. Observations and Findings

The inspector noted that a dedicated individual from the Nuclear Oversight organization was assigned to evaluate dry run activities. The inspector noted that QC personnel attended dry run briefings, post-job critique sessions, and were present in the field to observe work activities. The inspector interviewed the QC representative evaluating dry run activities to gain an understanding of Nuclear Oversight's role throughout the dry run process. The QC staff's primary role was to observe ongoing activities and monitor compliance with procedural and work package requirements. The representative stated that based on experience gained during the dry run, key aspects of dry cask storage operations would be identified and used as input when developing long-range Nuclear Oversight surveillance schedules for future fuel loading campaigns. The development of these surveillance schedules would consider lessons learned from the dry run and initial loading activities.

The QC representative issued periodic surveillance reports throughout the dry run campaign covering specific activities evaluated. These reports summarized observations and findings. The surveillance reports covered key aspects of the dry run. The inspector noted that notifications were generated as appropriate based upon evaluation findings. These notifications were entered into the licensee's corrective action program for trending and tracking and resolution. The surveillances were found to be adequate. No safety concerns were identified.

c. Conclusions

The Nuclear Oversight department provided effective independent review of ISFSI activities. QC and QA efforts were appropriately incorporated into ISFSI activities. QC personnel were actively engaged in field activities and verified that hold points, TS, and work order requirements were implemented in accordance with approved procedures and related work documents. The identification and tracking of issues was implemented in accordance with the licensee's corrective action program, with the proper review and evaluation of action items performed prior to initial loading of spent fuel in the ISFSI facility.

VIII. Training and Qualifications

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 reviewed to verify that the required elements described in 10 CFR 72 Subpart I were incorporated into the ISFSI training program. The inspection consisted of a review of licensee documentation, interviews with cognizant personnel, and field observations.

b. Observations and Findings

The inspector interviewed the Operations Instructor regarding training and qualification of personnel performing ISFSI activities. Overview training was provided to personnel prior to ISFSI work activities. Initial training activities utilized normal station processes for the development and implementation of the training program. The Operations Instructor reviewed changes to procedures for impact and determined appropriate actions to ensure personnel were aware of changes and retrained as necessary. The training and qualification status for ISFSI personnel was documented on a Qualification

Matrix. Training and qualification consisted of satisfactory completion of classroom training and a written examination, followed by on-the-job training and evaluation.

Several training modules were specifically developed for ISFSI activities. These modules covered such activities as general overview of the ISFSI project to job-task specific modules, covering such activities as operation of the transporter, MPC closure, and cask loading and handling operations. The inspector reviewed selected training modules and noted that they were comprehensive and adequately covered training aspects of a given task. The inspector noted that the licensee had developed a student qualification matrix that designated individuals qualified to perform a given task based upon successful completion of the required training modules. The inspector reviewed selected names from the qualification matrix and reviewed training records to verify that individuals observed in the field were qualified for tasks they were performing. Medical qualifications for crane operators were confirmed to be current.

c. Conclusions

The licensee implemented an effective program to identify personnel training requirements associated with the ISFSI program. Appropriate training modules were developed for the various tasks. Individuals were properly trained and qualified to perform their assigned functions. The licensee utilized extensive practice sessions and on-the-job training sessions to verify readiness of individuals to perform their assigned functions.

IX. Initial Fuel Loading

a. Inspection Scope

The inspector observed the initial loading of spent fuel from loading of the MPC to placement of the HI-STORM at the ISFSI facility over the period from October 23 to November 7, 2006. The inspection consisted of field observations, review of licensee documentation and interviews with cognizant personnel.

b. Observations and Findings

The pre-job brief was conducted with the same thoroughness observed during several other pre-job briefings as noted elsewhere in this inspection report. The inspector reviewed the MPC loading documentation to confirm that the selected fuel assemblies that had been previously characterized for loading were configured as described. The fuel transfer forms were independently witnessed by a second individual during loading of the spent fuel assemblies into the MPC. Documentation associated with the fuel placement in the MPC was accurate and completed in accordance with approved procedures.

Prior to moving the loaded MPC from the cask storage pit to the 201' elevation, the inspector noted that the placement of monitoring equipment for welding activities, the location of the vacuum drying system skid, and work stations were configured as they were during dry run activities. Temporary lead shielding had been staged on the 201' elevation and was available for use but was not positioned at designated work locations to minimize radiation exposure to individuals. Discussions with licensee personnel indicated that an evaluation would be made based upon actual dose rates once the HI-TRAC, containing the loaded MPC, was in position on the 201' elevation. Once the HI-TRAC was moved to the 201' elevation and work activities commenced, unanticipated delays associated with such tasks as placing the VDS skid into service and additional time required to complete blowdown activities resulted in additional personnel exposures. Appropriate actions were taken as these items were encountered and formal changes made to the ALARA work package in accordance with approved procedures to reflect changes in dose estimates. The inspector noted that work stations were relocated to a more remote location on the 201' elevation, clearly posted low-dose waiting areas were designated, temporary lead shielding racks were positioned between the welding monitoring station, and the HI-TRAC and other measures implemented to minimize personnel exposures and to facilitate the performance of tasks.

Even though the licensee self-identified these issues, the inspector also identified and discussed related issues with cognizant personnel and noted that more aggressive evaluation and implementation of these measures would have further minimized personnel exposures. The inspector noted that such items as the location of work stations and certain equipment, timing of the placement and location of temporary shielding, time estimated for equipment set-up (e.g., the VDS), use of remote communication devices, were examples of items that could have been more effectively evaluated for conditions when the HI-TRAC contains spent fuel. Consequently, this observation is offered as an item for improvement whereby additional measures and lessons learned should be implemented prior to loading the next MPC associated with the preparation for sealing, vacuum drying, and backfilling activities.

Though no safety concerns were identified, these observations were offered as enhancements for subsequent MPC loadings. The inspector discussed possible enhancements related to ALARA and contamination control activities with cognizant personnel. The inspector noted that licensee personnel had self-identified similar issues and had entered the item in the corrective action program (e.g., Notification Number 20302218) for further evaluation. Licensee personnel stated that these items along with other lessons learned during the initial fuel loading would be evaluated per the corrective action program and appropriate changes implemented prior to loading of the next canister. The inspector noted that the licensee performed a critique upon completion of the initial loading and identified lessons-learned and corrective actions to be completed prior to loading the next MPC. The licensee subsequently provided confirmation to the inspector, after completion of the onsite inspection, that various corrective actions were completed prior to loading of the second MPC.

During the vacuum drying sequence, the licensee requested that Operations personnel monitor vacuum drying progress overnight on October 26, 2006. The inspector noted that the time to complete the vacuum drying process took longer than the licensee had originally anticipated for the initial MPC. Over this period of time, the MPC pressure decreased from approximately 100 torr to 40 torr over an eight to 10 hour period. Procedure NC.MD-PM.DCS-0003(Q), required that MPC pressure be held steady for 15-minute time intervals at designated ranges of pressure. These pressure ranges included 65-75 torr and 45-55 torr among others. Upon arrival the next morning, cognizant personnel identified that required procedure steps specifying various 15-minute hold periods were missed during the evening. The issue was entered into the licensee's corrective action program. The purpose of the procedure steps was to minimize the potential for freezing of residual water or moisture that may be present in the MPC. In the event of freezing conditions, the time required to complete the blowdown process would be extended. No problems were encountered over this period. The inspector determined that the licensee's failure to follow approved procedures during the vacuum drying process was a violation of CoC 1014, Section 2. However, because of the low safety significance and the timeliness and effectiveness of corrective actions, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section VI.A of the NRC Enforcement Policy (NVC 50-354/001).

The movement of the HI-STORM was performed in a controlled and deliberate manner. The transporter pre-operational checks and preparation of the HI-STORM for movement were completed in accordance with approved procedures. The field supervisor maintained custody of the work package and confirmed that procedure steps were completed as prescribed. Individuals escorted the transporter and HI-STORM during the entire movement from Hope Creek to the ISFSI facility. The haul path was inspected for any debris that could interfere with the safe movement of the HI-STORM. Security was notified prior to moving the loaded HI-STORM from the Hope Creek reactor building. Security personnel were noted to be present while the HI-STORM was transported to the ISFSI facility.

The inspector reviewed radiation and contamination survey data for the HI-STORM and loaded MPC. Radiation levels and contamination levels must be within certain limits to satisfy criteria specified in the TS. The inspector observed licensee personnel as they obtained radiation survey data after the MPC was placed into the HI-STORM. The inspector determined that the HI-STORM cask was in compliance with TS radiological requirements.

c. Conclusions

The licensee safely loaded and transferred the first MPC containing spent fuel to the ISFSI facility. Work activities were performed in a safe manner and met the requirements of TS. Spent fuel loaded into the MPC was properly characterized. The MPC was properly sealed, tested, surveyed and inspected, and met the requirements of the CoC. The licensee self-identified an incident in which personnel failed to follow approved procedures during the vacuum drying process.

X. Exit Meeting

The inspector presented the dry run inspections results to Mr. George Barnes and members of his staff at the conclusion of the dry run inspection on October 19, 2006. On November 9, 2006, the inspector presented the results of the initial loading to Mr. Jim Lewis and members of his staff.

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee
Alain Artayet, Welding Engineer
Craig Banner, Emergency Planning Supervisor
*George Barnes, Hope Creek - Site Vice President
Michael Bruecks, Manager-Nuclear Security
*Chic Cannon, Nuclear Communications
John Carlin, Fire Protection Supervisor
Rod Cavalieri, Manager-Outage Services
Joseph Cline, Radiation Protection Technician
Mark Crisafulli, Mechanical Maintenance Superintendent
*Paul Davison, Hope Creek - Engineering Director
*Jeff Defebo, NOS
Freddie Foster, Operations Maintenance and Technical Instructor
G. Gellrich, Manager - Plant Support
Mike Gregg, Maintenance Supervisor
*Brian Gustems, Project Manager
Cecilia Homan, Medical
Harry Hooks, Electrician
*Michael Jesse, Regulatory Assurance Manager
Jim Krall, Reactor Engineer
Peter Koppel, Lubrication Engineer
Shelly Kugler, Manager-Design Engineering
*Jim Lewis
Greg Lichty, Supervisor-Electrical Maintenance
Joseph Louch, Manager-Electrical Maintenance
Eric Mushnick, System Engineer
*Terry O'hare, Radiation Protection Supervisor
*John Perry, Hope Creek Maintenance
Mike Petrowski, Human Performance Specialist
*Fritz Possessky, Hope Creek - Regulatory Assurance
Gary Schmelz, Simulator Instructor
*Brian Sebastian, Hope Creek - Radiation Protection Manager
John Seymour, Radiation Protection Technician
*Rick D. Shindel, Operations
Jim Stevely, Reactor Engineer
*Keith Swing, Design Engineering - Special Projects
*Mehdi Tadjalli, Design Engineering Manager
Steve Trickett, Manager-Radiological Engineering
*Tom Wallender, Project Manager-ISFSI
Ken Watson, ALARA Engineer
*Dennis Winchester, NOS
Gary Young, Emergency Planning Technical Specialist

Contractors
Jim Annett, Civil Engineer
Steve Baker, Reactor Engineer
*Bill Eckman, QA Supervisor
*Robert Gallaher, Engineer
Brian Gutherman, Contractor-ISFSI Project
Dan Harbert, Engineer
*Andy Jacobs, Dry Cask Supervisor
*Larry Kinney, Projects Support
Scotty Roland

Others
Daryl Almond, Superintendent PCI Services
Walker Hawkins, PCI Services
*Elliot Rosenfeld, State of New Jersey, Bureau of Nuclear Engineering
Tony Heinz, Vice President, Leak Testing Specialists, Inc.
*Steve Solar, Holtec Site Services Manager
Larry Vice, NDE Specialist, PCI Services
*Ron Zak, State of New Jersey, Bureau of Nuclear Engineering (via telecon)

*Denotes attendance at the October 19, 2006 exit meeting.

DOCUMENTS REVIEWED

Calculations:
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Mechanical Calculations (10855-M63(Q)-143-1), dated November 1, 1985, PACECO, Inc Polar Crane

Vendor Calculation 328426 (001), Polar Crane Main Hoist Rope Break Load Excursions and Movements Calculation, Equalizer Piston Performance Wire Rope Failure Emergency Action, Revision 1

Vendor Calculation CAL-20727-SE-001, Rope Break Load Excursions & Load Movements & Compliance Evaluation

Calculation A-5-DCS-CDC-4006, Evaluation of Cask Loading Pit Floor Elevation 156'-0, Revision 01

Calculation 623-65(Q), Corbel - Polar Crane Rail, Revision 3

Calculation A-5-DCS-SDC-1961, Probable Maximum Hirricane (PMH) Forces on Storage Cask

Procedures:
Procedure NC.MD-PM.DCS-0001(Q), Offloading and Receiving Dry Storage Components, Revision 0

Procedure NC.MD-PM.DCS-0002(Q), Handling and Loading MPC, Revision 1

Procedure NC.MD-PM.DCS-0003(Q), Sealing, Drying and Backfilling of a Loaded MPC, Revision 0

Procedure NC.MD-PM.DCS-0004(Q), Transfer and Transport of Loaded MPC to Cask Pad, Revision 1

Procedure NC.MD-PM.DCS-0010(Q), HI-STORM Maintenance Inspection, Revision 0

Procedure HC.MD-PM.KF-0012(Q), Overhead Crane and Hoist Load Test, Revision 3

Procedure HC.MD-PM.DCS-0013(Q), Dry Cask Storage Special Lifting Device Annual Inspection, Revision 0

Procedure HC.MD-PM.DCS-0015(Q), Transporter Maintenance, Revision 0

Procedure HC.MD-ST.KF-0001(Q), Polar Crane Periodic Inspection, Revision 12

Procedure HC.MD-PM.KF-0004 (Q), Polar Crane Annual Preventative Maintenance, Revision 16

HC.MD-CM.KF-0001(Q), General Load Handling, Revision 7

Procedure MA-AA-716-021, Rigging and Lifting Program, Revision 6

Procedure MA-HC-716-021, Hope Creek Rigging and Lifting Program, Revision 2

Procedure MA-AA-716-022, Control of Heavy Loads, Revision 2

Procedure MA-HC-716-022, Hope Creek Control of Heavy Loads Program, Revision 0

Work Plan Procedure Supplement M-2664, Revision 0

Procedure HC.OP-AB.MISC-0001(Q), Acts of Nature, Revision 7

Procedure HC.MD-PM.KF-0002(Q), Polar Crane Lubrication 1 MO., 3 MO., 4 MO., 6 MO., 1YR., 2 YR., and 3 YR. P.M., Revision 12

Procedure HC.RE-FR.DCS-0001(Q), Dry Cask Storage Fuel Characterization, Revision 0

Procedure HC.RE-FR.DCS-0002(Q), Dry Cask Storage Fuel Selection for Cask Loading, Revision 0

Others:
Hope Creek Generating Station Independent Spent Fuel Storage Installation 10 CFR 72.212 Evaluation Report

50.59 Evaluation No. HC-06-006, Activity Number CP 80088459

Report No. H-1-KF-SEE-1704, Rev 0, (Sargent & Lundy), Hope Creek Generating Station Reactor Building Polar Crane Study, January 3, 2003

ALARA Review 2006-159, Independent Spent Fuel Storage Installation

Lesson Plan NMTMDCSLST-C-2, Lift Systems Cask Transporter

Lesson Plan NMTMDCSMPC-C-O, MPC Closure

Lesson Plan NMTMDCSCUO-C-O, Cask Unloading Overview

Lesson Plan NMTMDCSSLH-C-O, Dry Storage System Load Handling

Lesson Plan NOHO1ISFSITS-01, Holtec HISTORM Technical Specifications

Lesson Plan NOHO1ISFSIOV-00, Dry Cask Storage System Overview

Work Order 30080617, 36 Month PM - Reactor Building Polar Crane Lube

Work Order 30128837, 12 Month PM Lube 10-H-200 - Reactor Building Polar Crane

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PSEG Work Order Numbers: 70058122, 70052605, 70059115, 70045014, 70032054

NUREG-1048, Supplement No. 1, Safety Evaluation Report (SER) Related to the Operation of Hope Creek Generating Station, Dated March 1985

NUREG-1048, Supplement No. 3, Safety Evaluation Report (SER) Related to the Operation of Hope Creek Generating Station, Dated October 1985

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Report H-1-KF-SEE-1704, "Reactor Building Polar Crane Study," Revision 0
50.59 Evaluation No. HC-06-006, Revision 0

72.48 Screening CP 80088459, Revision 0

CSP 0439-1, "HI-TRAC 100 Ton Lift Yoke Load Test Procedure," Revision 1, Attachment 3.2 Load Test Data Record, Dated July 20, 2005

HSP-113, Revision 4, Exhibit 3.4, "Trunnion/Support Lug Load Test Data Record," Dated February 14, 2006

CSP 0323-1, "HI-STORM Lifting Bracket Load Test," Revision 0, Attachment 3.2, Load Test Data Record, Dated June 27, 2005

CSP 0323-1, “HI-STORM Lifting Bracket Load Test,” Revision 0, Attachment 3.2, Load Test Data Record, Dated May 11, 2006

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Engineering Evaluation J. O. No. 02560.0760, Criteria for Determining Polar Crane “MCL” Rating, Stone and Webster Engineering Corporation, Revision 0, Dated 11/16/95

Engineering Evaluation A-5-DCS-FEE-1766, Hope Creek Generating Station Independent Spent Fuel Storage Installation Fire Hazards Analysis, Revision 2, Dated September 6, 2006

Daily Polar Crane Inspection, Attachment 5, Log Sheets

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
CMAA	Crane manufacturer's Association of America
CoC	Certificate of Compliance
CFR	Code of Federal Regulations
^{o}F	Degree Fahrenheit
DCP	Design Change Package
DCSS	Dry Cask Storage System
EAL	Emergency Action level
FSAR	Final safety Analysis Report
HI-STORM	Holtec International Storage and Transfer Operation Reinforced Module
HI-TRAC	Holtec International Transfer Cask
ISFSI	Independent Spent Fuel Storage Installation
MPC	Multi-Purpose Cannister
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
QA	Quality Assurance
QC	Quality Control
PSEG	Public Service Electric & Gas
psi	per square inch
SAR	Safety Analysis Report
SER	Safety Evaluation Report
SFP	Spent Fuel Pool
SSE	Safe Shutdown Earthquake
TS	Technical Specification
VDS	Vacuum Drying System