UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

June 28, 2005

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

SUBJECT: INSPECTION REPORT 050-00458/05-010; 072-00049/05-002

Dear Mr. Hinnenkamp:

On May 31 through June 2, 2005, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at your River Bend Station. The enclosed inspection report documents the results of that inspection, which were discussed with you and members of your staff on June 3, 2005.

The inspection included observation of two segments of your Independent Spent Fuel Storage Installation (ISFSI) pre-operational testing program. One segment included heavy lift operations outside the fuel building. The other segment included transfer cask annulus cooling and canister flooding operations. The inspection determined that you are conducting pre-operational testing activities in compliance with the Commission's rules and regulations and within the conditions of your license as they relate to pre-operational testing activities. No violations were identified.

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
050-00458/05-010; 072-00049/05-002

cc w/enclosure:
Executive Vice President and
Chief Operating Officer
Entergy Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

Vice President
Operations Support
Entergy Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

General Manager
Plant Operations
Entergy Operations, Inc.
River Bend Station
5485 US Highway 61N
St. Francisville, LA 70775

Director - Nuclear Safety
Entergy Operations, Inc.
River Bend Station
5485 US Highway 61N
St. Francisville, LA 70775

Wise, Carter, Child & Caraway
P.O. Box 651
Jackson, MS 39205

Mark J. Wetterhahn, Esq.
Winston & Strawn
1401 L Street, N.W.
Washington, DC 20005-3502

Manager - Licensing
Entergy Operations, Inc.
River Bend Station
5485 US Highway 61N
St. Francisville, LA 70775

The Honorable Charles C. Foti, Jr.
Attorney General
Department of Justice
State of Louisiana
P.O. Box 94005
Baton Rouge, LA 70804-9005

H. Anne Plettinger
3456 Villa Rose Drive
Baton Rouge, LA 70806

Burt Babers, President
West Feliciana Parish Police Jury
P.O. Box 1921
St. Francisville, LA 70775

Michael E. Henry, State Liaison Officer
Department of Environmental Quality
Permits Division
P.O. Box 4313
Baton Rouge, LA 70821-4313

Brian Almon
Public Utility Commission
William B. Travis Building
P.O. Box 13326
1701 North Congress Avenue
Austin, TX 78711-3326

bcc w/enclosure (via ADAMS e-mail distrib):\
LDWert
CLCain
DBSpitzberg
PJAlter, SRI
ER Ziegler
SPAtwater
RLKellar
DBGraves
KEGardin
FCDB File

SISP Review Completed: SPA

ADAMS: ✖Yes ☐ No Initials: __spa___
✖ Publicly Available ☐ Non-Publicly Available ☐ Sensitive ✖ Non-Sensitive

DOCUMENT NAME: s:\dnms\!fcdb\!spa\rb05-002.wpd final r:_rb\2005\

RIV:DNMS:FCDB	C:FCDB
SP Atwater	DBSpitzberg
S. Atwater	
06/28/05	06/28/05

OFFICIAL RECORD COPY T=Telephone E=E-mail F=Fax

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	050-00458; 072-00049
License No.:	NPF-47
Report No:	050-00458/05-010; 072-00049/05-002
Licensee:	Entergy Operations, Inc.
Facility:	Independent Spent Fuel Storage Installation River Bend Station 5485 U.S. Highway 61 St. Francisville, Louisiana
Dates:	May 31 through June 2, 2005
Inspector:	S.P. Atwater, Health Physicist
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 050-00458/05-010; 072-00049/05-002

License Condition 10 of Holtec Certificate of Compliance (CoC) 72-1014, Amendment 1 required the licensee to conduct pre-operational testing of the loading, closure, handling, unloading, and transfer of the HI-STORM 100 cask system prior to first use of the system to load spent fuel assemblies. License Condition 10 consisted of ten subsections lettered "a through j."

During this inspection, the licensee performed several of the pre-operational tests required by Holtec CoC License Condition 10. License Condition 10.h tested transferring a spent fuel canister from the transfer cask into the storage cask. License Condition 10.i tested transporting a storage cask from the loading area to the ISFSI pad. License Condition 10.j tested flooding a spent fuel canister during an unloading operation. Canister flooding was demonstrated using a canister mock-up. All other testing was conducted using actual ISFSI equipment and components. All testing was performed without spent fuel.

Based on NRC inspector observations, the pre-operational testing demonstrated the licensee's ability to safely perform these activities with spent fuel assemblies. Details related to the activities observed are provided in Attachment 2 to this report. The following provides a summary of the observations made during this inspection.

Pre-Operational Testing of an ISFSI (60854, 60854.1)

- The River Bend cask spacing configuration provided a tributary area that exceeded the minimum area specified in the Holtec Final Safety Analysis Report (FSAR). (Attachment 2, Page 1)

- The Holtec Technical Specifications limited storage cask lifting height to a maximum of 11 inches. The licensee's procedures specified a maximum cask lift height of 9.5 inches. During cask transport to the ISFSI pad, the cask lift height was frequently measured and the 9.5 inch limit was strictly enforced. (Attachment 2, Page 1)

- The licensee had modified the spent fuel cask handling crane support structure. The licensee reviewed the original seismic evaluation and concluded that this modification was bounded. All structural components were verified capable of performing their design function during a seismic event. (Attachment 2, Page 2)

- The licensee had modified the spent fuel cask handling crane. Post modification testing was performed in accordance with the River Bend Updated Safety Analysis Report and American National Standards Institute (ANSI) B30.2. The post modification testing consisted of a 125 percent load test over the full crane rail travel, followed by non-destructive examination (NDE) of all load bearing welds. The load testing was performed and no relevant indications of weld defects were identified during the subsequent NDE examinations. (Attachment 2, Pages 2-3)

- The Holtec FSAR required the licensee to use rigging diagrams and procedures for all heavy lifts. The River Bend dry fuel storage rigging plan provided procedural steps, drawings of rigging configurations, and tables of the required rigging components and their capacities for all lifts. During the inspection, all lifts were made in accordance with the rigging plan. (Attachment 2, Page 3)

- The Holtec Technical Specifications provided criteria for transport route hardness to ensure the design basis drop limits were met. The concrete slabs along the transport route, including the three turning pads, were constructed to meet the hardness criteria contained in the Technical Specifications. Load testing of the transport route from the cask handling crane support structure to the ISFSI pad was conducted. Post travel inspections found no indications of roadway distress. (Attachment 2, Pages 4-5)

- All pre-operational testing activities were conducted in accordance with written procedures, as required. During the inspection, procedure adherence and placekeeping were consistently demonstrated. (Attachment 2, Page 5)

- The Holtec FSAR required an ALARA pre-job briefing prior to commencing dry fuel storage operations. A comprehensive pre-job briefing was conducted on the first day of the inspection. The radiological safety topics included expected radiation dose rates, radiation protection personnel coverage, access control measures, Electronic Alarming Dosimeter (EAD) setpoints and alarm response, stay times and low dose waiting areas. (Attachment 2, Pages 5-6)

- Operational restrictions were established to meet ALARA objectives, as required. During the inspection, radiation protection personnel performed frequent radiation monitoring and exercised rigorous access control. The equipment operators understood the importance of the radiation protection role and complied with all directions provided by radiation protection personnel. (Attachment 2, Page 6)

- On April 26, 2005, the licensee notified the NRC that the River Bend Independent Spent Fuel Storage Installation (ISFSI) would begin receiving fuel on or about August 10, 2005. This notification met the 90 day notification requirement. (Attachment 2, Pages 6-7)

- Holtec CoC License Conditions 10.h and 10.i required pre-operational testing of a storage cask loading operation. The loading activities observed during this inspection included transferring the canister from the transfer cask into the storage cask, and transporting the storage cask to the ISFSI. The licensee demonstrated that the procedures and equipment were adequate to safely perform these operations with spent fuel. (Attachment 2, Pages 7-8)

- Holtec CoC License Condition 10.j required pre-operational testing of a cask unloading operation. The unloading activities observed during this inspection included retrieval of the canister from the storage cask into the transfer cask, transfer cask annulus cooling, and canister flooding. The licensee demonstrated that the procedures and equipment were adequate to safely perform these operations with spent fuel. (Attachment 2, Pages 8-9)

ATTACHMENT 1

Supplemental Information

PARTIAL LIST OF PERSONS CONTACTED

R. Biggs, Coordinator, Safety and Regulatory Affairs
M. Bourgeois, Radiation Protection Technician
J. Campbell, Manager, Dry Fuels Storage (DFS) Project
V. Carlson, Operations Shift Manager
R. Clardy, SWEC Boilermaker
E. Clevenger, Engineering Support
D. Drude, Mechanical Maintenance Lead
C. Edwards, Boilermaker
P. Ellis, Radiation Protection Technician
M. Feltner, Manager, Fuel Services
J. Furr, Operations Assistant Shift Manager
D. Hartman, Radiation Protection Technician
D. Heath, Supervisor, Radiation Protection
H. Hollkamp, Coordinator, Fuel Services
K. Huffstatler, Technical Specialist
D. Lorfing, Acting Manager, Licensing
M. McKean, Iron Worker
J. Rhodes, Mechanical Maintenance Lead
S. Robertson, Security
P. Scott, Radiation Protection Technician
B. Smith, Superintendent, Craft
G. Smith, Supervisor, SWEC Boilermaker
K. Suhrke, Dry Fuel Storage (DFS) Technical Support

INSPECTION PROCEDURES USED

60854	Preoperational Testing of an Independent Spent Fuel Storage Installation (ISFSI)
60854.1	Preoperational Testing of ISFSIs at Operating Plants

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
AWS	Automated Welding System
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
EAD	Electronic Alarming Dosimeter
FSAR	Final Safety Analysis Report
HEPA	High Efficiency Particulate Airborne
ISFSI	Independent Spent Fuel Storage Facility
kW	Kilowatt
MPC	Multi-Purpose Canister
NDE	Non-Destructive Examination
NRC	U.S. Nuclear Regulatory Commission
RWP	Radiation Work Permit
USAR	Updated Safety Analysis Report
VCT	Vertical Cask Transporter

Attachment 2
RIVER BEND INSPECTION 50-458/05-10; 72-049/05-02
(Inspector Notes)

Category: Design Features **Topic:** Cask Spacing

Reference: FSAR 1014, Sect 1.4, Table 1.4.1, Table 1.4.2

Requirement: Recommended cask spacing is provided in Holtec Final Safety Analysis Report (FSAR) Section 1.4. Table 1.4.1 provides recommended cask spacing for two by N arrays. Table 1.4.2 provides recommended cask spacing for square arrays. For both arrays, the tributary area for each cask should be a minimum of 225 square feet. For specific sites, a smaller tributary area could be established after appropriate thermal evaluations have been performed.

Finding: This requirement was implemented as determined through a review of the Independent Spent Fuel Storage Installation (ISFSI) pad design drawing and a walkdown of the pad. The River Bend ISFSI pad accommodated 44 storage casks arranged in 4 rows of 11 casks each. The casks were spaced on 15 foot centers in the east/west direction and on 19 foot centers in the north/south direction. The wider spacing in the north/south direction provided access for the Vertical Cask Transporter (VCT) during cask placement. This storage array provided a tributary area of 285 square feet for each cask, rather than the minimum tributary area of 225 square foot recommended in the FSAR.

Documents Reviewed: Drawing EC-090A, "ISFSI Slab Plan and General Notes", Revision 0

Category: Heavy Loads **Topic:** Cask Lifting Height

Reference: CoC 1014, Tech Specs A.5.5.a.1; 5.5.a.2; 5.5.3

Requirement: The transfer cask and storage cask may be lifted to any height necessary during transport between the fuel building and ISFSI, provided the lifting device is designed in accordance with American National Standards Institute (ANSI) N14.6 and has redundant drop protection features. If the lifting device does not meet the above criteria, the licensee may either perform a site specific drop analysis to determine the maximum lifting height, or use a maximum lifting height of 11 inches.

Finding: This requirement was implemented as determined by procedure review and direct observation. The River Bend Vertical Cask Transporter (VCT) was not equipped with redundant drop protection features and the licensee elected to use the Technical Specification maximum cask lifting height of 11 inches. A lower maximum cask lifting height of 9.5 inches was established in Procedure DFS-0003, Steps 6.10.2 / 8.11.28 / and 8.11.32, and in Procedure DFS-0015, Steps 6.19.3 and 8.5.32.

During the pre-operational testing, the VCT lifted the storage cask approximately 2" off the ground initially. Once clear of the crane support structure, the VCT raised the storage cask to approximately 6" for transport to the ISFSI pad. During transit, the ground clearance was frequently verified to be 9.5" or less.

Documents Reviewed: Procedure DFS-0003, "MPC Transfer Operations and HI-STORM Transport", Revision 0
Procedure DFS-0015, "Vertical Cask Transporter Operation", Revision 0

Category: Heavy Loads **Topic:** Crane Modifications and Testing

Reference: River Bend USAR, Section 9.1.4.1.2.1.4

Requirement: The Spent Fuel Handling Cask Crane is designed and tested in accordance with 29 CFR 17 Part 1910.179 and ANSI B30.2.

Finding: This requirement was implemented. The River Bend Spent Fuel Cask Handling Crane main hoist was rated for 125 tons and traveled in the north/south direction only. The crane was equipped with local controls in an underhung cab and with a remote control system manufactured by Control Chief. Both control systems were demonstrated during this inspection.

Engineering Request RB-2001-0783-002 raised the crane support structure northernmost horizontal beam three feet to allow the Vertical Cask Transporter (VCT) to enter the crane structure. The modification included four new gusset plates connecting the raised horizontal beam to the diagonal braces. The licensee reviewed the original seismic evaluation G13.18.1.4*092 and concluded that this modification was bounded. All structural components were verified capable of performing their design function during a seismic event.

Engineering Request RB-2001-0783-009 installed redundant crane links (rigging connections) on the cask handling crane main girt. During bridge travel, slings would be attached to the redundant crane links and the load would be shared between the main hook and the redundant crane links. This system provided redundant load drop protection if the main hook failed.

Engineering Request RB-2002-0298-000 added weldments to the connections between the cask handling crane main girt and end trucks. This modification increased the actual crane capacity to 131 tons and had been recommended by the crane manufacturer at initial installation. The modification was made concurrently with the other modifications as a scheduling convenience only. Since the licensee did not intend to increase the cask handling crane rating to 131 tons, these weldments simply provided additional safety margin for cask handling operations.

Procedure ENS-MA-119, Step 5.1.9.A required all overhead and gantry cranes to be inspected and maintained in accordance with the crane manufacturer's requirements and ANSI B30.2. The Note following Step 5.1.9.A of the procedure stated that whenever a crane is modified, it should be brought up to the latest revision of ANSI B30.2. The latest revision of ANSI B30.2 was year 2001 and Section 2.2.2.2 required load testing to be performed between 100 percent and 125 percent of the rated capacity. Procedure GMP-0014, Step 8.6.1 and Attachment 2 also required a load test at 125 percent of rated capacity.

The cask handling crane post modification testing was performed by Plant Mechanical Services, Inc. of Baton Rouge, LA under River Bend Work Order 50363880. The testing consisted of a 125 percent load test in accordance with ANSI B30.2, followed by non-destructive examinations (NDE) of all load bearing welds. Load testing was completed on March 18, 2004. The test weight acceptance criteria was 125 percent of the rated

capacity, plus 0/minus 4 percent. The crane rated capacity was 125 tons and the acceptable testing weight range was 150.00 to 156.25 tons (300,000 to 312,500 pounds). The actual test weight was 311,012 pounds. The crane was traveled the full length of the runway outside the fuel building with the test weights attached to the main hook. The hoist brakes (stopping and holding) were also tested satisfactorily. The test weights were then raised and rigging was connected to the redundant crane links. The main hook was lowered until the full test weight was carried by the redundant crane links. The crane was again traveled the full length of the runway outside the fuel building with the test weights attached to the redundant crane links.

Liquid penetrant and magnetic particle non-destructive testing was performed on August 11, 2004. All load bearing welds on the redundant crane links, crane main girt, and end truck weldments were examined. No relevant indications were identified. The 125 percent load testing of the cask handling crane inside the fuel building was satisfactorily performed during initial installation and will not be re-performed.

Documents Reviewed:
Procedure ENS-MA-119, "Material Handling Program", Revision 2
Procedure GMP-0014, "Control of Load Lifting Equipment", Revision 10
Engineering Request RB-2001-0783-002
Engineering Request RB-2001-0783-009
Engineering Request RB-2002-0298-000
Work Order 50363880
River Bend Station Updated Safety Analysis Report, Revision 4, dated August 1991

Category: Heavy Loads **Topic:** Rigging Plan

Reference: FSAR 1014, Table 8.0.1

Requirement: Rigging diagrams and procedural guidance are provided for all lifts.

Finding: This requirement was implemented through the River Bend Dry Fuel Storage Rigging Plan, DFS-0005. Section 5.3 of the rigging plan provided the weights for the ISFSI equipment and the Holtec HI-STORM 100 components. Sections 8.2 through 8.15 provided procedural guidance for; 1) empty canister handling; 2) empty transfer cask handling; 3) storage cask and lid handling; 4) lift yoke and lift yoke extension operations; 5) installing an empty canister into the transfer cask; 6) removing a loaded cask from the spent fuel pool; 7) installing and removing the Automated Welding System (AWS) baseplate; 8) transfering a loaded canister from the transfer cask into the storage cask; 9) installing the canister lid underwater; 10) installing and removing the mating device and spacer ring; 11) operation of the Vertical Cask Transporter (VCT) lifting brakets; 12) installing and removing the redundant crane links; and 13) handling the impact limiters.

Attachments 1 through 15 of the Rigging Plan provided drawings for each lift. Each drawing clearly illustrated the proper rigging configuration. Included in each drawing was a table of the rigging components and capacities required for the lift. Attachment 16 provided the rigging inspection criteria.

Documents Reviewed: Procedure DFS-0005, "DFS Rigging Plan", Draft

---

Category: Heavy Loads **Topic:** Transport Route Hardness

Reference: CoC 1014, Tech Spec A.5.5.a.1; FSAR Table 2.2.9

Requirement: To ensure the design basis drop limits are met, the transport route hardness and pad thickness shall be equivalent to or less limiting than either the Set A or Set B parameters contained in Holtec FSAR Table 2.2.9. Set A parameters apply to concrete slab thicknesses of 36" or less. Set B parameters apply to concrete slab thicknesses of 28" or less. This specification does not apply when the transport device provides support from underneath the cask such as a rail car, heavy haul trailer, air pads, etc.

Finding: This requirement was implemented. The Holtec FSAR Table 2.2.9 Set A requirements applied to the concrete slab under the cask handling crane support structure. This slab had a north and south section. Engineering Request 01-0783-003 indicated the south section met all of the Set A criteria: 1) concrete thickness of 36" or less; 2) concrete compressive strength at 28 days of 4200 psi or less; 3) reinforcing bars (ASTM 613 grade 60) installed in both top and bottom and in both directions; and 4) subgrade effective modulus of elasticity of 28,000 psi or less. Since storage casks could potentially be stored in this area for short periods of time, the surface coefficient of friction between the concrete slab and the bottom of storage cask was verified to be 0.53 or greater. Engineering Request 01-0783-003 indicated the north section met all of the Set A parameters except for the subgrade effective modulus of elasticity. The north section shared a common spread footing with the crane structure and had a subgrade effective modulus of elasticity of 36,000 psi or less, rather than 28,000 psi or less. The Holtec site specific drop analysis for the River Bend station showed there was sufficient margin in the drop analysis to support the higher modulus of elasticity in this area.

The Holtec FSAR Table 2.2.9 Set B requirements applied to the concrete slab from the crane support structure northward to the Protected Area fence. Engineering Request 01-0783-003 indicated this concrete slab met all of the Set B criteria: 1) concrete thickness of 28" or less; 2) concrete compressive strength at 28 days of 6000 psi or less; 3) reinforcing bars (ASTM 613 grade 60) installed in both top and bottom and in both directions; and 4) subgrade effective modulus of elasticity of 16,000 psi or less.

The Holtec FSAR Table 2.2.9 Set B requirements applied to the three concrete turning pads. Engineering Request 01-0783-008 indicated the turning pads met all of the Set B criteria.

Engineering Request 01-0785-000 used ground penetrating radar to identify utilities buried under the transport route. One electrical cable and two hydrogen water chemistry lines were identified. These systems were not classified as important to safety and would not be impacted by the heavy loads transiting above.

Load testing of the roadway between the crane support structure and the ISFSI pad was conducted under Work Order 00063843. The road between the crane support structure and the north access road, the north access road, and the west access road were load tested on April 20, 2005. The south access road and the ISFSI pad access road were load tested during this inspection. The Vertical Cask Transporter (VCT) was calculated to load the roadway to 545,743 pounds when transporting a fully loaded storage cask. The licensee did not have access to a fully weighted dummy canister and was therefore not

able to test the roadway at the full 545,743 pounds. Instead, the testing was performed using an actual spent fuel canister without a shield lid installed. The roadway loading was 487,754 pounds, or 89.4 percent of the expected full load. Engineering Request 00-0392-000 indicated that this was sufficient weight to demonstrate the bearing capacity of the roadway. Any potentially weak areas were expected to exhibit visible signs of distress under this weight. Post travel roadway inspections were performed and no indications of distress were identified.

Documents Reviewed:
Engineering Request 00-0392-000, ERCN-06
Engineering Request 01-0783-003, Revision 0
Engineering Request 01-0783-008, Revision 0
Engineering Request 01-0785-000, Revision 0
Work Order 00063843

Category: Procedures & Tech Specs **Topic:** Written Procedures Required

Reference: 10 CFR 72.212(b)(9); CoC 1014 Condition 2

Requirement: The licensee shall conduct activities related to storage of spent fuel under this general license only in accordance with written procedures.

Finding: This requirement was implemented as determined through direct observation. The procedures used for conducting the pre-operational testing are listed below in the documents reviewed section. The procedures were well written and the directions were clear and specific. There was very little branching to other procedures. Notes and warnings were clearly identified and appropriately placed. Procedure adherence and placekeeping were consistent, even with several procedures in effect concurrently.

Documents Reviewed:
Procedure DFS-0003, "MPC Transfer Operations and HI-STORM Transport", Revision 0
Procedure DFS-0004A, "MPC Unloading Procedure", Revision 0
Procedure DFS-0005, "Rigging Plan", Draft
Procedure DFS-0006, "Radiological Monitoring Requirements for the HI-STORM 100 Dry Fuel Storage System", Draft
Procedure DFS-0008, "MPC Sampling and Cooldown", Revision 0
Procedure DFS-0015, "Vertical Cask Transporter Operation", Revision 0

Category: Radiological **Topic:** ALARA Pre-Job Briefings

Reference: FSAR 1014, Sect 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: This requirement was implemented through a comprehensive pre-job briefing conducted prior to the pre-operational testing and through smaller, more specific pre-job briefings held at the job site prior to each major evolution. The initial pre-job briefing covered both industrial safety and radiological safety. Potentially conflicting station evolutions, security force participation, operating experience and Special Nuclear Material (SNM) transfer requirements were also presented.

The industrial safety topics included human error traps, heat stress awareness, trip hazards, fall protection measures, electrical hazards, housekeeping, and personnel

protective equipment.

The radiological safety topics included expected radiation dose rates, radiation protection personnel coverage, access control measures, electronic alarming dosimeter (EAD) setpoints and alarm response, stay times, and low dose waiting areas. Radiation Work Permit (RWP) 2000-2025, Task 03 was developed using dose rates from a similar loading campaign at another plant.

Documents Reviewed: Work Order 56984
RWP 2005-2025, Task 03, Revision 0

Category: Radiological **Topic:** ALARA Measures

Reference: 10 CFR 72.104(b)

Requirement: Operational restrictions must be established to meet ALARA (as low as reasonably achievable) objectives for radioactive materials in effluents and direct radiation levels associated with ISFSI operations.

Finding: This requirement was implemented through radiological monitoring procedure DFS-0006. Procedure DFS-006 contained provisions for; 1) performing a baseline contamination survey of the transfer cask interior surfaces prior to installing an empty canister; 2) monitoring dose rates and decontaminating a loaded transfer cask upon removal from the pool; 3) use of temporary shielding and High Efficiency Particulate Airborne (HEPA) units during welding, draining, moisture removal and helium backfilling; 4) monitoring dose rates during canister downloading into the storage cask; and 5) monitoring dose rates from a storage cask following loading. Procedure DFS-0006 also contained the technical specification limits for transfer cask dose rates, transfer cask surface contamination levels and storage cask dose rates.

Radiation protection personnel demonstrated knowledge of the requirements in procedure DFS-0006 and referred to it frequently during the pre-operational testing. They were aware of the area radiation monitor located inside the fuel building door and the requirements to notify the control room of potential alarms during cask movement. The operators understood the importance of the radiation protection role and complied with all directions provided by radiation protection personnel.

Documents Reviewed: Procedure DFS-0006, "Radiological Monitoring Requirements For The HI-STORM 100 Dry Fuel Storage System", Draft

---

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: This requirement was implemented through a letter from Entergy Operations, Inc. to the Nuclear Regulatory Commission dated April 26, 2005. The letter provided the 90 day advance notification that the River Bend Independent Spent Fuel Storage Installation (ISFSI) would begin receiving fuel on or about August 10, 2005.

Documents Reviewed: Entergy Operations, Inc. letter to the NRC dated April 26, 2005 (ADAMS Ascension Number ML051230347)

Category: Training **Topic:** Dry Run Exercise; Loading

Reference: CoC 1014, Condition 10

Requirement: A dry run training exercise of the loading, closure, handling, unloading and transfer of the HI-STORM 100 cask system shall be conducted by the licensee prior to the first use of the system to load spent fuel assemblies.

Finding: This requirement was implemented. The heavy loads segment of the pre-operational testing program was conducted outside the fuel building between the cask handling crane support structure and the ISFSI pad. The storage cask loading operations were performed in accordance with Procedures DFS-0003 and DFS-0015. The storage cask unloading operations were performed in accordance with DFS-0004A. All rigging and hoisting operations were performed in accordance with DFS-0005.

The major elements of the testing sequence were: 1) lifting and placing the loaded transfer cask onto the storage cask mating device (termed stack-up); 2) downloading the canister from the transfer cask into the storage cask; 3) retrieving the canister from the storage cask back up into the transfer cask; 4) downloading the canister back into the storage cask; 5) removing the transfer cask and mating device from the loaded storage cask; and 6) transporting the storage cask from the crane support structure to the ISFSI pad using the Vertical Cask Transporter (VCT).

The initial conditions for the testing were; 1) An empty canister, with a strongback and two lifting cleats, was installed in the transfer cask; 2) The transfer cask was on the ground under the crane support structure immediately to the south of the storage cask; and 3) The mating device was installed on the storage cask.

The first operation was to lift the transfer cask onto the mating device in accordance with Procedure DFS-0003, Section 8.6. Once completed, the lift yoke was returned to its stand and the canister lift slings were attached to the crane main hoist. The canister was lifted slightly (less than 1") to unload the pool lid at the bottom of the transfer cask. The air bags in the mating device tray were inflated to support the pool lid while the bolts were removed. Once the pool lid bolts were removed, the air bags were deflated and the pool lid was lowered into the mating device tray. The mating device tray was retracted from under the transfer cask, taking the pool lid with it. The canister was then downloaded into the storage cask. Tag lines were attached to the lift slings and the slings were lowered onto the top of the canister.

At this point, the licensee exited the loading procedure DFS-0003 at Step 8.7.23 and entered the unloading procedure DFS-0004A at Step 8.7. Another set of tag lines was lowered through the transfer cask onto the top of the canister. The transfer cask was then lifted to the south of the mating device and the two sets of tag lines (transfer cask and lift slings) were tied together. The transfer cask was then returned to the mating device, the lift slings were pulled up through the transfer cask and were attached to the main hoist. The canister was then raised approximately 6' to demonstrate canister retrieval capability

during an unloading sequence.

The licensee then exited the unloading procedure DFS-0004A at step 8.7.5 and re-entered the loading procedure DFS-0003 at Step 8.7.17. The canister was lowered back into the storage cask, the transfer cask was removed from the mating device and lowered back to the ground, the canister slings and lift cleats were removed from the canister, the mating device was removed from the storage cask, and the storage cask lid was installed. Using Procedure DFS-0015, the Vertical Cask Transporter (VCT) was moved into the crane support structure, straddling the storage cask. The storage cask lifting studs were installed and attached to the VCT lifting beams. The storage cask was lifted approximately 2" off the ground and the VCT traveled northward. Once clear of the crane support structure, the storage cask was raised to approximately 6" and the VCT was rotated 180 degrees in place. Finally, the VCT transported the storage cask along the transport route to the ISFSI pad.

Documents Reviewed:
Procedure DFS-0003, "MPC Transfer Operations and HI-STORM Transport", Revision 0
Procedure DFS-0004A, "MPC Unloading Procedure", Revision 0
Procedure DFS-0005, "Rigging Plan", Draft
Procedure DFS-0015, "Vertical Cask Transporter Operation", Revision 0

Category: Training **Topic:** Dry Run Exercise; Unloading

Reference: CoC 1014 Condition 10.j / FSAR 1014 Section 12.2.2

Requirement: A dry run exercise of the unloading, including cooling fuel assemblies, flooding the MPC cavity, and removing MPC welds shall be conducted by the licensee.

Finding: This requirement was implemented. The storage cask unloading operations included canister retrieval from the storage cask, transfer cask annulus cooling, and canister flooding and recirculation. These unloading operations were performed in accordance with Procedures DFS-0004A and DFS-0008.

Once the canister was downloaded into the storage cask during the loading sequence, the licensee exited the loading procedure DFS-0003 and entered the unloading procedure DFS-0004A. Another set of tag lines was lowered through the transfer cask onto the top of the canister. The transfer cask was then lifted to the south of the mating device and the two sets of tag lines (transfer cask and lift slings) were tied together. The transfer cask was then returned to the mating device, the lift slings were pulled up through the transfer cask and attached to the main hoist. The canister was then raised approximately 6' to demonstrate canister retrieval capability during an unloading sequence.

Once the canister retrieval was complete, the licensee exited the unloading procedure DFS-0004A and re-entered the loading procedure DFS-0003. The canister was then lowered back into storage cask and the loading sequence was resumed.

Transfer cask annulus cooling was performed in accordance with Procedure DFS-0008. The procedure provided two options for annulus cooling. The first option was a bottom-to-top flowpath in which demineralized water entered the bottom of the annulus through the drain connection in the pool lid, and exited out the top of the annulus. The second option was a top-to-bottom flowpath in which demineralized water entered the top of the

annulus through a spray ring (optional) and exited out the bottom of the annulus through the drain connection in the pool lid. The licensee selected the top-to-bottom flowpath for the demonstration (simulated). Procedure DFS-0008, Section 8.3 was used, along with a spray ring which had been fabricated for transfer cask annulus cooling.

When the average of the transfer cask annulus inlet and outlet temperatures was less than 100 degrees F, the procedure directed a minimum additional cooling time based on decay heat load. The licensee assumed a decay heat load of 9.0 kW for the simulation. Procedure DFS-0008, Step 8.3.15 specified a minimum cooling time of 49.7 hours for this heat load. The licensee demonstrated that the procedure and equipment would support cooling the transfer cask annulus during an unloading operation.

Canister flooding and recirculation were performed using Procedure DFS-0008 beginning at Step 8.9. A 55 gallon drum was used to simulate the spent fuel pool as the source of water for flooding the canister (mock-up). A diaphragm pump, DFS-P-1, was used to transfer water from the spent fuel pool to the canister. Temperature gauges, with ranges of 20-240 degrees F, were installed on the canister inlet and outlet lines. Spent fuel pool water entered the canister through the drain port and exited the canister through the vent port. The diaphragm pump was started and a 20-40 gpm flowrate was established. When water exited the canister through the vent port in step 8.9.10, flooding was complete. The canister was then recirculated for a minimum of 20 minutes while the temperature of the water exiting the canister was monitored. The licensee demonstrated that the procedure and equipment would support flooding and recirculating the canister during an unloading operation.

Documents Reviewed:

Procedure DFS-0003, "MPC Transfer Operations and HI-STORM Transport", Revision 0
Procedure DFS-0004A, "MPC Unloading Procedure", Revision 0
Procedure DFS-0008, "MPC Sampling and Cooldown", Revision 0