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

November 23. 2010

Mr. Michael J. Annacone
Vice President
Brunswick Steam Electric Plant
P.O. Box 10429
Southport, NC 28461-0429

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) INSPECTION REPORT NOS.: 05000325/2010009 AND 05000324/2010009 AND 07200006/2010003

Dear Mr. Annacone:

The enclosed report documents the inspection conducted between September 20, 2010, and October 8, 2010, at the Brunswick Steam Electric Plant. This inspection involved a review of the pre-operational demonstration and initial loading activities of spent fuel into the ISFSI facility as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspection covered all 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 run and the initial loading of spent fuel into the ISFSI facility. The inspectors noted that ISFSI activities were implemented in a safe manner. Based on results of this inspection, no violations or findings of significance were identified. The inspection results were discussed Mr. Ed Wills, Plant General Manager, and other members of the staff during a telephone exit meeting on October 14, 2010.

In accordance with 10 CFR 2.390 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 Public Document Room or from the Publicly Available Records (PARS) component of

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).

Sincerely,

/RA/

Mark E. Franke, Chief
Engineering Branch 3
Division of Reactor Safety

Docket Nos.: 50-325, 50-324, 72-006
License Nos.: DPR-71, DPR-62

Enclosure: Inspection Report 05000325, 324/2010009, and 07200006/2010003
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

cc w/encl:
R. J. Duncan, II
Vice President
Nuclear Operations
Carolina Power & Light Company
Electronic Mail Distribution

William Jefferson, Jr.
Director Site Operations
Brunswick Steam Electric Plant
Electronic Mail Distribution

Edward L. Wills, Jr.
Plant General Manager
Brunswick Steam Electric Plant
Progress Energy Carolinas, Inc.
Electronic Mail Distribution

Christos Kamilaris
Director
Fleet Support Services
Carolina Power & Light Company
Electronic Mail Distribution

Joseph W. Donahue
Vice President
Nuclear Oversight
Carolina Power and Light Company
Electronic Mail Distribution

Brian C. McCabe
Manager, Nuclear Regulatory Affairs
Progress Energy Carolinas, Inc.
Electronic Mail Distribution

Phyllis N. Mentel
Manager, Support Services
Brunswick Steam Electric Plant
Progress Energy Carolinas, Inc.
Electronic Mail Distribution

Michael S. Williams
Manager, Training
Brunswick Steam Electric Plant
Progress Energy Carolinas, Inc.
Electronic Mail Distribution

(Vacant)
Manager
License Renewal
Progress Energy
Electronic Mail Distribution

Annette H. Pope
Supervisor, Licensing/Regulatory Programs
Brunswick Steam Electric Plant
Progress Energy Carolinas, Inc.
Electronic Mail Distribution

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Brunswick Steam Electric Plant
U.S. NRC
8470 River Road, SE
Southport, NC 28461

John H. O'Neill, Jr.
Shaw, Pittman, Potts & Trowbridge
2300 N. Street, NW
Washington, DC 20037-1128

Peggy Force
Assistant Attorney General
State of North Carolina
P.O. Box 629
Raleigh, NC 27602

Chairman
North Carolina Utilities Commission
Electronic Mail Distribution

Robert P. Gruber
Executive Director
Public Staff - NCUC
4326 Mail Service Center
Raleigh, NC 27699-4326

Brunswick County Board of Commissioners
P.O. Box 249
Bolivia, NC 28422

James Ross
Nuclear Energy Institute
Electronic Mail Distribution

(cc w/encl cont'd – See page 4)

(cc w/encl cont'd)
Public Service Commission
State of South Carolina
P.O. Box 11649
Columbia, SC 29211

W. Lee Cox, III
Section Chief
Radiation Protection Section
N.C. Department of Environmental
Commerce & Natural Resources
Electronic Mail Distribution

Warren Lee
Emergency Management Director
New Hanover County Department of
Emergency Management
230 Government Center Drive
Suite 115
Wilmington, NC 28403

Letter to Michael J. Annacone from Mark S. Franke dated November 23, 2010

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) INSPECTION REPORT NOS.: 05000325/2010009 AND 05000324/2010009 AND 07200006/2010003

Distribution w/encl:
RIDSNRRDIRS
PUBLIC
RidsNrrPMBrunswick Resource

X PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE X NON-SENSITIVE

ADAMS: X Yes ACCESSION NUMBER:_____ X SUNSI REVIEW COMPLETE

OFFICE	NMSS:SFST	NMSS:SFST	RII:DFFI	RII:DRS	RII:DRS	RII:DRS	RII:DRS
SIGNATURE	RA	RA	RA	RA	RA		
NAME	ELove	CMorell	RPrince	CFletcher	RCarrion		
DATE	11/16/2010	11/18/2010	11/22/2010	11/22/2010	11/22/2010		
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES N

OFFICIAL RECORD COPY DOCUMENT NAME: S:\DRS\ENG BRANCH 3\BRUNSWICK ISFSI REPORT 72006-2010003.DOC

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-325, 50-324, and 72-006
License Nos.:	DPR-71, DPR-62
Report Nos.:	05000325/2010009, 05000324/2010009, 07200006/2010003
Licensee:	Carolina Power and Light (CP&L)
Facility:	Brunswick Steam Electric Plant, Units 1 & 2
Location:	8470 River Road, SE Southport, NC 28461
Dates:	September 20, 2010 through October 8, 2010
Team Leader	Robert Carrion, Senior Reactor Inspector, Region II
Inspectors:	Cecil Fletcher, Senior Reactor Inspector, Region II Robert Prince, Fuel Facilities Inspector, Region II Earl Love, Storage and Transportation Safety Inspector, Office of Nuclear Materials Safety and Safeguards (NMSS) Clyde Morell, Storage and Transportation Safety Inspector, NMSS Lucieann Vechioli, Storage and Transportation Safety Inspector, NMSS
Approved by:	Mark Franke, Chief Engineering Branch 3 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000325/2010009, 05000324/2010009, and 07200006/2010003; 09/20/10 - 10/8/10; Brunswick Steam Electric Plant, Units 1 & 2; spent fuel pre-loading demonstration and initial loading of the Independent Spent Fuel Storage Installation (ISFSI).

This report covers on-site 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, and the initial loading of, spent fuel from the Unit 2 spent fuel pool (SFP) to the Transnuclear Inc. Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Fuel on the ISFSI. Upon completion of the dry run demonstrations, on October 1, 2010, the licensee began activities to begin the transfer of Unit 2 spent fuel to the onsite ISFSI. Units 1 and 2 were at power operations during this period.

The inspectors reviewed the pre-operational 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 processing and 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

Progress Energy selected the Transnuclear Inc. Standardized NUHOMS®-HD Horizontal Modular Storage System for dry storage of spent nuclear fuel at the Brunswick Steam Electric Plant (BSEP). The Nuclear Regulatory Commission (NRC) had certified the NUHOMS®-HD system under CoC No. 72-1004, Amendment No. 10, on August 24, 2009.

Preparations for loading spent fuel from the Unit 2 SFP to the Transnuclear Inc. Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Fuel were initiated during this inspection period. Upon completion of the dry run demonstrations, on October 1, 2010, the licensee began activities to transfer Unit 2 spent fuel to the onsite ISFSI. Units 1 and 2 were at power operations during this period.

From September 20- October 8, 2010, a team of inspectors performed two evaluations. The first evaluation, from September 20 to October 1, was 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 ISFSI. During the second evaluation, from October 3 to 8, NRC inspectors observed activities associated with the first loading of spent fuel into dry storage to ensure that those activities were performed safely, in accordance with approved procedures and within the TS limits, and to determine if the Brunswick Nuclear Plant (BNP) programs were adequate for continued maintenance and operation of the ISFSI once the ISFSI was loaded.

Brunswick ISFSI Activities

1. Preoperational Test Program

a. Inspection Scope (60854)

The CoC for the Standardized NUHOMS® Horizontal Modular Storage System for 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 activities required by the CoC. The inspection consisted of field observations, interviews with licensee personnel, and review of licensee documentation.

b. Observations and Findings

The CoC for the NUHOMS® Horizontal Modular Storage System for Irradiated Fuel includes a TS requirement (in Section 1.1.6, Pre-Operational Testing and Training Exercise) to demonstrate specific activities prior to loading the first dry shielded canister (DSC). Specifically, a dry run of the DSC loading, transfer cask (TC) handling and DSC insertion into the horizontal storage module (HSM) shall be held. This dry run shall include, but not be limited to, the following:

1. Functional testing of the TC with lifting yokes to ensure that the TC can be safely transported over the entire route required for fuel loading, washdown pit (decontamination area) and trailer loading.
2. DSC loading into the TC to verify fit and TC/DSC annulus seal.
3. Testing of TC on transport trailer and transported to ISFSI along a predetermined route and aligned with an HSM.
4. Testing of transfer trailer (TT) alignment and docking equipment. Testing of hydraulic ram to insert a DSC loaded with test weights into an HSM and then retrieve it.
5. Loading a mock-up fuel assembly into the DSC.
6. DSC sealing, vacuum drying, and cover gas backfilling operations (using a mock-up DSC).
7. Opening a DSC (using a mock-up DSC).
8. Returning the DSC and TC to the spent fuel pool.

Note that Item 7, opening of a DSC, was not demonstrated as part of this dry run because the equipment and procedures utilized to open a sealed DSC have been successfully demonstrated by the contractor at other facilities utilizing the same methods and procedures that would be employed by Progress Energy in the unlikely event that the need arose to open a previously sealed DSC.

The onsite inspection was performed 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.

The Work Package for the dry run activities was reviewed. The work package contained all applicable procedures associated with the scope of the dry run activities including loading the TC onto the TT, preparation of the TT for movement, transport of the TC to the ISFSI, DSC insertion into a HSM location, and retrieval of a DSC from a HSM. The procedures were comprehensive and adequately addressed key aspects of the evolutions; they contained sufficient detail to support safe handling, and movement of the TC and TT.

Over the period of September 21 to October 1, 2010, the inspectors observed the “dry run” activities, including loading of the TC onto the TT, transportation of the TC to the ISFSI along the designated haul path, and insertion and retrieval of the DSC into and from the HSM. The licensee conducted a pre-job briefing on September 21, with personnel involved with dry run activities. The briefing was comprehensive and effectively covered key aspects of the evolution, including procedural adherence expectations, safety aspects of the activities, use of three-way communications, Quality Assurance (QA) hold points, as well as a detailed overview of the tasks to be performed. Procedure compliance was strictly followed during the performance of the activities. Radiological conditions were simulated and appropriate measures implemented to provide a degree of realism during the performance of the dry run. The inspectors noted that the licensee had simulated radiological postings in order to prepare workers for the radiological conditions that could be encountered during actual transfer of 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 manner. The responsible supervisor maintained the work package in his possession throughout the performance of the activity. Procedure steps were followed and, for those steps requiring the performance of a specific task (e.g., independent verification of equipment configuration or position of a control switch), repeat-back communication techniques were employed. Inspectors noted effective use of "two-minute briefs" during critical stages of various evolutions (e.g., prior to insertion of the DSC) to ensure that all personnel knew their respective roles.

The licensee demonstrated the capability to safely place a DSC into the TC. Rigging, movement, and placement of the DSC into the TC were performed in a controlled manner with good coordination and communication observed among individuals involved in the activity. The inspectors observed fuel handlers place a dummy fuel assembly into several different DSC storage cells while the TC was underwater in its designated area of the SFP. 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 initialed or otherwise notated by the responsible supervisor to signify completion of a given step and that work order documents were strictly followed.

The licensee demonstrated the ability to safely load the TC onto the TT and subsequently transport the loaded TC to the ISFSI. The placement of a DSC into the TC to verify fit and confirmation that the DSC fuel storage cells were capable of accepting spent fuel assemblies was also successfully demonstrated. The licensee successfully aligned the DSC with the HSM and demonstrated the ability to insert and retrieve a DSC. ISFSI project personnel 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.

No findings of significance were identified.

2. Review of Evaluations

a. Inspection Scope (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)(2)(i)) to establish that the ISFSI design can be used at that site and that site operations can accommodate operation of an ISFSI. Brunswick holds a general license for operation of its ISFSI. Brunswick documented the results of the required evaluations in Technical Report OPLP-36, "Brunswick Nuclear Plant Operating Manual Volume XXII Plant Programs – 10 CFR 72.212 Report."

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 when questions arose.

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. Progress Energy notified the NRC on June 16, 2010, of its intent to use Transnuclear NUHOMS® storage casks. This letter met the requirements for the 90-day notification. The licensee is also required, as specified in 10 CFR 72.212(b)(1)(ii), to register the use of each cask with the NRC within 30 days of using that cask to store spent fuel. The licensee provided this registration to the NRC in a letter dated November 9, 2010.

The inspectors reviewed a draft copy of the Brunswick 72.212 evaluation report as a final approved copy was not available at the time of the inspection. Based on the review of the draft evaluation, the inspectors assessed that, overall, the evaluation report was comprehensive and adequately addressed the areas required to be evaluated under 72.212(b)(2) through (4). No significant oversights or concerns were identified. The inspectors noted that, with regard to the review of seismic design, the dynamic vertical response of the HSM/pad/soil system was calculated by BNP to be slightly above the maximum vertical response (0.224g vs 0.200g) required by the Transnuclear (TN) design basis document but it was determined to be acceptable. The inspectors noted that the TN calculation had evaluated this condition and concluded that the vertical seismic acceleration did not adversely affect the margins of safety of the HSM-H design. In addition, the inspectors noted that the response spectra for vertical motion associated with the BSEP design basis earthquake is 0.11g and that the vertical seismic acceleration level contained in TN TS Section 1.1.1, Item 3, for the NUHOMS® -61BTH System HSM-H was determined by BNP and TN to be acceptable. This section of the evaluation report was subsequently revised in the final evaluation report to address this issue and to provide a clear basis for acceptance.

The inspectors also reviewed several supporting documents referenced in the evaluation report, including, Report Nos. ISFSI-0010 and -0011, Cask Hauling and Storage Fire Hazards Analysis and Cask Hauling and Storage Explosion Hazards Evaluation, respectively. The reports contained the results of the fire and explosion hazard analysis for the ISFSI haul path and storage location and prescribed required standoff distances for various hazards as well as any other physical or administrative controls required for ISFSI operations. The inspectors reviewed the above-referenced documents and determined that the supporting engineering evaluations for the fire/explosion hazards analyses were detailed and used a systematic approach to evaluate all potential fixed and transient fire/explosion hazards. The inspectors walked the haul path and noted that all fixed sources of combustible material were sufficiently distanced from the ISFSI or heavy haul path or sufficiently shielded so as not to represent a hazard to the Transfer Cask/Dry Shielded canister or HSM-H. The inspector noted that the combustible energy of transient combustibles along the heavy haul path and at the ISFSI was limited by administrative controls in BNP ISFSI operating procedures. No observations were made with respect to fixed and transient combustibles.

The loading, transportation, and storage operations of the NUHOMS® -61BTH System HSM-H at BNP were reviewed under the 10 CFR 50.59 Process. Reliability of structures systems and components important to safety was evaluated. The inspector noted the performance of numerous screening and evaluations that had been performed in accordance with the requirements of 10 CFR 50.59 for activities associated with the ISFSI. No activities or modifications related to ISFSI implementation required prior approval as documented in the 10 CFR 50.59 screenings/evaluations.

A 10 CFR 50.59 evaluation of the construction and operation of the ISFSI and plant interfaces had been performed to demonstrate that changes to plant TSs or a license amendment were not required. The ISFSI has been incorporated into the Protected Area of the BNP. The NUHOMS system design parameters enveloped the reactor site parameters described in the Brunswick Unit 2 FSAR, with the exception of the seismic vertical response previously described.

Other general license requirements dealing with review of reactor emergency plans, quality assurance program, training, and radiation protection program must also be satisfied pursuant to 10 CFR 72.212(b)(6). Records and procedural requirements for the general license holder are described in 10 CFR 72.212(b)(7), (8), (9) and (10). The inspectors reviewed selected referenced records and procedure changes related to emergency preparedness, fire protection, training, health physics and quality assurance programs. The inspectors interviewed cognizant personnel to confirm that they were knowledgeable of the impact of ISFSI-related activities. For instance, the inspectors interviewed the Fire Protection Manager with respect to coordination with offsite organizations which may be called upon to respond during a major fire at the plant. The inspectors also interviewed the Emergency Planning Manager concerning the Emergency Action Levels (EALs) associated with ISFSI operations. The emergency plan, quality assurance program, training program, radiation protection program, and fire protection program had been evaluated and their effectiveness was determined not to be decreased by ISFSI activities.

The licensee performed an extensive review of the dry cask storage program to ensure compliance with the requirements of 10 CFR 72, Subpart K, General License for Storage of Spent Fuel at Power Reactor Sites. Specifically, the 10 CFR 72.212 evaluation report was found to be acceptable, containing sufficient objective evidence that written evaluations which 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 radiological impact to members of the public. Applicable reactor site parameters, such as earthquake intensity, tornados, wind-generated missile impacts, flooding, temperature, fire and explosion, lightning, etc., were evaluated for acceptability with the bounding values specified in the NUHOMS Safety Analysis Report (SAR) and the NRC Safety Evaluation Report (SER). The evaluations demonstrated that the design features for the NUHOMS® -61BTH System HSM-H enveloped the site specific characteristics of the BNP site.

No findings of significance were identified.

3. Fuel Characterization and Verification

a. Inspection Scope (60854)

The CoC for the NUHOMS-61BTH dry cask storage system specifies 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 licensee documentation.

b. Observations and Findings

The inspectors reviewed the licensee's process for selecting and verifying fuel assemblies for placement in the first DSC. The inspectors reviewed documents associated with the qualification, characterization, and selection of fuel assemblies for storage at the ISFSI. These documents were contained in the "Fuel Selection and Characterization Package for BNP-61BTH-2-F-1-HZ01." Technical Specifications require that selected fuel assemblies be visually inspected, independently identified, free of cladding defects, and 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 they were knowledgeable of the TS requirements. The inspectors noted that the selected fuel assemblies met all appropriate TS requirements for placement into a DSC for dry storage. Supporting documentation adequately characterized the selected fuel assemblies for loading into DSC 1.

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

No findings of significance were identified.

4. Welding and Nondestructive Examination (NDE)

a. Inspection Scope (IP 60854)

The inspectors observed and evaluated the welding and NDE to determine whether the Brunswick staff and contractor had developed the capability to properly weld and perform NDE on the specific type of DSC to be used for storage of spent fuel at the Brunswick site. The inspection consisted of interviews with cognizant personnel, review of documentation, and field observations associated with welding activities for the initial DSC loading.

Specifically, the inspectors reviewed TN CoC No. 72-1004, Amendment No. 10, to determine if the American Society of Mechanical Engineers (ASME) Code and exceptions to the Code had been incorporated into the welding fabrication control documents and to ensure that the fabrication specifications were consistent with the

design commitments and requirements documented in the SAR, the CoC, and the TSs. The inspectors also reviewed the TN canister-welding contractor (TriVis) welding process control procedures for compliance to TN's CoC commitment to the Spent Fuel Project Office Interim Staff Guidance (ISG) -15 (Materials Evaluation) requirements for limiting the amount of weld metal deposited per weld pass and the need to perform a multilevel liquid penetrant (PT) examination. The inspectors observed welding of the cask mock up lid-to-shell root pass and the intermediate weld pass as well as the verification that the weld metal deposited was less than 0.25". The inspectors reviewed the training and certification of personnel performing quality-related activities and interviewed personnel to determine their familiarity with the specified design, designated fabrication techniques, testing requirements, and quality controls associated with the construction of the dry cask storage system (DCSS). The inspectors reviewed and verified that the welding procedures met ASME, Section IX, requirements and were acceptable for the demonstration. The inspectors reviewed the PT examination procedure to determine whether it met the ASME Code Section V, Article 6, requirements.

b. Observations and Findings

The licensee utilized the services of a dedicated contractor welding and NDE team experienced in the DSC type to be used by the licensee.

The inspectors observed the welding equipment setup, welding on the mockup, visual weld examination, and penetrant testing. Portions of the applicable work instructions and procedures were reviewed and the inspectors determined that neither of the requirements of Spent Fuel Project Office ISG -15, previously referenced, for limiting the amount of weld metal deposit per weld pass and the need to perform a multilevel PT examination were being implemented in the TriVis welding process control procedures. Prior to the first loading campaign, these issues were resolved via TN Corrective Action No. 2010-147, and further documented in a letter (E-29967, Revision1, dated 9/30/2010) from TN to BNP. The inspectors determined that on-site fabricator personnel were familiar with the specified design, designated fabrication techniques, testing requirements, and quality controls associated with the construction of the DCSS. The inspectors reviewed the welder qualifications and verified that the welders met the ASME Section IX requirements for welder qualifications. The inspectors observed the TriVis inspector perform a visual (VT-1) inspection of lid-to-shell tack welds prior to the root pass, in accordance with the TriVis procedure. The inspectors also observed a PT examination used on the tack welds and the final welds for the vent port to verify that it satisfied the ASME Section V requirements. The inspectors verified that the TriVis NDE technicians were well qualified to perform the VT-1 and PT and that they were performed in accordance with the established procedures. During the first loading campaign, the inspectors observed preparations for welding the inner top cover of the DSC and noted that contractor personnel were knowledgeable of their work activities and worked closely with licensee personnel and that rigging and handling of the top covers, welding machine, and associated equipment were performed in a safe manner. The individuals were knowledgeable of procedural requirements and followed approved rigging and lifting practices.

Although minor issues were identified during the welding demonstration, all issues were resolved during the course of the inspection prior to the first spent fuel loading campaign. The inspectors concluded that the capability to adequately weld and perform NDE on DSCs was sufficiently demonstrated by the mockup work. Personnel were qualified to perform their assigned functions.

No findings of significance were identified.

5. Heavy Loads Program

a. Inspection Scope (60854)

Per TS Section 1.1.4, the licensee was required to demonstrate the adequacy of its heavy loads program pertaining to the movement of the DSC and TC from the spent fuel pool to the cask preparation area and loading and unloading the TC from the TT in the Unit 2 Reactor Building (RB) truck bay. The inspection consisted of field observations, interviews with licensee personnel and review of documentation.

b. Observations and Findings

The Brunswick Unit 2, RB crane is a single trolley, Seismic Category 1 overhead crane with a 125-ton capacity main hoist. The crane was previously reviewed by the NRC and found to meet the single-failure proof criteria specified in NUREG-0612 and NUREG-0554. (See NRC Inspection Report 07200006/2010002, dated May 21, 2010 (ML1014502931).) The licensee implemented Engineering Change 71206, Reactor Building Crane Wire Rope Upgrade, in 2009. The design modification replaced the existing wire rope with a rope of sufficient load capacity to handle the fully-loaded 110-ton transfer cask to be utilized for dry cask storage activities.

To ensure that the crane could not travel over areas of the SFP where spent fuel is stored, the licensee had designated safe load paths on the 117' elevation of the RB. These restrictions are specified in procedure OMMM15, Operation and Inspection of Cranes and Material Handling Equipment. Procedure OMST-CR51R, Operating and Visual Inspection of Reactor Building Crane, provides instructions for verifying the operability of the crane interlocks, which prevent travel over stored spent fuel assemblies.

The RB Unit 2 crane is used to move the TC containing the DSC from the cask loading area located in the southeast corner of the SFP to the cask preparation area, located on the 117' elevation of the RB, and back again. The crane is also used to lift the TC from the transport trailer from the 20' elevation to the 117' elevation refuel floor.

The inspectors reviewed the preventative maintenance and inspection programs for the Unit 2 RB crane. The inspectors determined that procedures adequately addressed test requirements, frequent and periodic inspections, pre-operational checks, and inspections prior to use. The inspectors reviewed recently performed pre-operational checks, and quarterly inspection work packages for completeness and accuracy.

The Unit 2 RB crane was inspected previously this year by the NRC after completion of the design changes noted above. (See NRC Inspection Report 07200006/2010002, dated May 21, 2010 (ML1014502931).) During the current inspection, visual observations were performed on the Unit 1 RB crane. The same design changes previously made on the Unit 2 RB crane had recently been completed for the Unit 1 RB crane. The inspectors were accompanied by licensee personnel as they performed an inspection of the Unit 1 RB crane. The inspectors observed the overall material condition of crane components. The new rope on the main hoist was inspected for defects or indications of damage. The inspectors and licensee personnel discussed the purpose of the various components that were installed under Engineering Change 0000071207R11, Reactor Building Crane Tornado Latch Control Modification (Units 1 and 2).

The DSC was loaded with weights to reflect the weight of a fully loaded DSC containing 61 fuel assemblies. A specially designed lift yoke was provided for use with the TC. This yoke is designed to engage the lifting trunnions of the TC. The inspectors observed personnel performing visual inspections of the yoke prior to performing lifts of the TC, in accordance with approved procedures. Over the course of the dry run, inspectors observed all the movement pathways of a fully-loaded TC. Pre-lift job briefings were thorough and emphasized safety aspects of heavy load lifts. Individual responsibilities were clearly communicated during pre-job briefings. Crane operators, spotters and members of the lifting team were knowledgeable of their responsibilities. Movements of heavy loads were performed in a deliberate and safe manner. The inspectors noted that effective communication was maintained between the Load Director, crane operator and members of the lifting team while lifts were in progress. Positive controls were established to keep non-essential personnel away from the work area to minimize distractions of the lift team.

Procedures governing the lifting of heavy loads contained the appropriate requirements specified in NUREG-0612, NUREG-0554, and national industry standards. 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. Maintenance and testing of equipment to ensure the ability of the equipment to safely handle anticipated loads were properly performed and documented in accordance with approved procedures.

No findings of significance were identified.

6. Vacuum Drying and Helium Backfill Operations

a. Inspection Scope (60854)

The licensee was required to drain, vacuum dry, and backfill the DSC with helium. The inspection consisted of a review of the licensee's equipment and procedures, a simulation of the process during the dry run activities (per TS Section 1.1.6.6), field observations, and interviews with licensee personnel.

b. Observations and Findings

The licensee demonstrated the capability, using a mockup, to drain a DSC and to perform vacuum drying and helium backfilling of a DSC during the dry run on September 23, 2010.

During the loading of the first DSC, the NRC inspectors reviewed the vacuum drying and helium backfill sequence. The vacuum drying sequence involves draining water from the DSC, drying the DSC under vacuum conditions, backfilling the DSC with helium, and testing for helium leakage. The licensee utilized a vacuum drying system (VDS) to perform these activities. The VDS is a modular system equipped with a touch-activated control monitor display panel to operate pumps, manipulate valve positions and display overall equipment configuration during the vacuum drying and helium backfilling process. The operators demonstrated a thorough knowledge and understanding of the VDS system operating parameters and the function and purpose of the various display indicators. The VDS was staged immediately adjacent to the DSC cask preparation area. Licensee procedure IFS-NGGC-0016, ISFSI DSC Sealing Operations, Revision 2, provided the instructions for operating the Vacuum Drying System utilized for pumping down the DSC, vacuum drying the DSC, and backfilling the DSC with helium.

The vacuum drying process was performed in accordance with the approved procedure. Although the initial vacuum drying phase took longer than expected, the required vacuum pressure was achieved and the pressure maintained within the limits for holding time as required by the TSs. Helium backfilling operations were also performed in accordance with the approved procedure and achieved the helium backfill pressure limits required by the TSs.

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

No findings of significance were identified.

7. Quality Assurance (QA) Program

a. Inspection Scope (60854)

Per TS Section 1.1.3, Quality Assurance, activities at the ISFSI shall be conducted in accordance with a Commission-approved quality assurance program which satisfies the applicable requirements of 10 CFR Part 50, Appendix B, and which is established, maintained, and executed with regard to the ISFSI.

Quality assurance associated with ISFSI activities is organized within the corporate Nuclear Oversight organization. The involvement and role of QA was evaluated to ensure that sufficient independence 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 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.

b. Observations and Findings

The inspectors interviewed the Manager of Nuclear Oversight and a Lead Auditor. Nuclear Oversight is organized with a QA function performing audits, a Quality Control (QC) function performing inspections, and specialists performing assessments of ISFSI activities. Nuclear Oversight developed an Integrated Assessment Plan for the ISFSI project using QA audits, QC inspections, and field observations. Issues were to be identified and reported through audits, Condition Reports (CRs), and biweekly site vice president briefings. The inspectors noted that QC personnel attended the dry run briefings and were present in the field to observe work activities.

The inspectors reviewed vendor documentation on activities that included various construction stages associated with DSC and HSM fabrication. The surveillances were noted to be adequate with no safety concerns identified.

The inspector reviewed licensee self-assessments. The results of the audited areas were documented and tracking items identified for unresolved items.

The inspector reviewed CRs issued by the licensee pertaining to the ISFSI program and activities. The inspector noted that action items were identified and being tracked to closure and that issues required to be addressed prior to the first loading of spent fuel were completed or closed.

The Nuclear Oversight organization provided effective independent review of ISFSI activities. Quality control and assurance efforts were appropriately incorporated into ISFSI activities. QA personnel 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. The identification and tracking of issues were 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.

No findings of significance were identified.

8. Training and Qualifications

a. Inspection Scope (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 reviewed to verify that the required elements described in 10 CFR 72, Subpart I, Training and Certification of Personnel, and TS Section 1.1.5, Training Module, 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 licensee utilized the services of TN personnel and a subcontractor to TN to perform ISFSI activities. Contractor personnel were experienced in the operations and activities that they were responsible for performing.

The inspectors interviewed training personnel regarding training and qualification of personnel performing ISFSI activities. Overview training was provided to personnel with ISFSI-related responsibilities. 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 transfer trailer, DSC/HSM alignment operations, and TC/DSC preparation and drying. 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 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 inspectors 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.

The licensee utilized experienced contractor personnel qualified to perform ISFSI-related tasks and activities. Appropriate training modules were developed for the various tasks. Individuals were properly trained and qualified to perform their assigned functions.

No findings of significance were identified.

9. Initial Loading of the HSM

a. Inspection Scope (60855)

The inspectors observed activities associated with the first loading of spent fuel into the ISFSI on October 12, 2010. The inspection consisted of field observations, review of licensee documentation, and interviews with licensee and contractor personnel.

b. Observations and Findings

The inspectors observed activities associated with the first loading of spent fuel into an HSM from the pre-job brief of October 3 to the vacuum drying part of the evolution. The pre-job briefing was thorough and covered all pertinent issues associated with the initial loading. The inspectors reviewed the DSC loading documentation to confirm that the selected fuel assemblies that had been previously characterized for loading were configured as described. The core component and fuel movement forms were independently witnessed by a second individual during loading of the spent fuel assemblies into the DSC. Documentation was accurate and completed in accordance with approved procedures.

Local area radiation monitors were staged at strategic locations in the immediate vicinity of the SFP and areas adjacent to DSC handling operations. These monitors were equipped with local alarms and remote readout displays.

The field supervisor maintained custody of the work package and confirmed that procedure steps were performed and properly signed-off.

The licensee safely loaded the first DSC containing spent fuel into an HSM. Work activities were performed in accordance with approved procedures and met the requirements of the technical specifications. Spent fuel loaded into the DSC was properly characterized. The DSC was properly sealed, tested, surveyed and inspected, and met the requirements of the CoC.

No findings of significance were identified.

Exit Meeting

The preliminary results of the inspection were discussed during a telephone exit on October 14, 2010, with Mr. Ed Wills, Plant General Manager, and other members of the staff.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
S. Bostic, Major Projects
S. Edwards, Nuclear Fuel Management & Safety Analysis
L. Grzeck, Licensing
J. Johnson, Manager-Environment & Radiation Control (E&RC)
P. Mentel, Manager-Site Support Services
W. Murray, Licensing
A. Pope, Corporate Licensing/Regulatory Affairs
J. Smith, ISFSI Supervisor
R. Tripp, Major Projects
J. Vincelli, E&RC
M. Williams, Manager - Training
K. Ward, Major Projects
E. Wills, Plant General Manager

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed
None

Closed
None

Discussed

None

List of Documents Reviewed

Section 1, Preoperational Test Program

- Work Order 01571121 03, Perform ISFSI Internal Dry Runs and Perform ISFSI NRC-Observed Dry Run

Section 2, Review of Evaluations

- Technical Report OPLP-36, "Brunswick Nuclear Plant Operating Manual Volume XXII Plant Programs – 10 CFR 72.212 Report."
- Calculation Number ISFSI-0016, ISFSI Dose Rate Evaluation, Revision 0, June 26, 2010
- Report No. ISFSI-0010, Cask Hauling and Storage Fire Hazards Analysis
- Report No. ISFSI-0011, Cask Hauling and Storage Explosion Hazards Evaluation

Emergency Preparedness Documents

- Emergency Preparedness Off-Site Training – 2009 Annual Basic Radiation Protection Training and Letter of Agreement for Brunswick County and New Hanover County. Dry Fuel Storage was covered during the presentations.
- Emergency Response Plan, 0ERP, Revision 76, which adds ISFSI information to the Plan
- Plant Emergency Procedure, 0PEP-02.2.1, Emergency Action Level Technical Basis, Revision 0

Fire Protection Documents

- Nuclear Electric Insurance Limited Property Loss Control Report of March 9, 2010 (includes the ISFSI and the ISFSI storage Building)
- 0PFP-013, General Fire Plan, Revision 34
- 0PFP-MBPA, Miscellaneous Buildings Prefire Plans- Protected Area, Revision 13
- Calculation Number ISFSI-0010, Cask Hauling and Storage Fire Hazards Evaluation, Revision 0, October 2, 2008
- Calculation Number ISFSI-0011, Cask Hauling and Storage Explosion Hazards Evaluation, Revision 0, October 2, 2008

Section 3, Fuel Characterization and Verification

- Fuel Selection and Characterization Package for BNP-61BTH-2-F-1-HZ01
- NFP-NGGC-0023, Selection of Fuel for Storage in Independent Spent Fuel Storage Installations, Revision 2
- OENP-24.12, Preparation of Core Component Sequence Sheets, Revision 36
- OENP-24.12-3, Core Component Sequence Sheets for DSC BNP-62BTH-2-F-1-HZ01

Section 4, Welding and Nondestructive Examination (NDE)

- Procedure 0SP-10-008, (TriVis 10368-BNP-GWS-7), Spent Fuel Cask Welding: 61BTH (Type 1 & 2) NUHOMS Canisters, Revision 0
- Procedure 0SP-10-009, (TriVis WAP-1), Control of Welding and Brazing Procedure Specifications, Revision 0
- Procedure 0SP-10-010, (TriVis WAP-2), Control of Welder and Welding Operator Qualification, Revision 0
- Procedure 0SP-10-011, (TriVis WAP-3), Control of Filler Metal, Revision 0
- Procedure 0SP-10-012, (TriVis 10368-BNP-QP-9.201), Visual Weld Examination of Dry Cask Assembly, Revision 0
- Procedure 0SP-10-013, (TriVis 10368-BNP-QP-9.202), Color Contrast Liquid Penetrant (PT) Examination Using the Solvent Removable Method, Revision 0
- Procedure 0SP-10-014, (TriVis 10368-BNP-SS-8-A-TN), Welding Procedure Specification, Revision 0
- Procedure 0SP-10-015, (TriVis 10368-BNP-SS-8-M-TN), Welding Procedure Specification, Revision 0
- Procedure 0SP-10-017, (TriVis PQR-1), WPS No. SS-8-M for GTAW and SS-8-C for SMAW, Revision 0
- Procedure, QP-9.200, TriVis Written Practice for the Qualification and Certification of Nondestructive Examination (NDE) Personnel

Section 5, Heavy Loads Program

- OMST-CR51R, Operating and Visual Inspection of Reactor Building Crane, Revision 15
- OMMM-015, Operation and Inspection of Cranes and Material Handling Equipment, Revision 54
- OPM-CRN002, Overhead Crane Checkout, Revision 12
- OPM-CRN501, PM for the Fixed Gantry and Track Cranes, Revision 33
- Engineering Change 0000071207R11, Reactor Building Crane Tornado Latch Control Modification (Units 1 and 2)
- MNT-NGGC-0021, Lifting and Rigging Practices and Equipment, Revision 0
- Work Order 1571121-02, Unit 2 BCRB Bridge Crane, Before Use or Daily Crane Inspection Sheets from September 3 through September 17, 2010

Section 6, Vacuum Drying and Helium Backfill Operations

- IFS-NGGC-0016, ISFSI DSC Sealing Operations, Revision 2

Section 7, Quality Assurance (QA) Program

- Action Request 00330907, Brunswick Nuclear Plant SAT Process Documentation (Dry Cask Storage Project), Training Material
- Brunswick Nuclear Plant Quick Hit Self Assessment Report Number 00334329-04, Assessment Date 10/09/09-11/12/09, Procedure Use and Adherence Practices During Performance of IFS-NGGC-0011, Horizontal Storage Module Assembly
- Brunswick Nuclear Plant Quick Hit Self Assessment Report Number 00376031, Assessment Date 01/25/10-01/28/10, Readiness of BNP DFS Program to Load Spent Fuel in the NUHOMS 61BTH System
- AREVA Corrective Action Report Number 2010-132, All four socket head cap screws were found to be sheared.
    - Transnuclear Nonconformance Report 2101-149, Socket head cap screw for restraining yoke bearing broke during cask handling operations
        - LR No. 721004-867, Repair NCR – Replace broken bearing insert screws
        - Work Order Package 01571121 15, 0-ISFSI-Xfer-Cask-Yoke Inspect/Replace Palm Bearing Screws
- 10 CFR 72.48, Applicability and 10 CFR 71 Review, Repair NCR 2010-149, Replace Broken Bearing Insert Screws as Originally Specified, Except Without Zinc Coating
- Quick Hit Self-Assessment Report, Assessment Number 00334329-04, Procedure Use and Adherence Practices During Performance of IFS-NGGC-0011, November 2009
- Quick Hit Self-Assessment Report, Assessment Number 376031, Readiness of the BNP DFS Program to Load Spent Fuel in the NUHOMS 61BTH System, January 2010
- Readiness Assessment, Assessment Number 373571, BNP Dry Fuel Storage Readiness, June 2010
- Work Order Package 01589025, HSM Installation and Inspection
- AREVA/Transnuclear Certificate of Conformance Spent Fuel Storage Cask, NUHOMS-61BTH-2-F-1-HZ02, May 26, 2010

- AREVA/Transnuclear Certificate of Conformance Spent Fuel Storage Cask, NUHOMS-61BTH-2-F-1-HZ03, July 14, 2010
- AREVA/Transnuclear Certificate of Conformance Spent Fuel Storage Cask, NUHOMS-61BTH-2-F-1-HZ04, July 14, 2010
- AREVA/Transnuclear Certificate of Conformance Spent Fuel Storage Cask, NUHOMS-61BTH-2-F-1-HZ05, July 14, 2010

Section 8, Training and Qualifications

- AOI-CLS-LP-065, Independent Spent Fuel Storage Installation (ISFSI) Lesson Plan, Revision 1
- Brunswick Nuclear Plant Generalized Training for BNP Mechanical, Maintenance, and Health Physics Documentation for Completion
- TriVis Incorporated Training Module LP# NDS01L001D, Revision 3
- TriVis Incorporated Training Module LP# NDS02L001D, Revision 4
- TriVis Incorporated Training Module LP# NDS02L002D, Revision 3
- TriVis Incorporated Training Module LP# NDS02L003D, Revision 3
- TriVis Incorporated Training Program Administration, SP-0006, Revision 1
- TriVis Incorporated, Transnuclear Generic Training, Dry Fuel Storage, DS-01-07, Revision 0
- TriVis Incorporated Personnel Qualification Data

Section 9, Initial Loading of the HSM

- 0ISFS-002, Transfer Cask Handling Operations for Fuel Loading, Revision 2
- 0ISFS-003, Dry Shielded Canister Fuel Loading, Revision 2
- 0ISFS-006, Transfer Cask Handling Operations for Fuel Loading, Revision 1
- IFS-NGGC-0010, Start-Up or Accident Temperature Monitoring of the Horizontal Storage Module, Revision 2
- IFS-NGGC-0015, Transfer Cask and Dry Shielded Canister Preparation for Loading, Revision 2
- IFS-NGGC-0016, ISFSI DSC Sealing Operations, Revision 2
- IFS-NGGC-0017, Transfer Cask and Dry Shielded Canister to the Horizontal Storage Module, Revision 2