UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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November 17, 2005

Mr. Paul D. Hinnenkamp
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Entergy Operations, Inc.
River Bend Station
5485 US Highway 61N
St. Francisville, LA 70775

SUBJECT: INSPECTION REPORT 050-00458/05-013; 072-00049/05-004

Dear Mr. Hinnenkamp,

An NRC team inspection was conducted on October 3-7, 2005, at your River Bend Nuclear Power Station to evaluate the dry cask storage activities for your Independent Spent Fuel Storage Installation (ISFSI). This pre-operational inspection reviewed various site programs and procedures related to dry cask storage operations to verify compliance with regulatory requirements related to the use of the Holtec Hi-Storm 100 casks system at your River Bend site. The enclosed report presents the results of that inspection. Overall, the inspection found that the regulatory requirements were being adequately incorporated into your program. No violations of NRC regulations were identified.

A significant portion of your program reviewed during this inspection was in the final stages of completion and approval. As a result, several actions were identified that need to be completed by your staff prior to initiating fuel loading activities. These actions are described in detail in the attached inspection report and are identified as inspection follow-up items. The actions include completion of the analysis for storage casks sliding on the ISFSI pad, completion of the actions required by the crane license amendment, completion and approval of the 10 CFR 72.212 evaluation report, completion of the ISFSI training program and demonstration of helium leak testing of the vent and drain port cover plate welds.

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 NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

Should you have any questions concerning this inspection, please contact the undersigned at (817) 860-8191 or Mr. Scott Atwater at (817) 860-8286.

Sincerely,

D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle and Decommissioning Branch

Docket Nos.: 50-458
72-049
License No.: NPF-47

Enclosure:
NRC Inspection Report
050-00458/05-013; 072-00049/05-004

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	050-00458; 072-00049
License No.:	NPF-47
Report No:	050-00458/05-013; 072-00049/05-004
Licensee:	Entergy Operations, Inc.
Facility:	River Bend Nuclear Generating Station 5485 U.S. Highway 61 St. Francisville, Louisiana
Dates:	October 3-7, 2005
Inspectors:	J. V. Everett, Senior Health Physicist, Region IV - Team Leader S. P. Atwater, Health Physicist, Region IV K. J. Hardin, Nuclear Engineer, Spent Fuel Project Office J. J. Pearson, Safety Inspection Engineer, Spent Fuel Project Office S. S. Sakai, General Engineer, Nuclear Reactor Regulation B. N. Jagannath, Senior Geotechnical Engineer, Division of High Level Waste Repository Safety
Approved By:	D. B. Spitzberg, Ph.D., Chief Fuel Cycle and Decommissioning Branch
Attachments:	1. Supplemental Information 2. Inspector Notes

EXECUTIVE SUMMARY

River Bend Nuclear Generating Station
NRC Inspection Report 050-00458/05-013; 072-00049/05-004

Over the past 13 months, River Bend has been conducting pre-operational testing of the dry fuel storage equipment and procedures. The major sections of the testing program included canister loading, lid welding, hydrostatic testing, blowdown, forced helium dehydration, helium backfill, and movement of a loaded cask to the ISFSI pad. With the exception of helium leak testing of the canister vent and drain port cover plate welds, the River Bend pre-operational testing program is complete.

The focus of prior ISFSI inspections had been hardware and procedure testing. This inspection focused on implementation of the programmatic requirements of the dry fuel storage license. Details related to the inspection are provided in Attachment 2 to this report. The following provides a summary of the findings.

- ISFSI operations had been incorporated into the River Bend Station Emergency Plan. Fuel handling accidents had been integrated into the last two annual emergency plan drills. Controls for revising the emergency plan had been established consistent with regulatory requirements (Attachment 2, Emergency Planning).

- The fire and explosion hazards analyses performed for the ISFSI pad and cask haul path were complete and comprehensive. The site fire brigade had received training on fire fighting at the ISFSI pad and on the Vertical Cask Transporter. The offsite fire departments had been briefed on the access roads, fire hydrants, and fire fighting equipment available for fighting fires at the River Bend Station ISFSI (Attachment 2, Fire Protection).

- The spent fuel assemblies identified as candidates for the first dry fuel loading campaign met technical specification requirements. Provisions had been established in procedures to visually verify the serial number of each fuel assembly loaded into the canister and to report to the NRC any fuel assembly mis-loading. The licensee had incorporated the ISFSI into their Special Nuclear Material (SNM) accountability program and had made provisions for documenting the transfer of spent fuel assemblies from the spent fuel pool to the ISFSI (Attachment 2, Fuel Selection/Verification).

- At the time of the inspection, the 10 CFR 72.212 evaluation report was in the draft stage. The report discussed all of the license conditions established in the Certificate of Compliance, however not all sections had been completed. Completion of the 10 CFR 72.212 evaluation report is being tracked as an Inspection Follow-up Item (Attachment 2, General License Condition).

- River Bend site parameters had been evaluated and determined to be enveloped by the cask design basis as described in the Holtec Final Safety Analysis Report (FSAR) and the NRC Safety Evaluation Report. The evaluations were documented in the 10 CFR 72.212 evaluation report (Attachment 2, General License Condition).

- Controls for maintaining and revising the 10 CFR 72.212 evaluation report had been established consistent with regulatory requirements (Attachment 2, General License Condition).

- Site specific analyses for a cask design basis drop, ISFSI pad flooding and site temperature extremes had been performed by the licensee. These conditions were determined to be enveloped by the Holtec cask system design. However the analysis for a storage cask sliding on the ISFSI pad during a seismic event with icing conditions had not been completed. This evaluation must be completed and the results incorporated into the 10 CFR 72.212 evaluation report. This issue is being tracked as an Inspection Follow-up Item (Attachment 2, General License Condition).

- At the time of this inspection, the River Bend crane license amendment request was still under NRC review. This request will allow the licensee to use the fuel building cask handling crane for dry fuel storage operations. Once the request is approved, the operating procedures will be revised. Completion of all actions related to the crane amendment is being tracked as an Inspection Followup Item (Attachment 2, Heavy Loads).

- Written procedures for ISFSI component maintenance, inspection, operation and testing had been developed consistent with the requirements specified in the FSAR. Technical specification requirements had been incorporated into the procedures (Attachment 2, Procedures and Tech Specs).

- The licensee had incorporated the ISFSI operations into their 10 CFR Part 50 corrective action program. Based on the condition reports reviewed during this inspection, conditions adverse to quality were being promptly identified, adequately documented, reported to the appropriate levels of management and corrected in a timely manner (Attachment 2, Quality Assurance).

- ISFSI operations had been incorporated into the River Bend Station procurement program. Controls had been established to ensure that purchased parts and materials conformed to the purchase specifications and were properly receipt inspected, cleaned, tagged and stored (Attachment 2, Quality Assurance).

- The River Bend radiation protection program, policies and procedures had been effectively applied to the ISFSI operations. Pre-job briefings were required by procedures to enable workers to minimize their radiation exposures (Attachment 2, Radiation Protection).

- Projected radiation levels at the ISFSI controlled area boundary during a design basis accident had been evaluated to verify that the radiation exposure to any real individual located on or beyond the site boundary was less than the regulatory limits (Attachment 2, Radiation Protection).

- Calculated radiation levels from a fully loaded ISFSI pad at River Bend were evaluated to verify that any real individual located on or beyond the site boundary would receive less than the regulatory limits during normal operation and anticipated occurrences (Attachment 2, Radiation Protection).

- The licensee had created a record for each cask which contained all the cask and spent fuel information required by NRC regulations. The record was assigned a retention period of "life of the plant" (Attachment 2, Records).

- The licensee had notified the NRC of plans to commence ISFSI operations in accordance with the required 90 day notification. The loading procedure included the requirement to register each loaded cask with the NRC within 30 days of placing the cask on the ISFSI pad (Attachment 2, Records).

- A 10 CFR 72.48 safety review program had been developed and implemented for the ISFSI system and operation. The criteria for determining if a change, test or experiment required a license amendment was consistent with the criteria specified in 10 CFR 72.48 (Attachment 2, Safety Reviews).

- An NRC approved training program was used for training personnel in dry fuel storage operations. It included off-normal events and accidents, operations, surveillances and radiation protection procedures, system design and licensing bases and expected radiation dose rates. At the time of this inspection, the training was still in progress. Completion of training is being tracked as an Inspection Followup Item (Attachment 2, Training).

- Amendment 2 to the Holtec Certificate of Compliance required helium leak testing of the vent and drain port cover plate welds. River Bend will demonstrate helium leak testing prior to loading fuel to comply with License Condition 10.f. Completion of the helium leak test demonstration is being tracked as an Inspection Follow-up Item (Attachment 2, Weld Testing).

- Inspection Follow-Up Item 72-49/0401-01 was opened in Inspection Report 72-049/04-01, dated October 1, 2004, and was closed during this inspection. The licensee established an adequate control in the welding procedures to require verification that applicable design and code requirements were met for components prior to use (Attachment 2, Welding).

Attachment 1

Supplemental Information

PARTIAL LIST OF PERSONS CONTACTED

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INSPECTION PROCEDURES USED

60854	Preoperational Testing of an Independent Spent Fuel Storage Installation (ISFSI)
60856	Review of 10 CFR 72.212(b) Evaluations
60857	Review of 10 CFR 72.48 Evaluations
92701	Followup

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

72-049/0504-01	IFI	Completion of the 10 CFR 72.212 Evaluation Report.
72-049/0504-02	IFI	Analysis for casks sliding on the ISFSI pad
72-049/0504-03	IFI	Implementation of heavy loads LAR 2004-26
72-049/0504-04	IFI	Completion of ISFSI training
72-049/0504-05	IFI	Helium leak testing of the vent and drain port cover plate welds.

Closed

72-049/0401-01	IFI	ASME code reconciliation requirements

Discussed

None

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
ASME	American Society of Mechanical Engineers
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
DFS	Dry Fuel Storage
EAL	Emergency Action Level
FSAR	Final Safety Analysis Report
IFI	Inspection Follow-up Item
ISFSI	Independent Spent Fuel Storage Facility
kW	Kilowatt
MPC	Multi-Purpose Canister
MWD/MTU	Megawatt Days per Metric Ton Uranium
NUPIC	Nuclear Procurement Issues Committee
NRC	U.S. Nuclear Regulatory Commission
SNM	Special Nuclear Material
SSC	System, Structure and Component
wt.% U-235	Weight Percent U-235

Attachment 2

RIVER BEND TEAM INSPECTION

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RIVER BEND TEAM INSPECTION

INSPECTOR NOTES

Category: Emergency Planning **Topic:** Emergency Plan

Reference: 10 CFR 72.32(c)

Requirement: Each ISFSI must have an Emergency Plan. For an ISFSI that is located on the site of a nuclear power plant licensed for operation, the site emergency plan required by 10 CFR 50.47 shall be deemed to satisfy this requirement.

Finding: The ISFSI was incorporated into the River Bend Emergency Plan in Section 13.3.1. Section R of Table 13.3-1 assigned an emergency classification of Alert for ISFSI accidents involving confinement boundary leakage.

Attachment 2 of Procedure EIP-2-001 contained the Emergency Action Levels (EALs) applicable to the reactor plant. Several of them were also applicable to the ISFSI. Fuel damage indication, fire within the protected area, security threat, unusual natural events, a dropped cask and cask tip-over were EALs that constituted an Unusual Event. Fuel handling accidents with the release of radioactivity to the fuel building and storage cask accidents with confinement boundary leakage were EALs that constituted an Alert.

Attachments 1 and 2 of Procedure EIP-2-002 provided the actions required for each of the emergency classifications; Unusual Event, Alert and Site Area/General Emergency.

Documents Reviewed: River Bend Station Emergency Plan, Revision 29
Procedure EIP-2-001, "Classification of Emergencies," Revision 13
Procedure EIP-2-002, "Classification Actions," Revision 25

Category: Emergency Planning **Topic:** Emergency Plan Drills

Reference: 10 CFR Part 50, Appendix E, Section F.1

Requirement: Radiation emergency response training shall be provided to employees. Periodic drills shall be conducted to ensure that employees are familiar with their specific radiation emergency response duties.

Finding: The licensee had conducted two emergency plan drills involving fuel handling accidents. The first drill was conducted on August 12, 2003 and involved a refueling hoist malfunction that resulted in substantial spent fuel assembly damage. A critique of this drill indicated that overall performance was good and all of the drill objectives were met. The crew recognized all events and abnormal indications and took timely actions in accordance with procedures. Crew performance was rated as satisfactory.

The second drill was conducted on May 12, 2004 and began when the fuel pin grapple became disengaged while holding a spent fuel pin. The fuel pin bent, the end plug fell off and fuel pellets were released to the spent fuel pool. A

critique of this drill indicated that the team satisfactorily demonstrated the capability to respond to a simulated emergency and to carry out the actions in the emergency plan. Crew performance was rated as satisfactory.

Documents Reviewed: Scenario Number RDRL-EP-0302, "Site Drill Manual," Revision 0
Memo from Barry Allen to Distribution dated September 22, 2003; Subject 8/12/03 Drill Evaluation Report, ERO Team C
Scenario Number RDRL-EP-0403, "Site Drill Scenario," Revision 0
Memo from Joe Leavines to Distribution dated December 7, 2004; Subject NRC/FEMA Dress Rehearsal Evaluation Report

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Category: Emergency Planning **Topic:** Emergency Plan Revisions

Reference: 10 CFR 72.44(f)

Requirement: The licensee may make changes to the emergency plan without prior NRC approval provided the changes do not decrease the effectiveness of the plan. Within six months of any changes made to the emergency plan, the licensee shall submit a report containing a description of the changes to the appropriate regional office and to the Spent Fuel Project Office.

Finding: The ISFSI was incorporated into Revision 29 of the River Bend Emergency Plan. The 10 CFR 72.48 screening performed prior to the revision determined that the changes did not decrease the effectiveness of the emergency plan. Procedure EIP-2-101, Step 6.1.5.12 required the licensee to submit a report of all emergency plan revisions to the NRC within 30 days of the effective date, rather than within six months as specified by 10 CFR 72.44(f).

Documents Reviewed: River Bend Station Emergency Plan, Revision 29
Procedure EIP-2-101, "Periodic Review of the Emergency Plan," Revision 20

Category: Fire Protection **Topic:** Fire and Explosion Hazards Analysis

Reference: CoC 1014, TS B.3.4.5; FSAR 1014, Sect 2.2.3.3

Requirement: The potential for fire or explosion shall be addressed, based on site specific considerations. This includes the condition that the onsite transporter fuel tank will contain no more than 50 gallons of diesel fuel while handling a loaded storage cask or transfer cask.

Finding: The fire hazards evaluation for the storage cask transport route and ISFSI pad was completed on April 19, 2005. All fire hazards were evaluated in comparison to the design basis fire and determined to be acceptable. Some fire sources were determined to be blocked from contributing radiative heat to the storage cask. Others were determined to be non-credible during the limited time of cask transport. The fire sources that were credible and not blocked were evaluated and found to be bounded by the design basis fire in terms of total energy content.

The explosive hazards evaluation for the storage cask transport route and ISFSI pad was completed on April 19, 2005 using Regulatory Guide 1.91, "Evaluations Of Explosions Postulated To Occur On Transportation Routes Near Nuclear Power Plants", Revision 1. Regulatory Guide 1.91 assumed a maximum over-

pressure of 1 psi from an explosion. Some explosion sources were determined to be non-credible due to a lack of a high flash point temperature. Others were credible, but the distance from the storage cask was great enough to limit the explosion over-pressure to less than 1 psi. Explosive sources that were credible and close enough to yield an explosion over-pressure on the storage cask greater than 1 psi were controlled as follows: During cask movement parked vehicles were prohibited within 105' of the haul path and ISFSI pad, compressed gas cylinders and liquid propane containers were prohibited within 163' of the haul path and ISFSI pad and tanker trucks were prohibited within 500' of the haul path and ISFSI pad.

Procedure DFS-0003, Step 6.24 and Procedure DFS-0015, Step 6.17.7.3 prohibited more than 50 gallons of combustible fuel within 30' of the storage cask. This limit included the Vertical Cask Transporter fuel tank. At the time of the inspection, the licensee had not developed provisions for controlling combustibles on the ISFSI pad during storage operations. The licensee issued Condition Report CR-RBS-2005-03498 concerning this issue.

Documents Reviewed: Engineering Calculation G13.18.12.2-137, "Fire Hazards Evaluation for ISFSI Cask Hauling and Storage," Revision 0
Engineering Calculation G13.18.12.2-138, "Explosives Hazard Evaluation for ISFSI Cask Hauling and Storage," Revision 0
Procedure DFS-0003, "MPC Transfer Operations and HI-STORM Transport," Revision DRAFT
Procedure DFS-0015, "Vertical Cask Transporter Operation," Revision DRAFT

Category: Fire Protection **Topic:** Fire Response

Reference: FSAR 1014, Sect 11.2.4.4

Requirement: Upon detection of a fire adjacent to a loaded transfer cask or storage cask, the ISFSI operator shall take the appropriate immediate actions necessary to extinguish the fire. Fire fighting personnel should take appropriate radiological precautions, particularly with the transfer cask as the pressure relief valves may have opened and water loss from the water jacket may have occurred resulting in an increase in radiation dose. Following the termination of the fire, a visual and radiological inspection of the equipment shall be performed.

Finding: Procedure FPP-0010 established the actions to be taken by River Bend station personnel in all fire situations, including those occurring during dry fuel storage operations. Section 5.1 of Procedure FPP-0010 specified the actions to be taken by the person discovering the fire. Use of a portable fire extinguisher was authorized ONLY IF the individual was trained in its use AND believed the fire was small enough to approach. No other fire fighting measures or equipment were authorized. Section 5.7 of Procedure FPP-0010 specified the actions to be taken by the radiation protection technician. The radiation protection technician was required to evaluate the radiological hazards associated with the fire and to advise the fire brigade leader. At the termination of the fire event, the radiation protection technician was required to conduct contamination surveys of fire fighting personnel and equipment.

Fire brigade personnel had received training on fire fighting at the ISFSI and on the Vertical Cask Transporter through training course RLEC-FT-039. The course material included training on the potential loss of water shielding through the transfer cask pressure relief valves.

Documents Reviewed: Procedure FPP-0010, "Fire Fighting Procedure," Revision 11
Training course RLEC-FT-039, "Radiological Fire Incidents," Revision 1

Category: Fire Protection **Topic:** Offsite Emergency Support

Reference: 10 CFR 72.122(g)

Requirement: Systems, structures and components (SSCs) important to safety must be designed for emergencies. The design must provide for accessibility to the equipment of onsite and available offsite emergency facilities and services such as hospitals, fire and police departments, ambulance services, and other emergency agencies.

Finding: The ISFSI facility was located in the southwest quadrant of the River Bend site. The facility was accessible from the east and west using the site access roads. Access to the ISFSI pad and storage casks was provided by a gate on the south fence. Two security officers were assigned to the fire brigade to ensure emergency vehicle access to secured areas during an emergency.

The offsite fire departments were the St. Francisville Fire Department and Fire Protection District #1 of the West Feliciana Parish. An interview with the Fire Protection Engineer indicated that both fire departments had been provided with River Bend site drawings that identified the access roads, fire hydrants, and fire fighting equipment storage locations.

Documents Reviewed: None.

Category: Fuel Selection/Verification **Topic:** Acceptable Contents for Storage; MPC-68

Reference: CoC 1014, TS B.2.1.1; Tables 2.1-1, 2.1-3, 2.1-8

Requirement: The MPC-68 may be loaded with uranium oxide or mixed oxide fuel, intact or damaged fuel assemblies, and non-fuel hardware. Fuel debris is not authorized. The fuel assemblies must meet the criteria for maximum planar-average initial enrichment, initial maximum rod enrichment, cooling time, average burnup, and decay heat. The non-fuel hardware must meet the criteria for cooling time and average burnup.

Finding: The first River Bend loading campaign will consist of three casks, each containing 68 intact Boiling Water Reactor (BWR) fuel assemblies of the 8X8C and 8X8D array and class. Non-fuel hardware, fuel debris, damaged fuel assemblies, fuel assemblies with stainless steel clad or channels, and fuel assemblies with high burnup were not loaded in the first campaign. At the time of the inspection, the licensee had identified 349 spent fuel assemblies as candidates for the first loading. Of these, the 204 fuel assemblies needed for the first three casks had not been selected. The individual characteristics of each fuel assembly were contained in the licensee's "CASK LOADER" database.

For each 8X8C and 8X8D fuel assembly, Technical Specification Table 2.1-3 limited the maximum planar-average initial enrichment to 4.2 wt.% U-235 and limited the initial maximum rod enrichment to 5.0 wt.% U-235. A review of the CASK LOADER database indicated the spent fuel assemblies identified as candidates for the first loading campaign had maximum planar-average initial enrichments of less than 4.2 wt.% U-235, and initial maximum rod enrichments of less than 5.0 wt.% U-235.

Technical specification B.2.4.1 limited decay heat to 0.414 kW per assembly when using a uniform loading pattern. A review of the CASK LOADER database indicated the spent fuel assemblies identified as candidates for the first loading campaign had decay heat values of 0.136 to 0.348 kW.

Maximum allowable fuel assembly average burnup varied with cooling time, decay heat, and minimum fuel assembly average enrichment. Technical specification 2.4.3.2 provided an equation for integrating these variables to reach a value for maximum allowable fuel assembly average burnup. This equation was incorporated into the licensee's CASK LOADER computer program. The licensee used the CASK LOADER computer program to determine the maximum allowable fuel assembly average burnup for River Bend fuel assemblies with cooling times of 5.7 to 9.8 years and fuel assembly average enrichments of 3.22 to 3.55 wt.% U-235. The results of the calculations were presented in Table 6-3 of Calculation NEAD-SR-2004/012. Two of the licensee's calculations were randomly selected for independent review. The results of the independent calculations performed by the NRC inspector were consistent with the licensee's.

Table 4.4.21 of the Holtec FSAR limited the MPC-68 total heat load to 28.19 kW. Procedure REP-0061, Step 7.3.4.3 required verification that the total decay heat load was less than 28.19 kW. Even if all 68 spent fuel assemblies had a maximum decay heat of 0.414 kW, the total heat load in the canister would be 28.15 kW. This would be below the 28.19 kW limit provided in the FSAR.

Documents Reviewed: Procedure REP-0061, "Fuel Selection for Dry Storage," Revision 0
Calculation NEAD-SR-2004/012, "RBS Cycles 1-5 CASK LOADER Database," Revision 1

Category: Fuel Selection/Verification **Topic:** Damaged Fuel Classification

Reference: CoC 1014, Tech Spec B.1; ISG-1, Rev. 2

Requirement: The fuel assemblies must be classified as intact or damaged in order to determine if they are acceptable candidates for storage in a specific storage canister model. The criteria for classifying fuel assemblies as damaged is provided in Technical Specification B.1, "Definitions", and in Interim Staff Guidance, ISG -1, "Damaged Fuel", Revision 2.

Finding: The first River Bend loading campaign consisted of three casks, each containing 68 intact BWR fuel assemblies of the 8X8C and 8X8D array and class. Damaged fuel assemblies will not be loaded in the first campaign.

Procedure REP-0061, Step 3.5 contained the technical specification definition for

a damaged fuel assembly. Steps 6.3.1.2 and 6.3.1.3, and Attachment 1 of the procedure referred to the guidance contained in Interim Staff Guidance, ISG -1 for classifying the spent fuel assemblies. The licensee had classified the fuel assembly candidates for the first loading campaign as intact based on a combination of historical reactor and fuel records, chemistry data, and fuel assembly visual inspection results.

Documents Reviewed: Procedure REP-0061, "Fuel Selection for Dry Storage," Revision 0
Interim Staff Guidance, ISG -1, "Damaged Fuel," Revision 2

Category: Fuel Selection/Verification **Topic:** Fuel Loading Configuration

Reference: CoC 1014, Tech Spec B.2.4.2; Table 2.4-1

Requirement: When uniform loading is used for a canister loaded with intact fuel assemblies only, the maximum allowable decay heat per canister cell is 0.414 kW. When both intact fuel assemblies and damaged fuel containers are loaded into the same canister, the maximum allowable decay heat per canister cell is 0.393 kW.

Finding: The first River Bend loading campaign will consist of three casks, each containing 68 intact BWR fuel assemblies, loaded uniformly. Damaged fuel assemblies will not be loaded in the first campaign. Procedure REP-0061, Step 7.3.2.8 required confirmation that each assembly had a decay heat load of 0.414 kW or less. A review of the licensee's CASK LOADER database indicated the spent fuel assemblies identified as candidates for the first loading campaign had decay heat values of 0.136 to 0.348 kW.

Documents Reviewed: Procedure REP-0061, "Fuel Selection for Dry Storage," Revision 0
Calculation NEAD-SR-2004/012, "RBS Cycles 1-5 CASK LOADER Database," Revision 1

Category: Fuel Selection/Verification **Topic:** Fuel Loading Verification

Reference: FSAR 1014, Section 8.1.4; Table 8.0.1

Requirement: Perform a post-loading visual verification of the assembly identification markings to confirm the fuel assemblies loaded match the approved fuel loading procedure.

Finding: Procedure DFS-0002, Step 8.4.10 required the fuel handler to perform a visual verification of each fuel assembly serial number immediately after loading the assembly into the canister. This verification ensured the fuel assembly loaded was approved for loading and the cell location matched the loading pattern.

Documents Reviewed: Procedure DFS-0002, "Dry Fuel Cask Loading," Revision DRAFT

Category: Fuel Selection/Verification **Topic:** Fuel Mis-loading Criteria

Reference: CoC 1014, Tech Spec B.2.2.1, 2.2.2, and 2.2.3

Requirement: If any loading condition of Technical Specification B.2.1 is violated, the affected fuel assemblies shall be placed in a safe condition, the NRC Operations Center shall be notified within 24 hrs, and a special report describing the cause of the violation and actions taken to restore compliance and to prevent recurrence shall

be submitted to the NRC within 30 days.

Finding: Procedure DFS-0002, Step 8.4.11 required the fuel handler to notify reactor engineering if the post loading visual verification indicated that the fuel assembly serial numbers did not match the loading pattern. Reactor engineering would then evaluate the loading error and determine if the fuel specifications or loading conditions of Technical Specification 2.1 had been violated. Procedure REP-0061, Step 7.6 contained the reporting requirements for spent fuel mis-loading as required by Technical Specification 2.2. Interviews with fuel handling personnel indicated they were knowledgeable of the reporting requirements.

Documents Reviewed: Procedure REP-0061, "Fuel Selection for Dry Storage," Revision 0
Procedure DFS-0002, "Dry Fuel Cask Loading," Revision DRAFT

Category: Fuel Selection/Verification **Topic:** Special Nuclear Material Inventory & Records

Reference: 10 CFR 72.72(a)

Requirement: Each licensee shall keep records showing the receipt, inventory (including location), disposal, acquisition, and transfer of all Special Nuclear Material (SNM) with quantities specified in 10 CFR 74.13(a)(1).

Finding: Section V of the 10 CFR 72.212 Evaluation Report stated that the requirements for SNM inventory, transfer and storage were contained in Corporate Procedure EN-NF-104. The licensee had implemented Corporate Procedure EN-NF-104 through River Bend site specific Procedure REP-0010.

Procedure REP-0010, Attachment 2 identified the reactor core, spent fuel pool and ISFSI as Item Control Areas (ICAs) for storage of SNM. Step 7.3.2 required that movement of all SNM between ICAs be controlled by an SNM tracking sheet. Procedure DFS-0002, Step 8.4.12 required the dry fuel storage supervisor to complete an SNM transfer sheet immediately following the post loading visual verification. Procedure DFS-0003, Step 8.11.41 required the dry fuel storage supervisor to complete an SNM transfer sheet once the storage cask was placed on the ISFSI pad.

Interviews with the reactor engineer indicated that all fuel assembly movements were tracked in the Core Component Accountability Software database. A review of the latest annual SNM physical inventory report completed September 29, 2005 indicated the inventory of SNM was complete and well documented.

Documents Reviewed: 110 CFR 72.212 Evaluation Report, Revision DRAFT
Procedure DFS-0002, "Dry Fuel Cask Loading," Revision DRAFT
Procedure DFS-0003, "MPC Transfer Operations and HI-STORM Transport," Revision DRAFT
Procedure EN-NF-104, "Special Nuclear Materials Program"
Procedure REP-0010, "SNM Accounting," Revision DRAFT
SNM Physical Inventory Report, dated September 29, 2005
Core Component Accountability Software (CCAS) database

Category: General License Condition **Topic:** 72.212 Report - Compliance With CoC

Reference: 10 CFR 72.212(b)(2)(i)(A)

Requirement: A general licensee shall perform written evaluations, prior to use, that establish that the conditions set forth in the Certificate of Compliance (CoC) have been met.

Finding: Procedure ENS-LI-115, Step 4.4.2 stated that the 10 CFR 72.212 Evaluation Report documented whether the conditions set forth in the CoC have been met, cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, and the requirements of 10 CFR 72.104 have been met. The requirements of 10 CFR 72.104 applied to radioactive materials in effluents and direct radiation from an ISFSI.

At the time of the inspection, the 10 CFR 72.212 Evaluation Report was in the draft stage. The report discussed all of the license conditions established in the Certificate of Compliance, however not all sections had been completed. The 10 CFR 72.212 Evaluation Report must be completed prior to loading fuel. This issue is being tracked as Inspection Follow-up Item #72-049/0504-01.

Documents Reviewed: Procedure ENS-LI-115, "Independent Spent Fuel Storage Installation (ISFSI) Licensing Document Preparation and Control," Revision 1
10 CFR 72.212 Evaluation Report, Revision DRAFT
Holtec Certificate of Compliance, #1014, Amendment 2

Category: General License Condition **Topic:** 72.212 Report - Compliance With FSAR

Reference: 10 CFR 72.212(b)(3)

Requirement: The general licensee shall review the Final Safety Analysis Report (FSAR) and NRC Safety Evaluation Report, prior to use of the general license, to determine whether the reactor site parameters, including analysis of earthquake intensity and tornado missiles, are enveloped by the cask design basis. The results of this review must be documented in the 10 CFR 72.212(b) Evaluation Report

Finding: Procedure ENS-LI-115, Step 4.4.4 required a review of the FSAR and NRC Safety Evaluation Report to verify that River Bend site parameters, including analysis of earthquake intensity and tornado missiles, were enveloped by the cask design bases. Section D.3.10 of the 10 CFR 72.212 Evaluation Report stated that the Holtec FSAR and the NRC Safety Evaluation Report for the HI-STORM 100 System had been reviewed and a determination made that the reactor site parameters at the River Bend Station were bounded by the assumptions made in the cask FSAR and NRC Safety Evaluation Report.

The reactor site parameters evaluated included climate, soil conditions, earthquake intensity, tornado missiles, and fire and explosion. The ISFSI site was not subject to environmental conditions that would degrade the casks. The climate was mild and the air had negligible salt content. The soil below the ISFSI pad consisted of 30 feet of compacted sand, 2 feet of silty clay, 8 feet of fat clay and 5 feet of soft weathered shale on a base of hard shale. The liquefaction potential of the soil was negligible and the required modulus of elasticity for the ISFSI pad was met. The design basis earthquake produced

maximum horizontal and vertical accelerations of 0.1g. This was well within the 0.28g to 0.32g range of earthquake intensity used in the HI-STORM cask system analysis. The tornado analyzed for the HI-STORM 100 system was the same as the tornado analyzed for the River Bend Station. Both analyses used the same tornado model of 360 mph maximum winds with 290 mph rotational and 70 mph translational speed, and a pressure drop of 3 psi. The River Bend site tornado conditions were therefore bounded by the HI-STORM cask design.

Documents Reviewed: Procedure ENS-LI-115, "Independent Spent Fuel Storage Installation (ISFSI) Licensing Document Preparation and Control," Revision 1
10 CFR 72.212 Evaluation Report, Revision DRAFT
Holtec Final Safety Analysis Report (FSAR) #1014, Amendment 2
NRC Safety Evaluation Report - Holtec International HI-STORM 100 Cask System, Certificate of Compliance No. 1014, Amendment 2

Category: General License Condition **Topic:** 72.212 Report - Compliance With Part 50

Reference: 10 CFR 72.212(b)(4)

Requirement: Prior to use of the general license, determine whether activities related to storage of spent fuel involve a change in the facility technical specifications or require a license amendment for the facility pursuant to 10 CFR Part 50.59(c)(2). Results of this determination must be documented in the 10 CFR 72.212(b) Evaluation Report.

Finding: Procedure ENS-LI-115, Step 4.4.5 required determining whether activities related to the storage of spent fuel under a general license involved a change in the facility technical specifications or required a license amendment for the facility. The evaluation was required to be made using the criteria established in 10 CFR 50.59(c)(2).

The licensee used the 10 CFR 50.59 review program to evaluate the use of the fuel building cask handling crane for dry fuel storage operations. The evaluation indicated that an amendment to the facility license was needed. Section D.1.5 of the 10 CFR 72.212 Evaluation Report contained a summary of License Amendment Request 2004-26, submitted to the NRC on March 8, 2005.

Documents Reviewed: 10 CFR 72.212 Evaluation Report, Revision DRAFT
Procedure ENS-LI-115, "Independent Spent Fuel Storage Installation (ISFSI) Licensing Document Preparation and Control," Revision 1

Category: General License Condition **Topic:** 72.212 Report - Record Retention

Reference: 10 CFR 72.212(b)(2)(i)

Requirement: A copy of the 10 CFR 72.212 analysis shall be retained until spent fuel is no longer stored under the general license issued under 10 CFR 72.210.

Finding: Procedure ENS-LI-115 provided the administrative controls for maintaining the ISFSI and cask licensing basis documents. Step 1.1.5 of the procedure identified the 10 CFR 72.212 Evaluation Report as a licensing basis document.

Procedure ENS-LI-112, Step 5.2.9 required that all changes to the cask licensing

basis documents be evaluated under the 10 CFR 72.48 review program. Step 7.3 (a) of Procedure ENS-LI-112 required that records of changes to the 10 CFR 72.212 Evaluation Report be maintained until spent fuel was no longer stored at the ISFSI, the cask design was no longer used, or the NRC terminated the license or Certificate of Compliance.

Documents Reviewed: Procedure ENS-LI-115, "Independent Spent Fuel Storage Installation (ISFSI) Licensing Document Preparation and Control," Revision 1
Procedure ENS-LI-112, "10 CFR 72.48 Review Program," Revision 2

Category: General License Condition **Topic:** 72.212 Report - Revisions

Reference: 10 CFR 72.212(b)(2)(ii)

Requirement: The general licensee shall evaluate any changes to the 10 CFR 72.212 report in accordance with the requirements of 10 CFR 72.48(c). A copy of this record shall be retained until spent fuel is no longer stored under the general license.

Finding: Procedure ENS-LI-115, Step 4.4.3 and the NOTE preceding step 5.3.1.2.6 required that any changes to the 10 CFR 72.212 Evaluation Report be evaluated using the criteria of 72.48(c). Step 4.4.1 specified that 72.48 reviews were to be performed in accordance with Procedure ENS-LI-112.

Procedure ENS-LI-112, Step 5.2.9 required all changes to the ISFSI and cask licensing basis documents, ie. HI-STORM Certificate of Compliance, NRC Safety Evaluation Report, Cask Safety Analysis Report, and the 10 CFR 72.212 Evaluation Report to be evaluated under the 10 CFR 72.48 review program. Procedure ENS-LI-112, Step 7.3 (a) required that records of changes to the 10 CFR 72.212 Evaluation Report be maintained until spent fuel was no longer stored at the ISFSI, the cask design was no longer used, or the NRC terminated the license or Certificate of Compliance.

Documents Reviewed: Procedure ENS-LI-115, "Independent Spent Fuel Storage Installation (ISFSI) Licensing Document Preparation and Control," Revision 1
Procedure ENS-LI-112, "10 CFR 72.48 Review Program," Revision 2

Category: General License Condition **Topic:** Analysis - Cask Design Basis Drop

Reference: CoC 1014, Tech Spec B.3.4.6.a

Requirement: For free standing casks, the ISFSI pad shall be verified by analysis to limit cask deceleration during design basis drop and non-mechanistic tip-over events to less than or equal to 45 g's at the top of the canister fuel basket.

Finding: Section D.4.3.2.6 of the 10 CFR 72.212 Evaluation Report stated that the ISFSI pad was designed and constructed using the Set A Parameters in Table 2.2.9 of the Holtec FSAR. The pad design parameters included concrete strength, subgrade soil modulus of elasticity, yield strength of the reinforcing steel, coefficient of friction between the pad and cask base, and pad thickness. These design parameters ensured that cask deceleration values at the top of the fuel basket would be 45 g's or less during a design basis drop and non-mechanistic tip-over.

Documents Reviewed: Holtec Final Safety Analysis Report (FSAR) #1014, Amendment 2
10 CFR 72.212 Evaluation Report, Revision DRAFT

Category: General License Condition **Topic:** Analysis - Flooding

Reference: CoC 1014, Tech Spec B.3.4.4

Requirement: The analyzed flood condition of 15 fps water velocity and a height of 125 feet of water (full submergence of the loaded cask) are not exceeded.

Finding: Section 2.4.4 of the River Bend Station USAR contained the flood analysis for dam failures in the Mississippi River Basin. The dams nearest the site were approximately 100 river miles northwest of the site. The Mississippi River flood plain at the site was approximately 30 miles wide. Considering the distance of the dams from the site and the wide flood plain available for overbank flows, a dam failure or series of dam failures anywhere in the Mississippi River basin would not result in flood levels at the site higher than 35' below plant grade.

Section D.4.3.2.4 of the 10 CFR 72.212 Evaluation Report indicated that the probable maximum flood was approximately 40' below plant grade. The ISFSI pad was 2.5' above plant grade, or 42.5' above the probable maximum flood. Flooding of the casks during storage operations was determined to not be credible.

Documents Reviewed: 10 CFR 72.212 Evaluation Report, Revision DRAFT
River Bend Station Updated Safety Evaluation Report (USAR), 1987

Category: General License Condition **Topic:** Analysis - Limiting Site Temperatures

Reference: CoC 1014, Tech Spec B.3.4.1; 3.4.2

Requirement: The temperature of 80 degrees F is the maximum average yearly temperature. The allowed temperature extremes, averaged over a 3-day period, shall be greater than -40 degrees F and less than 125 degrees F.

Finding: Section D.4.3.2.1 of the 10 CFR 72.212 Evaluation Report stated that the yearly average daily maximum temperature at the River Bend site was 65 degrees F. This was well below the 80 degree F limit established in the technical specification. The 65 degree F value was extracted from Table 2.3-6 of the River Bend Station USAR.

Section D.4.3.2.2 of the 10 CFR 72.212 Evaluation Report referenced Table 2.3-5 of the River Bend Station USAR. Notes 2 and 3 to Table 2.3-5 stated that the maximum and minimum temperatures of 110 degrees F and 2 degrees F respectively, were recorded in the Baton Rouge area around the turn of the century. These two temperature extremes demonstrated that the 3-day averages for the site would be bounded by the technical specification limits of 125 degrees F and -40 degrees F.

Documents Reviewed: 10 CFR 72.212 Evaluation Report, Revision DRAFT
River Bend Station Updated Safety Evaluation Report (USAR), 1987

Category: General License Condition **Topic:** Analysis - Seismic Acceleration of Casks

Reference: CoC 1014, Tech Spec B.3.4.3; Condition 7

Requirement: Free-standing storage casks may be deployed at sites when it can be shown that design basis earthquake acceleration values are below the threshold needed to cause cask tip-over or excessive sliding, when the coefficient of friction between the cask and the ISFSI pad is 0.53 or greater. For sites with environmental conditions that may degrade the coefficient of friction, an analysis should be performed to demonstrate that a design basis earthquake will not result in cask tip-over or cause a cask to fall off the pad. Impacts between casks should be preluded, or shown to result in fuel deceleration values of 45 g's or less. For sites with design basis earthquake acceleration values higher than those allowed for free-standing casks, the casks shall be anchored to the ISFSI pad.

Finding: Section D.4.3.2.3 of the 10 CFR 72.212 Evaluation Report stated that the design basis earthquake acceleration values, both horizontal and vertical, at the River Bend ISFSI were 0.10g. The licensee performed the required calculations specified in Technical Specification B.3.4.3 to demonstrate that a cask would not tip over. Therefore, the use of free-standing storage casks was permitted. The coefficient of friction between the ISFSI pad and the cask base was tested on October 2, 2003 under Maintenance Action Item #358547 and confirmed to be greater than 0.53.

At the time of the inspection, the licensee had not analyzed cask sliding during a seismic event with ice under the cask base. The analysis must show that the impact of sliding between the two casks would result in fuel deceleration values of 45 g or less. This evaluation is currently in progress and must be completed in order to meet License Condition 7. Once complete, the results will be incorporated into the licensee's 10 CFR 72.212 Evaluation Report. This issue is being tracked as Inspection Follow-Up Item #72-049/0504-02.

Documents Reviewed:
10 CFR 72.212 Evaluation Report, Revision DRAFT
Calculation No. G13.18.1.2-040, "ISFSI Dry Fuel Storage Pad Design," Rev. 0
Engineering Request ER-RB-2000-0392-000, ECRN02
Maintenance Action Item #358547

Category: Heavy Loads **Topic:** Crane Operational Compliance

Reference: CoC 1014, License Condition 5

Requirement: Each lift of a canister, transfer cask, or storage cask must be made in accordance with the existing heavy loads requirements and procedures of the licensed facility at which the lift is made. A plant specific regulatory review (under 50.59 or 72.48, if applicable) is required to show operational compliance with existing plant specific heavy loads requirements.

Finding: Section D.4.1.1 of the 10 CFR 72.212 Evaluation Report specified that the license requirements for lifting heavy loads would be met and procedures would be used for each heavy lift. The licensee had performed an initial safety evaluation to determine if the fuel building cask handling crane could be used for dry fuel storage operations. The evaluation indicated that an amendment to the license would be required. License Amendment Request 2004-26

(ML050750179) was submitted to the NRC on March 8, 2005 and was still under review at the time of this inspection.

Once the license amendment request is approved, the dry fuel storage procedures will be revised as needed to comply with the amendment. Each procedure will then receive a 50.59/72.48 evaluation, which will be reviewed by the NRC to meet the requirements of License Condition 5. Once the procedures are approved, the heavy loads section of the 10 CFR 72.212 Evaluation Report will be completed and approved. This issue is being tracked as Inspection Followup Item #72-049/0504-03.

Documents Reviewed: 10 CFR 72.212 Evaluation Report, Revision DRAFT

Category: Heavy Loads **Topic:** Crane Operational Temperature Limit

Reference: CoC 1014, Tech Spec B.3.4.8

Requirement: Loading operations, transport operations, and unloading operations shall only be conducted when area ambient temperature is zero degrees F or higher.

Finding: Procedure DFS-0002, Step 6.32.7 and Procedure DFS-0003, Step 6.9.5 contained precautions stating that loading operations, transport operations, and unloading operations shall only be conducted when working area ambient temperatures are greater than or equal to zero degrees F. Both lift yokes had been stenciled with the same minimum temperature limitation of zero degrees F.

Documents Reviewed: Procedure DFS-0002, "Dry Fuel Cask Loading," Revision DRAFT
Procedure DFS-0003, "MPC Transfer Operations and HI-STORM Transport," Revision DRAFT

Category: Procedures & Tech Specs **Topic:** Annual Maintenance - Storage Cask

Reference: FSAR 1014, Table 9.2.1

Requirement: The storage cask externals must be inspected annually. The identification markings must be verified intact and legible. The temperature monitoring system (if installed) must be calibrated annually, or in accordance with the licensee's Quality Assurance program.

Finding: Step 4 of the maintenance instruction reviewed required an annual inspection of the storage cask externals. The maintenance instruction included re-application of corrosion inhibiting material, as required, and a visual inspection of the cask identification markings. The licensee had not purchased the optional temperature monitoring system for the storage casks.

Documents Reviewed: Work Request 52172
RBS Unit 1 Maintenance Instruction "DFS-HS01, HS02, HS03, HI-STORM CASKS"

Category: Procedures & Tech Specs **Topic:** Annual Maintenance - Transfer Cask

Reference: FSAR 1014, Table 9.2.1

Requirement: The transfer cask internals and externals must be visually inspected annually for compliance to design drawings. The identification markings must be verified intact and legible. The transfer cask lifting trunnions must undergo annual load testing or dimensional testing and the water jacket pressure relief valves must be calibrated annually.

Finding: Step 2.1.b.4 of the maintenance instruction reviewed required inspection of the transfer cask internals and externals to verify compliance to design drawings. Step 2.1.b.5 required an inspection of the transfer cask to verify identification markings intact and legible. Step 2.1 required annual load testing or dimensional testing of the transfer cask lifting trunnions. Step 2.1.b.3 of the maintenance instruction required annual calibration of the transfer cask water jacket pressure relief valves.

Documents Reviewed: Work Request 52431
RBS Unit 1 Maintenance Instruction "DFS-DT1, HI-TRAC TRANSFER CASK; DFS-HTL2, HI-TRAC POOL LID; DFS-HTL1, HI-TRAC TOP LID"

Category: Procedures & Tech Specs **Topic:** Inspections Prior to Each Use

Reference: FSAR 1014, Table 9.2.1

Requirement: The storage cask internals, storage cask lid bolts, transfer cask internals, transfer cask lifting trunnions and transfer cask water jacket level must be visually inspected prior to each use.

Finding: Procedure DFS-0020, Step 8.3.5.1 required a visual inspection of the storage cask interior prior to use. The inspection points were dents, gouges, corrosion, chipped, cracked, or blistered paint, and damage to the top flange seating surface. Step 8.3.5.2 required a visual inspection of the storage cask lid studs, nuts and washers prior to use. The inspection points were dents, gouges or other damage.

Procedure DFS-0030, Step 8.7.4.4 required a visual inspection of the transfer cask interior prior to use. The inspection points were dents, gouges and other deformation. Step 8.7.4.4.4 required a visual inspection of the transfer cask lifting trunnions prior to use. The inspection points were deformation, cracks, end-plate damage, corrosion, galling, damage to plate retention bolts and missing or loose parts.

Procedure DFS-0002, Step 8.2.1.2 required the transfer cask water jacket to be full prior to placing the transfer cask into the cask pool. Step 8.8.1.4 required the transfer cask water jacket to be full prior to placing the transfer cask in the cask washdown area.

Documents Reviewed: Procedure DFS-0002, "Dry Fuel Cask Loading," Revision DRAFT
Procedure DFS-0020, "HI-STORM 100S Overpack Storage, Prior to Use Inspection, and Handling," Revision DRAFT
Procedure DFS-0030, "HI-TRAC Off-Loading, Storage, Prior to Use Inspection, and Handling," Revision DRAFT

Category: Procedures & Tech Specs **Topic:** Operating Procedures

Reference: CoC 1014, Condition 2

Requirement: Written operating procedures shall be prepared for cask handling, loading, movement, surveillance and maintenance. The user's site-specific written operating procedures shall be consistent with the technical basis described in Chapter 8 of the FSAR.

Finding: The licensee had developed approximately 16 site specific procedures for dry fuel storage operations. These procedures were field tested during the pre-operational testing program and revised as necessary. Approximately half of the procedures were selected for review during this inspection and were found to be consistent with the technical basis described in Chapter 8 of the Holtec FSAR.

Documents Reviewed:
Procedure DFS-0002, "Dry Fuel Cask Loading," Revision DRAFT
Procedure DFS-0003, "Dry Cask Cask Transport and Storage," Revision DRAFT
Procedure DFS-0005, "Dry Fuel Storage Rigging Plan," Revision DRAFT
Procedure DFS-0006, "Radiological Monitoring Requirements for the HI-STORM 100 Dry Fuel Storage System," Revision DRAFT
Procedure DFS-0015, "Vertical Cask Transporter Operation," Revision DRAFT
Procedure DFS-0020, "HI-STORM 100S Overpack Storage, Prior to Use Inspection, and Handling," Revision DRAFT
Procedure DFS-0030, "HI-TRAC Off-Loading, Storage, Prior to Use Inspection, and Handling," Revision DRAFT
Procedure DFS-0140, "Forced Helium Dehydration System Operation," Revision DRAFT

Category: Procedures & Tech Specs **Topic:** Testing - Heat Transfer Validation

Reference: CoC 1014, Condition 9

Requirement: The heat transfer characteristics of the cask system will be recorded by temperature measurements for the first cask system of each design (MPC-24/24E/24EF, MPC-32/32F, and MPC-68/68F/68FF) placed in service by any user, with a heat load equal to or greater than 10 kW. An analysis shall be performed that demonstrates the temperature measurements validate the analytic methods and predicted thermal behavior described in Chapter 4 of the FSAR. Validation tests shall be performed for each subsequent cask system that has a heat load exceeding the previous cask by 2 kW up to 16 kW. A letter summarizing each validation test shall be submitted to the NRC in accordance with 10 CFR 72.4.

Finding: River Bend referenced the thermal validation test performed at the Columbia Generating Station on March 16, 2004 on HI-STORM 100 System Cask Serial #120. Cask Serial #120 contained an MPC-68 with a decay heat load of 17.1 kW and the thermal behavior was as predicted. Columbia Generating Station submitted the test results to the NRC on July 28, 2004.

Documents Reviewed:
Holtec letter #9042868 to Energy Northwest, dated July 12, 2004.
Energy Northwest letter #GO2-04-134 to the NRC, dated July 28, 2004 (ML0421903320).

Category: Procedures & Tech Specs **Topic:** Testing - Storage Cask Air Ducts Clear

Reference: CoC 1014, Tech Spec A.3.1.2.1

Requirement: Every 24 hours, verify all storage cask inlet and outlet air ducts are free from blockage, OR for storage casks with installed temperature monitoring equipment, verify that the difference between the average air outlet temperature and the ISFSI ambient temperature is 126 degrees F or less.

Finding: The licensee did not purchase the optional temperature monitoring system for their storage casks. Instead, the storage cask inlet and outlet air ducts were verified free from blockage every 24 hours through the use of three procedures.

Procedure STP-000-0001, Step 118 required verification by visual inspection that all storage cask inlet and outlet air vents were free of blockage every 24 hours during plant operation. Procedure STP-000-0004, Step 44 required verification by visual inspection that all storage cask inlet and outlet air vents were free of blockage every 24 hours during cold shutdown conditions. Procedure STP-000-0005, Step 48 required verification by visual inspection that all storage cask inlet and outlet air vents were free of blockage every 24 hours during refueling operations.

Documents Reviewed: Procedure STP-000-0001, "Daily Operating Logs," Revision 48
Procedure STP-000-0004, "Daily Cold Shutdown Logs," Revision 29
Procedure STP-000-0005, "Daily Refueling Logs," Revision 31

Category: Procedures & Tech Specs **Topic:** Testing - Test Controls

Reference: 10 CFR 72.162

Requirement: The licensee shall establish a test program to ensure that all testing, required to demonstrate that the structures, systems, and components will perform satisfactorily in service, is identified and performed in accordance with written test procedures. The test procedure must include provisions to ensure that all prerequisites for the given tests are met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions. The licensee shall document and evaluate the test results to ensure that test requirements have been satisfied.

Finding: Section 8 of the Quality Assurance Program Manual contained a test control program for demonstrating that equipment and systems will perform satisfactorily in service. Pre-operational tests, post-maintenance tests, post-modification tests and operational tests were governed by the program. The test control program required written testing procedures that included instructions and prerequisites, use of proper test equipment and acceptance criteria. The test control program required evaluation of test results to assure that the test objectives had been satisfied. The dry fuel storage procedures had been developed under this test control program.

Documents Reviewed: Entergy Quality Assurance Program Manual, Revision 12
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Category: Quality Assurance **Topic:** Corrective Actions

Reference: 10 CFR 72.172

Requirement: The licensee shall establish measures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures must ensure that the cause of the condition is determined and corrective action taken to preclude repetition. This must be documented and reported to appropriate levels of management.

Finding: The licensee had incorporated dry fuel storage operations into their Part 50 corrective action program. Procedure EN-LI-102 provided detailed instructions for condition report initiation, operability determination, reporting requirements identification, significance determination, corrective action development, and closure. Procedure EN-LI-102, Step 3.9 defined conditions adverse to quality as failures, malfunctions, deficiencies, deviations, defects and non-conformances. This definition was consistent with 10 CFR 50 Appendix B, Criterion XVI. Procedure EN-LI-102, Step 3.48 defined significant conditions adverse to quality as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances which have resulted in, or could result in, a significant degradation or challenge to nuclear safety. Step 5.7.2 of the procedure required that all significant conditions adverse to quality be subjected to a root cause evaluation. The root cause and the proposed corrective actions were required to be approved by the corrective action review board. The corrective actions were required to correct the condition and preclude repetition.

Twenty two dry fuel storage condition reports had been initiated during 2005. Eighteen had been closed with an average closure time of 27 days. Four condition reports remained open and work was in progress to close them prior to fuel loading. The open condition reports involved: a) indeterminate relief valve settings on the forced helium dehydrator; b) documentation deficiencies on dry fuel storage components; c) incorrect redundant link sling length; and d) dry fuel storage procedure deficiencies. The condition reports reviewed indicated that conditions adverse to quality were being promptly identified, adequately documented, reported to the appropriate levels of management, and corrected in a timely manner.

Documents Reviewed: Procedure EN-LI-102, "Corrective Action Process," Revision 2
Dry Fuel Storage Condition Reports initiated between January 1 and October 3, 2005

Category: Quality Assurance **Topic:** Procurement Controls

Reference: 10 CFR 72.154(a)(b)(c)

Requirement: The licensee shall establish measures to ensure that purchased material, equipment, and services conform to procurement documents. These measures must include provisions for source evaluation and selection, objective evidence of quality furnished by the contractor/subcontractor, inspection at the contractor/subcontractor source, and examination of product on delivery.

Records shall be available for the life of the ISFSI. The effectiveness of the control of quality by contractors/subcontractors shall be assessed at intervals consistent with the importance, complexity and quantity of the product or service.

Finding: The licensee was using the Holtec HI-STORM 100 dry fuel storage system. All components and materials were supplied by Holtec International. The licensee's 10 CFR Part 50 Quality Assurance program requirements had been applied to all components received from Holtec.

Procedure ENS-DC-160, Step 5.4 created a cask document record for each cask, and Step 5.2.6 required the record to be retained for the life of the ISFSI. Each record contained the Holtec component completion record for each cask. The casks were fabricated for Holtec by U.S. Tool and Die, Inc. Cask fabrication travelers and other documents generated by U.S. Tool and Die, Inc. were submitted to Holtec as objective evidence of quality. Holtec reviewed the documentation and performed a receipt inspection of the components prior to shipment to the licensee. Holtec's review and acceptance of the documentation and components was contained in the component completion record supplied to the licensee with each cask.

The licensee had conducted two Nuclear Procurement Issues Committee (NUPIC) audits during 2004. The first audit evaluated the Holtec International Quality Assurance program for the design and licensing of wet and dry spent fuel storage systems. The technical areas audited included management controls, licensing changes, thermal/hydraulic analysis and calculations, structural evaluations, procurement controls for boral and metamic, and commercial grade dedication. The second audit evaluated the U.S. Tool and Die, Inc. Quality Assurance program for the manufacture and testing of spent fuel dry cask storage systems. The audit reviewed the processes, controls and procedures for fabrication and assembly, test and inspection, calibration, document control, corrective actions, and management controls.

The NUPIC audits concluded that both Holtec International and U.S. Tool and Die had established and implemented QA programs meeting the requirements of 10 CFR 50 Appendix B, 10 CFR 72, Subpart G, and 10 CFR 71 Subpart H. The audit checklists used were comprehensive and the documentation was adequately detailed.

Documents Reviewed: Procedure MP-120, "Material Receipt and Shipping," Revision 2
Procedure ENS-DC-160, "Dry Fuel Storage Document Control," Revision 1
NUPIC Audit of Holtec International, Report No. SA04-005, dated June 18, 2004
NUPIC Audit of U.S. Tool and Die, Inc., Report No. SA04-007, dated September 7, 2004

Category: Quality Assurance **Topic:** Receipt - Identification of Material & Parts

Reference: 10 CFR 72.156

Requirement: The licensee shall establish measures for the identification and control of materials, parts and components. These measures must ensure that identification of the item is maintained by heat number, part number, serial

number, or other appropriate means, either on the item or on records traceable to the item throughout fabrication, installation and use of the item. These identification and control measures must be designed to prevent the use of the incorrect or defective materials, parts and components.

Finding: Procedure MP-120, Section 5.3 and Attachment 9.5 required verification of the part identification number and the purchase order number during receipt inspection. The receipt inspection documentation for the cask washdown pit impact limiter was selected for review. The inspection record indicated that both the part identification number and the purchase order number had been verified.

Procedure ENS-DC-160, Step 5.4 created a cask document record for each cask. This record contained the storage cask serial number, canister serial number, component completion records, cask fabrication travelers, and receipt inspection documentation.

Documents Reviewed: Procedure MP-120, "Material Receipt and Shipping," Revision 2
Receipt Inspection Report No. R-0001-05
Purchase Order No. 10100866
Procedure ENS-DC-160, "Dry Fuel Storage Document Control," Revision 1

Category: Quality Assurance **Topic:** Receipt - Inspection Checklists

Reference: FSAR 1014, Tables 8.1.8, 8.1.9, 8.1.10

Requirement: Recommended receipt inspection checklists are provided for the storage cask, transfer cask, and canister. Users shall develop site-specific receipt inspection checklists based on the recommendations.

Finding: Procedure DFS-0020, Section 8.4 provided the inspection criteria for the storage cask main body, internal cavity, lid, lift studs and nuts, and vent screens. Procedure DFS-0030, Section 8.7 provided the inspection criteria for the transfer cask main body, internal cavity, pool lid, and top lid. Procedure DFS-0060, Section 8.4 provided the inspection criteria for the canister, canister internals, canister lid, drain tube, port cover plates, and closure ring. The inspection criteria contained in these three procedures was consistent with Tables 8.1.8, 8.1.9 and 8.1.10 of the Holtec FSAR.

At the time of the inspection, receipt inspections for the Holtec supplied storage system components used during the pre-operational testing were incomplete and had identified documentation problems. Condition Report CR-RBS-2005-02757 had been issued to correct this condition.

Documents Reviewed: DFS-0020, "HI-STORM 100S Overpack Storage, Prior to Use Inspection, and Handling," Revision DRAFT
DFS-0030, "HI-TRAC Off Loading, Storage, Prior to Use Inspection, and Handling," Revision DRAFT
DFS-0060, "MPC Handling, Prior to Use Inspection, and Preparation for Loading," Revision DRAFT

Category: Quality Assurance **Topic:** Receipt - Nonconforming Material and Parts

Reference: 10 CFR 72.170

Requirement: The licensee shall establish measures to control materials, parts or components that do not conform to their requirements in order to prevent their inadvertent use or installation. These measures must include procedures for identification, documentation, segregation, disposition and notification to affected organizations. Nonconforming items must be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures.

Finding: Procedure ENS-MP-120, Step 5.3.8 required that discrepancies found during the receiving process be documented in the licensee's PASSPORT system to provide notification to the affected organizations. Step 5.3.8 also required deficient materials to be segregated, tagged and placed on hold.

Procedure ENS-MP-120, Step 5.7 required a condition report to be issued if the deficiency met the non-conformance criteria provided in Procedure EN-LI-102. Procedure EN-LI-102 defined a non-conformance as a deficiency in characteristic, documentation, or procedure that renders the quality of an item unacceptable or indeterminate. The corrective action process was then used to disposition the deficient material as accept, reject, repair or rework.

Condition Report CR-RBS-2005-01549 was originated on April 22, 2005 to document that the Holtec supplied dry fuel storage equipment needed for pre-operational testing had not been receipt inspected. The receipt inspection was subsequently completed and several deficiencies in documentation were identified. Condition Report CR-RBS-2005-02757 was generated to allow conditional release of these components for the pre-operational testing program. A review of these two condition reports indicated that the receipt inspection and corrective action process were adequate to prevent inadvertent use or installation.

Documents Reviewed: Procedure ENS-MP-120, "Material Receipt and Shipping," Revision 2
Procedure EN-LI-102, "Corrective Action Process," Revision 2
Condition Report CR-RBS-2005-01549
Condition Report CR-RBS-2005-02757

Category: Quality Assurance **Topic:** Status of Received Material & Parts

Reference: 10 CFR 72.168(a)

Requirement: The licensee shall establish measures to indicate, by the use of markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items. These measures must provide for the identification of items which have satisfactorily passed required inspections or tests where necessary to preclude inadvertent bypassing of the inspection or test.

Finding: Procedure ENS-MP-120, Step 5.7.1 required that items successfully completing the receipt inspection be identified as acceptable for use. The identification may be made with a material label, acceptance tag, metal marking or other means, applied in a manner non deleterious to the item.

Documents Reviewed: Procedure ENS-MP-120, "Material Receipt and Shipping," Revision 2

Category: Quality Assurance **Topic:** Storage and Handling of ISFSI Components

Reference: 10 CFR 72.166

Requirement: The licensee shall establish measures to control, in accordance with work and inspection instructions, the handling, storage, shipping, cleaning and preservation of material and equipment to prevent damage or deterioration. When necessary for particular products, special protective environments, such as inert gas atmosphere and specific moisture content and temperature levels must be specified and provided.

Finding: Procedure ENS-MP-125 defined the licensee's storage areas and controls consistent with American National Standards Institute (ANSI) Standard N45.2.2. A Level D storage area was defined as an outdoor area, fenced or posted to limit access, and well drained. Procedure DFS-0020 stated that the storage cask was designed for outdoor storage with the lid installed, lid studs and nuts hand tight, stud caps installed (B-218 cask only), and the inlet and outlet gamma shields and screens installed. Procedure DFS-0030, Step 3.10 permitted the transfer cask to be stored outdoors in a Level D storage area, if wrapped and covered to protect it from weather. Procedure DFS-0050, Step 3.13 permitted the spent fuel canister to be stored outdoors if wrapped and covered.

A Level C storage area was defined as a fire resistant, weather tight, and well ventilated building (or equivalent enclosure) with a paved flooring and not subject to flooding. Procedure DFS-0050, Step 3.12 permitted the spent fuel canister to be stored indoors in a Level C storage area prior to fuel loading. Procedure DFS-0030, Step 8.3.8 permitted the transfer cask to be stored in the fuel building cask washdown area with the pool lid installed at the bottom and a Foreign Material Exclusion (FME) cover installed at the top. There were no dry fuel storage components that required Level B or Level A storage.

A tour of the storage area for the two HI-STORM 100 storage casks confirmed that the area was properly designated as a Level D storage area. A tour of the transfer cask mock-up area in the pipe shop confirmed that the forced helium dehydrator, transfer cask mockup and related equipment were being properly maintained in a Level C storage area. The canister lid, drain pipe, cover plates, and closure rings were covered for protection against the environment. Interviews with licensee personnel indicated that all remaining components were stored inside the fuel building, which is properly designated and recognized as a Level C storage area.

Procedure DFS-0030, Step 8.6.6 required flushing the transfer cask cavity surfaces, main body, top lid and pool lid thoroughly with demineralized water removing all dust, debris, and road film to meet cleanliness Class B criteria for stainless steel. Procedure DFS-0060, Step 8.4.6 required flushing and cleaning of the canister, canister lid, closure ring, drain tube, and other parts thoroughly with demineralized water removing all dust, debris, and road film to meet cleanliness Class B criteria for stainless steel.

Documents Reviewed:
Procedure ENS-MP-120, "Material Receipt and Shipping," Revision 2
Procedure ENS-MP-125, "Control of Material," Revision 1
Procedure DFS-0005, "DFS Rigging Plan," Revision DRAFT
Procedure DFS-0020, "HI-STORM 100S Overpack Storage, Prior to Use Inspection, and Handling," Revision DRAFT
Procedure DFS-0030, "HI-TRAC Off Loading, Storage, Prior to Use Inspection, and Handling," Revision DRAFT
Procedure DFS-0050, "MPC Off-Loading, Storage, and Handling," Revision DRAFT
Procedure DFS-0060, "MPC Handling, Prior to Use Inspection and Preparation for Loading," Revision DRAFT

Category: Radiation Protection **Topic:** ALARA Program

Reference: FSAR 1014, Section 10.1.1

Requirement: Licensees using the HI-STORM 100 System will apply their existing site ALARA policies, procedures and practices to ISFSI activities, to ensure that the personnel exposure requirements of 10 CFR 20 are met.

Finding: Procedure EN-S-RP-110 defined the Entergy ALARA program to be used at all Entergy sites. The ALARA program applied to all activities involving radiological hazards, including ISFSI activities. The ALARA program was implemented through the radiation protection, EN-S-RP, series of procedures. Procedure EN-S-RP-105 provided guidance on the use of radiation work permits. Procedure EN-S-RP-201 identified the personnel required to be monitored for radiation exposure and provided the regulatory and administrative exposure limits that applied to them. Procedure EN-S-RP-202 described the processes and guidelines for monitoring internal and external radiation exposure. Procedure EN-S-RP-204 provided guidelines for special monitoring methods, including the use of multiple whole body dosimeters, neutron dosimetry, external dosimetry and effective dose equivalent dosimetry.

Documents Reviewed:
Procedure EN-S-RP-110, "ALARA Program," Revision 2
Procedure EN-S-RP-105, "Radiation Work Permits," Revision 7
Procedure EN-S-RP-201, "Dosimetry Administration," Revision 3
Procedure EN-S-RP-202, "Personnel Monitoring," Revision 2
Procedure EN-S-RP-204, "Special Monitoring Requirements," Revision 3

Category: Radiation Protection **Topic:** Briefings

Reference: FSAR 1014, Section 10.1.1

Requirement: Pre-job ALARA briefings should be held with workers and radiological protection personnel prior to work on or around the system.

Finding: Procedure RP-110, Step 4.9.11 required the job supervisor to review the radiation work permit with the workers to verify their knowledge of radiological hold points, special requirements or conditions. Step 4.9.12 required the supervisor to familiarize workers with the radiological conditions of the work area.

Procedure ENS-RP-105, Step 5.3.7 required a radiation work permit pre-job

briefing for diving, radiography, entry into the drywell at power, entry into very high or locked high radiation areas, use of external effective dose equivalent dosimetry, or as deemed necessary by radiation protection supervision. An interview with the radiation protection supervisor indicated that a radiation work permit pre-job briefing would be required for all ISFSI related operations.

Procedure ENS-RP-105, Attachment 9.1, Form RP-105-02 listed the following major topics for pre-job briefings: work scope, roles and responsibilities, tools and equipment, personnel safety hazards, radiological safety hazards, dosimetry requirements and human error traps. The dry fuel storage supervisor determined which topics were relevant to the job, and included them in the pre-job briefing.

Documents Reviewed: Procedure EN-S-RP-110, "ALARA Program," Revision 2
Procedure EN-S-RP-105, "Radiation Work Permits," Revision 7

Category: Radiation Protection **Topic:** ISFSI Controlled Area Boundary

Reference: 10 CFR 72.106(a)(b)(c)

Requirement: For each ISFSI, a controlled area must be established. Any real individual located on or beyond the nearest boundary of the controlled area may not receive from any design basis accident the more limiting of 5 rem whole body dose. The minimum distance from the ISFSI to the nearest boundary of the controlled area must be 100 meters. The controlled area may be traversed by roads, railroads or waterways as long as arrangements are made to control traffic and to protect the public.

Finding: Appendix D, Section D.3.1 of the licensee's 10 CFR 72.212 Evaluation Report stated that the River Bend station exclusion area boundary was defined by a 3000 foot radius circle drawn about the reactor center. The ISFSI was located within the boundary of the exclusion area, which was entirely owned and controlled by the licensee. Appendix D, Section D.3.9 stated that the distance from the ISFSI to the nearest boundary of the plant exclusion area was approximately 700 meters.

As discussed in Chapter 11 of the Holtec FSAR, design basis accidents that may affect the storage cask can result in only limited and localized damage to the outer shell and radial concrete shield. Further, there is no credible leakage from the confinement boundary. Since there is no degradation in shielding or confinement capabilities, there is no effect on occupational or public exposures as a result of any of the design basis accidents. The site boundary dose rates were the same during accident conditions as they were during normal conditions and therefore the accident dose limits of 10 CFR 72.106 were met.

The site boundary dose rates during normal conditions and anticipated occurrences at the ISFSI are limited by 10 CFR 72.104 to less than 25 mrem/year whole body. The River Bend Station site boundary dose rates were within the 10 CFR 72.104 limits, as indicated in Holtec Report No. HI-2043196. There were no public roads, railroads, or waterways that traversed the ISFSI area.

Documents Reviewed: 10 CFR 72.212 Evaluation Report, Revision DRAFT
Holtec 1014 Final Safety Analysis Report, Revision 2
Holtec Report No. HI-2043196, "Dose Versus Distance From a HI-STORM 100S Version B Containing the MPC-68"

Category: Radiation Protection **Topic:** ISFSI Pad Dose Limits

Reference: CoC 1014 TS A 5.7.2; 72.104(a);

Requirement: The licensee shall perform an analysis to confirm that the dose limits of 10 CFR 72.104(a) will be satisfied under the actual site conditions and ISFSI configuration, considering the planned number of casks to be deployed and the cask contents. 10 CFR 72.104(a) specifies that during normal and anticipated occurrences the annual dose equivalent to any real individual located beyond the controlled area must not exceed 25 mrem whole body as a result of direct radiation from the ISFSI. The analysis should be included in the 10CFR72.212(b) Evaluation Report.

Finding: Holtec performed a River Bend site-specific analysis to determine the radiation dose to an individual at the closest point on the site boundary from a fully loaded ISFSI pad. The results of the analysis were documented in Holtec Report HI-2043196. The closest point on the site boundary was 700 meters from the ISFSI pad. The analysis assumed the ISFSI pad contained 40 casks, each containing the most bounding River Bend Station fuel with burn-up values of 55,000 MWD/MTU and 5 year cooling times. The analysis further assumed that the individual located at the closest point on the site boundary occupied that location continuously for one year (8760 hours). The Holtec analysis predicted an annual radiation dose to the individual of 4.71 mrem as a result of direct radiation from the ISFSI.

At the time of the inspection, the licensee was maintaining an environmental monitoring point 500 meters to the NNW of the plant. The 2004 Annual Environmental Operating Report indicated an annual mean dose of 15.22 mrem at that monitoring point. The predicted ISFSI dose rate of 4.71 mrem/year at 700 meters was then extrapolated to yield a dose rate of 6.9 mrem/year at the 500 meter monitoring point. Combining the predicted ISFSI dose rate of 6.9 mrem/year with the existing dose rate of 15.22 mrem/year yielded a total dose rate of 22.1 mrem/year at 500 meters from the ISFSI. This confirmed that the annual dose to an individual located 700 meters from the ISFSI, at the closest point on the site boundary, would not exceed 25 mrem whole body dose.

The results of the Holtec analysis were documented in Section D.3.9 of the licensee's 10 CFR 72.212 Evaluation Report.

Documents Reviewed: 10 CFR 72.212 Evaluation Report, Revision DRAFT
Holtec Report No. HI-2043196, "Dose Versus Distance From a HI-STORM 100S Version B Containing the MPC-68"

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Category: Radiation Protection **Topic:** Storage Cask Surface Dose Rates

Reference: CoC 1014, Tech Specs 5.7.3, 5.7.4, 5.7.8

Requirement: The licensee shall establish site specific dose rate limits for the storage cask at the top, on the sides and at the inlet and outlet air ducts. The limits established must ensure the dose rate analyzed for the closest point on the controlled area boundary from a fully loaded ISFSI pad is not exceeded. The site specific dose rate limits must not exceed 20 mrem/hr (gamma + neutron) on the top and 110 mrem/hr (gamma + neutron) on the side, excluding the inlet and outlet air ducts. The licensee shall measure the storage cask dose rates in accordance with Section 5.7.8.c, d, and e of the technical specifications. The measured dose rates shall not exceed the technical specification limits or the site specific limits, whichever are lower.

Finding: Holtec performed a radiation shielding analysis of the HI-STORM 100S storage cask assuming it was loaded with the most bounding River Bend station fuel with burn-up values of 55,000 MWD/MTU and 5 year cooling times. The predicted surface dose rates were documented in Holtec Report HI-2053382 and were: 71.0 mrem/hr at the inlet (bottom) air duct; 41.2 mrem/hr at 60" below mid-height; 41.9 mrem/hr at mid-height; 15.6 mrem/hr at 60" above mid-height; 18.3 mrem/hr at the outlet (top) air duct; 5.9 mrem/hr at the center of top lid; and 8.1 mrem/hr at the middle of top lid. These predicted values became the River Bend site specific dose rate limits and were incorporated into Procedure DFS-0006, Step 8.7.9 and Attachment 1. These dose rates were below the technical specification dose rates of 20 mrem/hr (gamma + neutron) on the top and 110 mrem/hr (gamma + neutron) on the side, excluding the inlet and outlet air ducts.

Using the predicted dose rates at the surface of a single storage cask loaded with the most bounding River Bend spent fuel, Holtec performed another analysis to determine the dose rate at the site boundary from a fully loaded ISFSI pad with 40 casks. The analysis predicted an additional dose rate of 4.71 mrem/year at the closest point on the site boundary (700 meters). This was documented in Holtec Report HI-2043196.

Procedure DFS-0006 required 12 dose rate measurements to be taken on the side of the storage cask. Four readings were taken 90 degrees apart at 60" above mid height, at mid height, and at 60" below mid height. Five dose rate measurements were taken on the top of the storage cask lid. One reading was taken in the center of the lid and 4 readings were taken half way between the center and edge of the top shield, 90 degrees apart. One reading was taken at each outlet and inlet air duct. The dose rate survey methodology was consistent with Technical Specification 5.7.8.

Documents Reviewed: Holtec Report No. HI-2043196, "Dose Versus Distance From a HI-STORM 100S Version B Containing the MPC-68"
Holtec Report Number HI-2053382, "HI-STORM CoC Radiation Protection Program Dose Rate Limits"
Procedure DFS-0006, "Radiological Monitoring Requirements for the HI-STORM 100 Dry Fuel Storage System," Revision DRAFT

Category: Records **Topic:** Cask Records Maintained by Licensee

Reference: 10 CFR 72.212(b)(8)

Requirement: The licensee shall accurately maintain the records provided by the cask supplier for each cask that show, in addition to the information provided by the cask vendor, the name and address of the cask vendor, the listing of the spent fuel stored in the cask, and any maintenance performed on the cask. This record must include sufficient information to furnish documentary evidence that any testing and maintenance of the cask has been conducted under an NRC approved Quality Assurance plan.

Finding: Section V of the 10 CFR 72.212 Evaluation Report contained the name and address of the cask vendor. Entergy was using Holtec International dry fuel storage systems at all their sites.

Procedure ENS-DC-160, Step 5.4 created a cask document record for each cask. The record contained information supplied by both Holtec and River Bend. The Holtec supplied information included the storage cask serial number, canister serial number, component completion records, cask fabrication travelers and all 10 CFR 72.48 reviews specific to the cask. The River Bend supplied information included receipt inspection documentation, the Holtec FSAR and Certificate of Compliance revisions, the 10 CFR 72.212 Evaluation Report and report appendices in effect at the time of loading, the loading work order, signed loading procedures, weld completion records, NRC notification of cask placement in service, and maintenance records. Procedure ENS-DC-160, Step 5.2.6 required the cask document records to be retained for the life of the ISFSI. The July 28, 2005 printout of the "Echelon Record Types For Ideas/Reflib" indicated that a retention period of LP (Life of the Plant) had been assigned to the cask document records.

Section V of the 10 CFR 72.212 Evaluation Report stated that Entergy would validate and document spent fuel storage in each cask in accordance with River Bend site Procedures REP-0029 and REP-0010. Procedure REP-0010, Attachment 2 recorded the total number of fuel assemblies stored in each cask. Procedure REP-0061, Attachment 7 and the CASK LOADER database identified the specific fuel assemblies stored in each cask.

Section V of the 10 CFR 72.212 Evaluation Report stated that any work performed on a cask would be controlled in accordance with corporate Procedure MA-101, "Conduct of Maintenance" and River Bend Procedure ADM-0023, "Conduct of Maintenance".

Procedure ENS-DC-160, Step 7.5.(a) required that records of changes to the ISFSI design or cask design be maintained until spent fuel is no longer stored at the River Bend ISFSI, in accordance with 10 CFR 72.48(d)(3).

Documents Reviewed:
10 CFR 72.212 Evaluation Report, Revision DRAFT
Procedure REP-0010, "SNM Accounting," Revision DRAFT
Procedure REP-0061, "Fuel Selection For Dry Storage," Revision 0
Procedure ENS-DC-160, "Dry Fuel Storage Document Control," Revision 1

"Echelon Record Types For Ideas/Reflib" printout dated July 28, 2005

Category: Records **Topic:** Copies of CoC and Related Documents

Reference: 10 CFR 72.212(b)(7)

Requirement: The general licensee shall maintain a copy of the CoC and documents referenced in the certificate until use of the cask is discontinued.

Finding: Procedure ENS-DC-160, Step 5.4 required the cask document record for each cask to contain the Holtec Certificate of Compliance in effect at the time of loading. Step 5.2.6 required each cask document record to be retained for the life of the ISFSI. The July 28, 2005 printout of the "Echelon Record Types For Ideas/Reflib" assigned a retention period of LP (Life of the Plant) to the cask document record.

Documents Reviewed: Procedure ENS-DC-160, "Dry Fuel Storage Document Control," Revision 1

Category: Records **Topic:** Notice of Initial Loading

Reference: 10 CFR 72.212(b)(1)(i)

Requirement: The general licensee shall notify the NRC at least 90 days prior to first storage of spent fuel.

Finding: The licensee provided notification to the NRC on April 26, 2005 of their intent to load fuel into the ISFSI. This met the requirement for the 90-day advance notice.

Documents Reviewed: Letter #RBF1-05-0072 from the River Bend Station to the NRC dated April 26, 2005 (ML051230347)

Category: Records **Topic:** Registration of Casks with NRC

Reference: 10 CFR 72.212(b)(1)(ii)

Requirement: The general licensee shall register the use of each cask with the NRC no later than 30 days after using the cask to store spent fuel. The registration letter must include the licensee's name and address, reactor license and docket number, contact person, cask certificate and model number, and cask identification number.

Finding: Procedure REP-0061, Step 7.5.1 required Attachment 7 of the procedure to be completed within 30 days of canister loading and sent to nuclear engineering for updating the CASK LOADER database. Attachment 7 contained the canister serial number, storage cask serial number, type of loading, date loading completed, and the fuel assembly identifications and cell locations.

Procedure DFS-0003, Step 8.12.7 required the storage cask serial number to be registered with the NRC within 30 days of placing it on the ISFSI pad.

Documents Reviewed: Procedure DFS-0003, "MPC Transfer Operations and HI-STORM Transport," Revision DRAFT
Procedure REP-0061, "Fuel Selection For Dry Storage," Revision 0

Category: Safety Reviews **Topic:** Changes, Tests, and Experiments

Reference: 10 CFR 72.48(c)(1)

Requirement: A general licensee may make changes in the facility or storage cask design, make changes to procedures, and conduct tests or experiments without obtaining a Certificate of Compliance (CoC) amendment if a change in the terms, conditions or specifications of the CoC is not required AND the change, test or experiment does not; a) result in more than a minimal increase in the frequency or consequence of an accident previously analyzed; b) result in more than a minimal increase in the frequency or consequence of a malfunction of a system, structure or component (SSC) important to safety; c) create a possibility for an accident not previously analyzed; d) create a possibility for failure of an SSC important to safety with a different result than previously analyzed; e) result in a design basis limit for a fission product barrier being exceeded; or f) result in a departure from a method of evaluation used in establishing the design basis.

Finding: Procedure ENS-LI-112, Step 5.2.5 required a 72.48 review for changes to an existing SSC or addition of a new SSC, tests and experiments not described in the Cask Final Safety Analysis Report, new procedures and revisions to existing procedures and changes to methods of evaluation.

Section IV of the 72.48 review form contained the criteria for determining if a change, test or experiment required a Certificate of Compliance amendment. The form included all of the 10 CFR 72.48(c)(1) criteria.

Documents Reviewed: Procedure ENS-LI-112, "10 CFR 72.48 Review Program," Revision 2
Form LI-112-01, "72.48 Review Form," Revision 2

Category: Training **Topic:** Approved Training Program - General

Reference: 10 CFR 72.44(b)(4); 72.190; 72.194

Requirement: The licensee shall have an NRC approved training program in effect that covers the training and certification of personnel that meets the requirements of Subpart I before the licensee receives spent fuel and/or reactor related Greater Than Class C waste at the ISFSI. Subpart I references to Part 72.190 and 72.194 for a general license. Part 72.190 specifies that only trained and certified personnel (or persons under the direct visual supervision of a certified individual) may operate equipment and controls identified as important to safety in the Safety Analysis Report and in the license. Part 72.194 specifies that the physical condition of certified personnel must not be such as might cause operational errors that could endanger other in-plant personnel or the public health and safety.

Finding: The licensee had developed and implemented a dry fuel storage training program that met the standards for training programs accredited by the Institute of Nuclear Power Operations and approved by the NRC. The licensee used the systematic approach to training process for development of the program, in accordance with Procedure EN-TG-201. A River Bend site specific job and task analysis was performed, on which the classroom courses and On-The-Job qualification guides were based. All dry fuel storage personnel were required to attend the classroom courses and to successfully complete the comprehensive

written examination, RWEX-DFS-200500, administered at the end of the training program.

All dry fuel storage personnel received periodic physical examinations and the dates were documented in the On-Track system database. Further, the dry fuel storage personnel participated in the behavioral observation and fitness for duty programs.

Each dry fuel storage procedure reviewed contained a prerequisite stating that, "personnel performing this procedure are qualified and trained to operate the required equipment or will work under the guidance of a person who is qualified and trained to operate the required equipment". All training and certification information and physical examination dates were documented in the licensee's On-Track computer tracking system. The dry fuel storage supervisor was required to access the On-Track system prior to performing each procedure, in order to ensure all personnel were qualified.

At the time of the inspection, the dry fuel storage training was still in progress. Approximately half of the personnel had not yet completed the comprehensive written examination. One person had completed the Vertical Cask Transporter qualification guide. No one had completed the Forced Helium Dehydrator qualification guide. The required reading course, RRR-DFS-INITIAL, was under development and had not yet been presented. Completion of the training program is required in order to meet License Condition 10. This issue is being tracked as Inspection Followup Item #72-049/0504-04.

Documents Reviewed: Entergy Nuclear Management Manual EN-TQ-201, "Systematic Approach to Training Process," Revision 0
Procedure RPCS-DFS-INITIAL, "River Bend Station Dry Fuel Storage Training," Revision 1
DFS Craft and Supervisor Qualification Matrix, Dated October 3, 2005
Training Module RRR-DFS-INITIAL, "Dry Fuel Storage Procedure Issue Required Reading," Revision DRAFT
Procedure DFS-0002, "Dry Fuel Cask Loading," Revision DRAFT
Procedure DFS-0003, "Dry Cask Cask Transport and Storage," Revision DRAFT
Procedure DFS-0005, "Dry Fuel Storage Rigging Plan," Revision DRAFT
Procedure DFS-0015, "Vertical Cask Transporter Operation," Revision DRAFT
Procedure DFS-0140, "Forced Helium Dehydration System Operation," Revision DRAFT

Category: Training **Topic:** Off-Normal and Accident Conditions

Reference: FSAR 1014, Section 12.2.1.11

Requirement: Training modules shall include responses to off-normal and accident conditions. The off-normal and accident conditions analyzed for the Holtec system include transfer cask and storage cask handling accidents, storage cask tip-over, storage cask exposure to fire, tornado, flood, earthquake, explosion, lightning, blockage of air vents, and loss of transfer cask supplemental cooling. The transfer cask supplemental cooling system is only required to be operable when

loading one or more fuel assemblies with high burnup (45,000 MWD/MTU).

Finding: Procedure DFS-10 contained responses for off-normal and accident conditions. The conditions included transfer cask and storage cask handling accidents, fire, explosion, storage cask tip over, and partial or full blockage of the air ducts. Procedure DFS-10, Step 8.1.6 directed the operations shift manager to Procedure AOP-0029 for a tornado or hurricane and to Procedure ARP-680-02 for an earthquake.

Procedure DFS-10 did not contain provisions for a flood, a lightning strike or a loss of the transfer cask supplemental cooling system. Flooding was not a credible scenario at the River Bend station, as indicated in the 10 CFR 72.212 Evaluation Report, Section D.4.3.2.4. A lightning strike on the storage cask will discharge through the steel shell to ground with no adverse impact on the storage cask, as indicated in the Holtec FSAR, Section 11.2.12. High burnup fuel will not be loaded during the first dry fuel storage campaign.

Training module RRR-DFS-INITIAL was under development at the time of the inspection. When completed, training module RRR-DFS-INITIAL will contain the final changes to the dry fuel storage procedures and a review of Procedure DFS-10.

Documents Reviewed: Training Module RRR-DFS-INITIAL, "DFS Initial Procedure Issue Required Reading"
Procedure DFS-0010, "DFS Equipment Handling and Storage Abnormal Conditions," Revision DRAFT
Procedure AOP-0029, "Severe Weather Operation," Revision 16
Procedure ARP-680-02, "Alarm Response to Seismic Event"
10 CFR 72.212 Evaluation Report, Revision DRAFT

Category: Training **Topic:** Operating, Surveillance, and RP Procedures

Reference: FSAR 1014, Section 12.2.1.11

Requirement: Training modules shall include procedures for fuel loading, component rigging and handling, canister closure, auxiliary equipment operations, pre-operational and in-service inspections, canister transfer and transport, surveillance, and radiation protection.

Finding: Dry fuel storage operations were performed by craft, supervisory, and radiation protection personnel. The craft personnel selected for the dry fuel storage project had previously completed training in rigging and crane operations. Classroom training on the operation of the dry fuel storage equipment was provided through the following coarses:

RCBT-DFS-MMOE, "Dry Fuel Storage Operating Experience For Mechanical Maintenance"
RLP-DFS-FLUIDOP, "Dry Fuel Storage Fluid Operations"
RLP-DFS-LOAD, "Dry Fuel Storage Loading Operations"
RLP-DFS-TRAOPS, "Dry Fuel Storage Transfer and Transport Operations"
RLP-DFS-VCTOPS, "Vertical Cask Transporter Operation"

On-the-Job training on the operation of the Forced Helium Dehydrator and Vertical Cask Transporter was provided through the following qualification guides:

ROJT-DFS-FHDOPS, "Operate the Forced Helium Dehydrator per DFS-0140"
ROJT-DFS-VCTOPS, "Operate the Vertical Cask Transporter per DFS-0015"

The radiation protection personnel selected for the dry fuel storage project had been performing radiation protection duties in the power plant. All radiation protection personnel were required to attend classroom training in radiological control practices specific to the dry fuel storage project. The training was presented in course RLP-RP-DFS0006.

Documents Reviewed: RCBT-DFS-MMOE, "Dry Fuel Storage Operating Experience For Mechanical Maintenance"
RLP-DFS-FLUIDOP, "Dry Fuel Storage Fluid Operations"
RLP-DFS-LOAD, "Dry Fuel Storage Loading Operations"
RLP-DFS-TRAOPS, "Dry Fuel Storage Transfer and Transport Operations"
RLP-DFS-VCTOPS, "Vertical Cask Transporter Operation"
ROJT-DFS-FHDOPS, "Operate the Forced Helium Dehydrator per DFS-0140"
ROJT-DFS-VCTOPS, "Operate the Vertical Cask Transporter per DFS-0015"
RLP-RP-DFS0006, "DFS Radiological Coverage Requirements"

Category: Training **Topic:** System Design and Licensing Bases

Reference: FSAR 1014, Section 12.2.1.1-10

Requirement: Training modules shall include dry fuel storage system design, ISFSI design, the Final Safety Analysis Report, the NRC Safety Evaluation Report, Certificate of Compliance conditions, technical specifications, regulatory requirements, required instrumentation, and operating experience.

Finding: Training module RCBT-DFS-OVERVW contained dry fuel storage system design, ISFSI design and ISFSI equipment operation overviews. Training module RGRP-DFS-PRIMER contained the Final Safety Analysis Report and NRC Safety Evaluation Report overviews and the Certificate of Compliance conditions.

Training module RLP-HLO-417 contained technical specifications. Regulatory requirements were presented in training modules 10 CFR 72.48-ELP-ADM and in Part 20 GET/RP training. Required instrumentation was presented in each applicable training module. Operating experience was presented in training module RCBT-DFS-MMOE.

Dry fuel storage operating procedures were presented in training module RRR-DFS-INITIAL and were demonstrated during the dry run training exercises.

Documents Reviewed: River Bend Station Compliance Matrix For Dry Fuel Storage Training

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Category: Training **Topic:** Training on Expected Dose Rates

Reference: FSAR 1014, Section 10.1.1

Requirement: Personnel performing ISFSI operations shall be trained on the operation of the HI-STORM 100 System and be familiar with the expected dose rates around the canister, transfer cask and storage cask during all phases of loading, storage and unloading.

Finding: Procedure DFS-0006 contained the requirements for radiation monitoring and contamination control during all phases of dry fuel loading and storage. The procedure was developed and refined during the pre-operational testing program using simulated dose rates encountered at other sites during actual loading operations.

Training course RLP-RP-DFS0006 was developed to describe the radiological conditions that can be expected for each phase of dry fuel loading and storage operations, and to present the radiation monitoring and contamination control requirements of Procedure DFS-0006. The course included potential radiation streaming sites and shielding, sequence and methodology for radiation and contamination surveys, radiation and contamination limits, use of portable High Efficiency Particulate Airborne (HEPA) units and vacuums and radiological postings. At the time of the inspection, 29 dry fuel storage personnel had attended the course and had successfully completed the written examination. The licensee intended to train four more radiation protection individuals prior to fuel loading.

Documents Reviewed: Procedure DFS-0006, "Radiological Monitoring Requirements for the HI-STORM 100 Dry Fuel Storage System," Revision DRAFT
Training Course RLP-RP-DFS0006, "HOLTEC DFS Radiological Coverage Requirements"
Training Attendance Rosters dated September 15, 2005 and September 29, 2005

Category: Weld Testing **Topic:** Leak Testing; Helium - Cover Plate Welds

Reference: FSAR 1014, Section 9.1.3; License Condition 10

Requirement: Perform a helium leakage rate test of vent and drain port cover plate welds in accordance with the Mass Spectrometer Leak Detector manufacturer's instructions and ANSI N14.5 (1997). The ANSI N14.5 definition of leak tight is 1.0 X 10-7 std atm/cc-sec.

Finding: Amendment 2 to the Holtec Certificate of Compliance had proposed deleting the requirement for helium leak testing of the canister closure welds. Based on this, River Bend did not include helium leak testing in their pre-operational testing program. When Amendment 2 was approved, the requirement for helium leak testing of the vent and drain port cover plate welds had not been deleted. River Bend will demonstrate helium leak testing to complete the requirements of License Condition 10.f prior to loading spent fuel. This issue is being tracked as Inspection Follow-up Item #72-049/0504-05.

Documents Reviewed: None.

Category: Welding **Topic:** Materials; Specifications

Reference: 10 CFR 72.154

Requirement: The licensee shall establish measures to ensure that purchased material, equipment, and services conform to procurement documents. These measures must include provisions for source evaluation and selection, objective evidence of quality furnished by the contractor/subcontractor, inspection at the contractor/subcontractor source and examination of product on delivery. Records shall be available for the life of the ISFSI. The effectiveness of the control of quality by contractors/subcontractors shall be assessed at intervals consistent with the importance, complexity and quantity of the product or service.

Finding: Inspection Follow-Up Item 72-49/0401-01 was opened in Inspection Report 72-049/04-01 dated October 1, 2004 (ML0427806321) and was closed during this inspection. The weld wire in use for the welding demonstration on August 31 - September 2, 2004 was purchased under the 1974-1980 editions of the ASME code. The Holtec FSAR specified the 1995 edition of the ASME code. The weld wire was subsequently determined to be acceptable, however a programmatic requirement to perform an ASME code reconciliation prior to use was not identified. The licensee issued Condition Report CR-RBS-2004-02551 and Program Change Notice CEP-WP-PCN-35 to resolve this condition. At the time of this inspection, a new step 5.8.4 had been added to Procedure CEP-WP-001 to require the station welding engineer to ensure the applicable design and licensing requirements are met.

Documents Reviewed: Procedure CEP-WP-001,"Program Section For The Control Of Special Processes: Welding, Heat Treating and Non-Destructive Examination, Revision 0