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

January 19, 2006

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

SUBJECT: INSPECTION REPORT 050-00458/05-016; 072-00049/05-005

Dear Mr. Hinnenkamp,

An NRC inspection was conducted at your River Bend Station on December 11-20, 2005 and December 28-29, 2005. The purposes of the inspection were to verify that the license requirements for loading spent fuel into dry storage had been met, and that your first dry fuel storage campaign was performed safely and in accordance with approved procedures.

The enclosed report presents the details of the inspection, which were discussed with members of your staff during the telephonic exit meeting held on January 12, 2006. The inspection found that your first dry fuel storage loading campaign was conducted in accordance with the conditions of your license and NRC regulations. 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
050-00458/05-016; 072-00049/05-005

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	050-00458; 072-00049
License No.:	NPF-47
Report No:	050-00458/05-016; 072-00049/05-005
Licensee:	Entergy Operations, Inc.
Facility:	River Bend Station 5485 U.S. Highway 61 St. Francisville, Louisiana
Dates:	December 11-20, 2005 December 28-29, 2005
Inspectors:	S. P. Atwater, Health Physicist, Region IV M. O. Miller, River Bend Station Resident Inspector
Approved By:	D. B. Spitzberg, Ph.D., Chief Fuel Cycle and Decommissioning Branch
Attachments:	1. Supplemental Information 2. Licensee Compliance With The Certificate of Compliance 3. Inspector Notes

EXECUTIVE SUMMARY

River Bend Station
NRC Inspection Report 050-00458/05-016; 072-00049/05-005

Inspections conducted by the Nuclear Regulatory Commission (NRC) of the River Bend dry fuel storage project over the past 16 months provided a comprehensive evaluation of the licensee's compliance with the requirements in the Holtec Certificate of Compliance, Technical Specifications, Final Safety Analysis Report (FSAR), NRC Safety Evaluation Report (SER) and 10 CFR Part 72.

The licensee met the requirements for loading and operating an Independent Spent Fuel Storage Facility (ISFSI) by integrating the ISFSI programmatic requirements into the River Bend Station 10 CFR Part 50 programs, incorporating the technical specifications into the ISFSI operating and maintenance procedures and by conducting extensive pre-operational testing of the ISFSI equipment and systems. A summary of the twelve conditions of the Holtec Certificate of Compliance for dry fuel storage and the NRC inspection report documenting compliance is provided in Attachment 2. A physical security inspection of the ISFSI was conducted on December 8, 2005 by the Division of Reactor Safety (DRS) and documented in Inspection Report 050-00458/05-007; 07200049/05-006 (ML060090464).

On December 11-29, 2005, the NRC observed loading of the first canister of spent fuel into the River Bend Station ISFSI. The NRC observed all risk significant activities including fuel movement, heavy lifts, initial radiation surveys, and canister closure operations. Details of the inspection are provided in Attachment 3 to this report. The following provides a summary of the inspection results.

- The licensee established effective measures for the control of combustible materials at the ISFSI. This was one of the conditions on which the fire and explosion hazards analysis was based (Attachment 3, Fire Protection).

- The licensee loaded and verified that the spent fuel assemblies were correctly placed into the canister in accordance with the loading plan and in compliance with the Certificate of Compliance (Attachment 3, Fuel Verification).

- The licensee completed and approved a 10 CFR 72.212 evaluation report that documented compliance with the conditions established in the Certificate of Compliance (Attachment 3, General License Conditions).

- On December 1, 2005, the NRC amended the River Bend Station operating license to allow use of the non single-failure proof fuel building cask handling crane for dry fuel storage operations. Subsequently, the licensee approved their heavy lift procedures and completed the required safety evaluations (Attachment 3, Heavy Loads).

- The first dry fuel loading campaign was conducted using written and approved procedures that were consistent with the technical basis in the Holtec FSAR. All procedures were strictly followed (Attachment 3, Procedures and Tech Specs).

- Operational restrictions were established to limit radiation exposures to as low as reasonably achievable (ALARA). The collective dose received by the workers during the first loading was consistent with the exposure levels experienced by other Region IV licensees. Criticality monitoring was provided in all spent fuel handling areas in accordance with regulatory requirements (Attachment 3, Radiation Protection).

- An NRC approved training program was used for training personnel in dry fuel storage operations. The River Bend workers demonstrated comprehensive knowledge of the technical requirements related to the loading and operation of an ISFSI and of the provisions contained in 10 CFR Part 72 (Attachment 3, Training).

- The space under the canister lid was continuously purged with air and monitored for combustible gases prior to and during all welding activities. Pre-operational testing of the helium leak testing equipment and procedure was conducted as required by the NRC Safety Evaluation Report (SER). The helium leak testing was performed by an examiner certified to Level III in helium leak testing in accordance with the non-destructive examination (NDE) standards (Attachment 3, Welding).

Attachment 1

Supplemental Information

PARTIAL LIST OF PERSONS CONTACTED

Licensee:

T. Avelone - Site Welding Engineer
R. Biggs - Coordinator, Safety and Regulatory Affairs
M. Bourgeois - Radiation Protection Technician
L. Cage - Radiation Protection Technician
J. Campbell - Senior Project Manager
R. Clardy - SWEC Boilermaker
E. Clevenger - Senior Engineer, Design Engineering
T. Coleman - Manager, P&S Outages
K. Davis - SWEC Boilermaker
C. Drude - Maintenance Repairman
B. Ellis - Fire Protection Engineer
P. Ellis - Radiation Protection Technician
M. Feltner - Manager, Nuclear Fuels
D. Heath - Supervisor, Radiation Protection
H. Hollkamp - Coordinator, Fuel Services
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K. Huffstatler - Technical Specialist
J. Landry - Maintenance Repairman
D. Lorfing - Manager, Licensing
J. Maher - Superintendent, Reactor Engineering
C. Mallory - Technical Training Instructor
P. Miktus - Supervisor, Engineering
J. Rhodus - Maintenance Repairman
P. Scott - SWEC Boilermaker
B. Smith - Nuclear Superintendent, Nuclear Fuels Supply
G. Smith - SWEC Boilermaker
K. Suhrke - Technical Assistant, Nuclear Fuels Supply
F. Wilson - Senior Project Manager

INSPECTION PROCEDURES USED

60855	Operation of an Independent Spent Fuel Storage Installation
92701	Followup

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None

Closed

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

Discussed

None

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
DFS	Dry Fuel Storage
FSAR	Final Safety Analysis Report
IFI	Inspection Follow-up Item
ISFSI	Independent Spent Fuel Storage Facility
kW	Kilowatt
MWD/MTU	Megawatt Days per Metric Ton Uranium
NDE	Non-Destructive Examination
NRC	U.S. Nuclear Regulatory Commission
SCS	Supplemental Cooling System
SER	NRC Safety Evaluation Report
SNM	Special Nuclear Material

Attachment 2

Licensee Compliance With The Certificate of Compliance

Holtec Certificate of Compliance #1014, Amendment 2 contained 12 conditions that the licensee was required to meet prior to loading spent fuel into dry storage. Condition 1 described the storage cask system to which the Certificate of Compliance applied. River Bend was using the Holtec HI-STORM 100 Cask System for dry storage of spent fuel under a general license. This cask system was approved for storage of irradiated fuel by the Nuclear Regulatory Commission (NRC) under Certificate of Compliance No. 72-1014.

Condition 2 required written procedures, consistent with the technical basis in the Holtec FSAR, for cask handling, loading, movement, surveillance and maintenance. The River Bend procedures were developed and validated during the pre-operational testing program and included the dry fuel storage technical specifications. The final procedures were approved prior to the first loading campaign. Licensee compliance with Condition 2 was evaluated during this inspection and documented in this report.

Condition 3 required acceptance testing and maintenance programs consistent with the technical basis in the Holtec FSAR. Licensee compliance with Condition 3 was evaluated during the final pre-operational inspection in October 2005 and documented in Inspection Report 50-0458/05-013; 72-049/05-04 (ML053250528)

Condition 4 required that important to safety activities be conducted in accordance with an NRC approved quality assurance program. Licensee compliance with Condition 4 was evaluated during the final pre-operational inspection in October 2005 and documented in Inspection Report 50-0458/05-013; 72-049/05-04 (ML053250528).

Condition 5 required that all lifts of the canister, transfer cask and storage cask be made in compliance with the station operating license. Licensee compliance with Condition 5 was evaluated during this inspection and documented in this report.

Condition 6 required spent fuel assemblies loaded into the Holtec HI-STORM 100 Cask System to meet the fuel specifications provided in the Certificate of Compliance. Licensee compliance with Condition 6 was evaluated during the final pre-operational inspection in October 2005 and documented in Inspection Report 50-0458/05-013; 72-049/05-04 (ML053250528).

Condition 7 required the design features and characteristics of the site, cask and ancillary equipment to be in accordance with the Certificate of Compliance. Licensee compliance with Condition 7 was evaluated during the final pre-operational inspection in October 2005 and documented in Inspection Report 50-0458/05-013; 72-049/05-04 (ML053250528).

Condition 8 described the process by which changes to the Certificate of Compliance can be made by the certificate holder. Under a general license, the certificate holder is Holtec. This condition did not apply to the River Bend Station.

Condition 9 placed special requirements on the first cask to be placed in service with a decay heat load greater than 10kW. The first Holtec cask exceeding 10 kW had already been placed in service at another site, therefore this condition had already been met.

Condition 10 required pre-operational testing of the HI-STORM 100 Cask System prior to loading spent fuel assemblies. The pre-operational testing program required testing of 11 specific operations lettered a through k.

- Operation 10.a moved the transfer cask from the washdown pit to the cask pool. Operation 10.b prepared the cask system for fuel loading. Operation 10.d loaded the dummy fuel assembly into the canister. Operation 10.e installed the canister lid underwater and moved the transfer cask from the cask pool back to the washdown pit. These operations were conducted during pre-operational testing in September 2005 and documented in Inspection Report 50-0458/05-011; 72-049/05-03 (ML052720421).

- Operation 10.c verified the fuel selection and verification process was capable of identifying fuel assemblies meeting the specifications contained in the Certificate of Compliance. The fuel selection and verification process was evaluated in October 2005 and documented in Inspection Report 50-0458/05-013; 72-049/05-04 (ML053250528).

- Operation 10.f required spent fuel canister welding, NDE inspections, pressure testing, draining, moisture removal and helium backfilling. Canister welding and NDE inspection operations were performed during pre-operational testing in August 2004 and documented in Inspection Report 72-049/04-01 (ML042780632). Canister pressure testing, draining, moisture removal and helium backfilling were performed during pre-operational testing in January 2005 and documented in Inspection Report 50-458/05-09; 72-049/05-01 (ML051380576).

- Operation 10.g required testing of the transfer cask supplemental cooling system (SCS). Technical specifications required the SCS to be operational when loading spent fuel assemblies with greater than 45,000 MWD/MTU burnup. Since the licensee did not intend to load any fuel assemblies with this level of burnup during their first loading campaign, the SCS was not tested.

- Operation 10.h required testing of the transfer cask horizontal handling equipment. Horizontal operations are not conducted at the River Bend Station and this operation was not applicable.

- Operation 10.i transferred the canister from the transfer cask into the storage cask. Operation 10.j placed the storage cask at the ISFSI. These operations were performed during pre-operational testing in May 2005 and documented in Inspection Report 50-458/05-10; 72-049/05-02 (ML051800346).

- Operation 10.k tested unloading of the cask system, including cooling fuel assemblies, flooding the canister cavity, and removing the canister lid welds. Cooling of the fuel assemblies and flooding the canister were performed during pre-operational testing in January 2005 and documented in Inspection Report 50-458/05-09; 72-049/05-01 (ML051380576). Removing canister lid welds was demonstrated on a mock-up in July 2004 and was videotaped. The NRC reviewed the videotape, along with the lid cutting procedure, during pre-operational testing in August 2004 and determined the weld removal operation had been adequately performed. This was documented in Inspection Report 72-049/04-01 (ML042780632).

Condition 11 exempted the licensee from the requirements of 10 CFR 72.236(f) when the supplemental cooling system (SCS) was in operation. 10 CFR 72.236(f) required the cask system to be able to provide adequate decay heat removal without active cooling systems. Since the casks loaded during the first loading campaign did not require use of the SCS, this exemption was not needed.

Condition 12 authorized use of the Holtec HI-STORM 100 Cask System subject to the conditions of the 10 CFR 72.212 evaluation report and the Technical Specifications. The 72.212 evaluation report documented licensee compliance with the Certificate of Compliance, Holtec FSAR, NRC Safety Evaluation Report and the River Bend Station operating license. ISFSI operations had been incorporated into the existing River Bend Station 10 CFR Part 50 programs for emergency planning, fire protection, quality assurance, radiation protection, records management, safety reviews, and training. Technical specifications had been incorporated into the dry fuel storage operating and maintenance procedures. Licensee compliance with Condition 12 was evaluated in October 2005 during the final pre-operational inspection and documented in Inspection Report 50-0458/05-013; 72-049/05-04 (ML053250528).

The NRC Safety Evaluation Report (SER) for Amendment 2 to the Holtec Certificate of Compliance required helium leak testing of the spent fuel canister vent and drain port cover plate welds. Pre-operational testing of the helium leak testing equipment and procedure was conducted during this inspection and documented in this report.

Attachment 3
RIVER BEND FIRST LOADING

INSPECTOR NOTES

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: During the final pre-operational inspection, provisions for controlling combustibles at the ISFSI had not been implemented. The licensee issued condition report CR-RBS-2005-03498 to correct this condition.

The licensee revised Procedure FPP-0040. Step 1.2.2 was added to include control of combustibles in all areas within 30' of the storage cask at the ISFSI. Step 5.1.2 and Attachment 1 were modified to require a transient fire loading evaluation prior to introducing combustibles to the ISFSI. Signs were posted on the ISFSI fence with a statement that combustible materials were strictly controlled at the ISFSI and that permission from Fuel Services was required for entry. Based on these actions, Condition Report CR-RBS-2005-03498 was closed.

Documents Reviewed: Procedure FPP-0040, "Control Of Transient Combustibles", Revision 10
Condition Report CR-RBS-2005-03498

Category: Fuel Verification **Topic:** Fuel Loading Verification

Reference: FSAR 1014, Table 8.0.1

Requirement Procedural guidance is given to perform fuel assembly selection verification and a post loading visual verification of fuel assembly identification prior to installation of the canister lid.

Finding: Spent fuel assemblies were loaded into the canister in accordance with Procedure REP-0029. Step 6.2.1 of the procedure identified the Special Nuclear Material (SNM) Tracking Sheet (STS) as the official authorization for moving spent fuel assemblies. The STS was provided in Attachment 2 and it specified the predetermined sequence for transferring spent fuel assemblies from the spent fuel pool to the canister.

Procedure REP-0029, Step 3.13.1 specified two independent methods for verifying the correct spent fuel pool rack location prior to grappling a fuel assembly. The fuel handler verified the correct X-Y coordinates using the rack indexing on the bridge and on the south wall of the fuel building. The spotter independently counted the cells in each row and compared the results to the pool map. Prior to grappling the fuel assembly, both the fuel handler and spotter confirmed that the pool rack location was consistent with the SNM Tracking

Sheet.

During the loading operation, three spent fuel assemblies could not be ungrappled in the spent fuel canister. They were returned to their original rack locations and a condition report was generated, as required by Step 8.4.8 of Procedure DFS-0002. The three assemblies that could not be ungrappled were replaced with three alternate assemblies, previously identified as acceptable substitutes. The three replacement assemblies had higher burnup values and were slightly longer than the assemblies they replaced. The SNM tracking sheets were revised to reflect the substitute fuel assemblies. The longer assemblies were then loaded into the canister and ungrappled successfully.

Post-loading fuel assembly verification was performed in accordance with Procedure REP-0059. Underwater cameras were used to videotape the serial numbers of the spent fuel assemblies in the canister. An independent review of the videotape confirmed that the correct fuel assemblies had been loaded. There were no discrepancies.

Documents Reviewed: Procedure DFS-0002, "Dry Fuel Cask Loading", Revision 0
Procedure REP-0029, "Fuel Movement", Revision 22
Procedure REP-0059, "Fuel Pool Loading Verification and Inspection", Revision 1

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: During the final pre-operational inspection, several sections of the 10 CFR 72.212 evaluation report had not been completed. Inspection Follow-up Item (IFI) #72-049/0504-01 was opened to track completion of the report.

During this inspection, the previously incomplete sections of the 10 CFR 72.212 report were reviewed. Sections D.3.11 and D.4.1.1 of the report were reviewed and found to be complete. Amendment #149 to the River Bend operating license was approved by the NRC on December 1, 2005 to allow use of the non single-failure proof fuel building cask handling crane for dry fuel storage operations.

Section D.4.1.3 of the report was reviewed and found to be complete. Helium leak rate testing of the spent fuel canister vent and drain port cover plate welds was successfully demonstrated during this inspection.

Section D.4.3.2.3 of the report was reviewed and found to be complete. Holtec performed an analysis to determine the maximum displacement of the storage casks on the ISFSI pad during an earthquake with icing conditions. The analysis concluded the maximum horizontal displacement would be eight inches, a distance insufficient to cause the storage casks to impact each other or to slide off the ISFSI pad. This was documented in a letter from Holtec International to

River Bend dated December 6, 2005.

The 10 CFR 72.212 evaluation report was determined to be complete and had been approved by the licensee. Completion of the 10 CFR 72.212 evaluation report closes IFI #72-049/0504-01.

Documents Reviewed: 10 CFR 72.212 Evaluation Report, Revision 0
Letter from Holtec International to River Bend dated December 6, 2005

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

Reference: CoC 1014, TS B.3.4.3; Condition 7

Requirement For sites with environmental conditions that may degrade the coefficient of friction, an analysis shall be performed to demonstrate that a design basis earthquake will not cause the storage casks to impact each other or to slide off the pad. If the casks impact each other the fuel deceleration values must be shown to be 45 g's or less.

Finding: During the final pre-operational inspection, the seismic analysis for casks stored on the ISFSI pad under icing conditions had not been completed. Inspection Follow-up Item #72-049/0504-02 was opened to track completion of the analysis.

An analysis was performed to determine the maximum displacement of the storage casks on the ISFSI pad during an earthquake with icing conditions. The analysis assumed a coefficient of friction value of zero and concluded the maximum horizontal displacement would be eight inches. This displacement would be insufficient to cause the storage casks to impact each other or to slide off the ISFSI pad. Section D.4.3.2.3 of the 10 CFR 72.212 evaluation report was revised to reflect this. Completion of the seismic analysis and incorporation of the results into the 10 CFR 72.212 report closes IFI #72-049/0504-02.

Documents Reviewed: Letter from Holtec International to River Bend dated December 6, 2005

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

Reference: CoC 1014, 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: During the final pre-operational inspection, the NRC had not approved amendment #149 to the River Bend Station operating license. Amendment #149 would allow use of the non single-failure proof fuel building cask handling crane for dry fuel storage operations. Inspection Follow-up Item #72-049/0504-03 was opened to track implementation of the license amendment, once it was approved.

Prior to dry fuel storage operations, all heavy lifts at the River Bend Station were made using Maintenance Lifting Procedures described in the Final Safety Analysis Report. Procedure MLP-7500 directed operation of the spent fuel cask

handling crane, but the procedure lacked sufficient lifting and rigging detail for handling dry fuel storage components. Procedure DFS-0005 was developed specifically for dry fuel storage operations and it contained the necessary lifting and rigging detail.

License amendment #149 was approved by the NRC on December 1, 2005. Procedure DFS-0005 was then completed and subjected to safety evaluations in accordance with 10 CFR 50.59 and 10 CFR 72.48. The evaluations confirmed operational compliance with existing plant specific heavy loads requirements. Sections D.3.11 and D.4.1.1 of the 10 CFR 72.212 evaluation report were revised to reflect this. Incorporation of license amendment #149 requirements into the River Bend crane operating procedures closes IFI #72-049/0504-03.

Documents Reviewed:
Procedure DFS-0005, "DFS Rigging Plan", Revision 0
Procedure MLP-7500, "Operation of the Spent Fuel Cask Crane", Revision 15

Category: Procedures & Tech Specs **Topic:** Operating Procedures Required by License

Reference: CoC 1014, License Condition 2

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

Finding: The first dry fuel storage campaign at River Bend was conducted using written and approved procedures that were consistent with the technical basis described in Chapter 8 of the Holtec #1014 FSAR. The campaign was conducted under Work Order #77002 and Radiation Work Permit #2005-1112.

Procedure DFS-0002 directed the spent fuel canister loading, closure, hydrostatic pressure testing and helium leak testing. Procedure DFS-0140 directed spent fuel canister blowdown, moisture removal with forced helium dehydration, and helium backfill. Procedure DFS-0003 directed the transfer of the canister from the transfer cask to the storage cask. Procedure DFS-0015 directed the transport of the storage cask to the ISFSI pad.

Spent fuel was loaded into the canister using Procedure REP-0029. Post loading fuel assembly verification was performed in accordance with Procedure REP-0059. Heavy lifts were made in accordance with Procedure DFS-0005 and radiological controls were implemented through Procedure DFS-0006. All procedures were strictly followed.

Documents Reviewed:
Work Order #77002
Radiation Work Permit #2005-1112
Procedure DFS-0002, "Dry Fuel Cask Loading", Revision 0
Procedure DFS-0003, "MPC Transfer Operations and HI-STORM Transport", Revision 0
Procedure DFS-0005, "DFS Rigging Plan", Revision 0
Procedure DFS-0006, "Radiological Monitoring Requirements For The HI-STORM 100 Dry Fuel Storage System", Revision 0

Procedure DFS-0015, "Vertical Cask Transporter Operation", Revision 0
Procedure DFS-0140, "MPC Forced Helium Dehydration Operation", Revision 0
Procedure REP-0029, "Fuel Movement", Revision 22
Procedure REP-0059, "Fuel Pool Loading Verification and Inspection", Revision 1

Category: Procedures & Tech Specs **Topic:** Time to Boil

Reference: FSAR 1014, Sect 4.5.1.1.5

Requirement Water inside the canister is not permitted to boil. A limit is imposed on the maximum allowable time duration for fuel to be submerged in water after a loaded transfer cask is removed from the pool. A formula is provided for determining this time limit, given the decay heat load and initial water temperature. The bounding heat-up rate for the transfer cask contents is 3.77 degrees F/hr.

Finding: Once the canister lid was installed, Procedure DFS-0002, Step 8.5.12 and Attachment 2 were used to calculate the time required for the water inside the canister to boil. The formula contained in Attachment 2 was consistent with the formula provided in the Holtec FSAR.

The time to boil was calculated at 56 hours based on the canister decay heat load of 16.6 kW and an initial cask pool water temperature of 89 degrees F. The actual time between lid placement and canister blowdown was approximately 47 hours. The time to boil limit was not exceeded.

Documents Reviewed: Procedure DFS-0002, "Dry Fuel Cask Loading", Revision 0

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: Receipt inspections performed on the dry fuel storage system components by the River Bend staff identified several deficiencies in documentation. Supplier documentation and purchase order numbers were incorrect for the spent fuel canister, both lift yokes and the redundant crane links. Supplier certification documentation was missing for the lift yoke extension slings and redundant crane link slings. The receipt inspection report number was incorrect for the transfer cask. The licensee had generated condition report CR-RBS-2005-02757 to track correction of these deficiencies.

Prior to initial dry fuel storage operations all of the identified documentation deficiencies had been corrected. The slings were determined to be incorrect for the application and were not used. Based on completion of these corrective actions, Condition Report CR-RBS-2005-02757 was closed.

Documents Reviewed: Condition Report CR-RBS-2005-02757

Category: Radiation Protection **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: During all fuel handling operations, two Eberline AMS4 portable air monitors were in operation on the north side of the spent fuel pool. Both monitors were within their calibration intervals. No airborne radioactivity above normal background levels was measured.

The collective dose for the first cask loading was estimated at 0.990 person-rem. The actual dose received was 1.028 person-rem. This exposure was consistent with exposure levels observed at other Region IV sites during first loading campaigns.

Documents Reviewed: None.

Category: Radiation Protection **Topic:** Criticality Control - BWR

Reference: 10 CFR 72.124.c; 10 CFR 50.68(b)

Requirement A criticality monitoring system shall be maintained in each area where spent fuel is handled, which will energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required.

Finding: Criticality monitoring in the spent fuel pool area was provided by the plant Digital Radiation Monitoring System (DRMS). This permanently installed system consisted of two area monitors mounted on the wall, one on the north side of the spent fuel pool and one on the south side. Both monitors actuated audible and visible alarms. The alert alarm (amber light) was set at 2 mrem/hr and the high alarm (red light) was set at 100 mrem/hr. Both radiation monitors were calibrated under the plant calibration system and were within their calibration interval.

Due to the configuration of the fuel building, the DRMS could not detect radiation levels in the cask handling area to the extreme north of the cask pool. In order to monitor this area, an Eberline EC4-3 portable area monitor was used. The monitor included both audible and visible alarms, and was within its calibration interval.

Documents Reviewed: None.

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: During the final pre-operational inspection, the dry fuel storage training program was still in progress. Inspection Follow-up Item #72-049/0504-04 was opened to track completion of the training.

Prior to dry fuel storage operations, all personnel had successfully completed the dry fuel storage training program. All craft and supervisory personnel had completed their required reading and had successfully passed the comprehensive written examination. All craft personnel had completed the Vertical Cask Transporter and Forced Helium Dehydrator qualification guides. IFI #72-049/0504-04 is closed based on completion of required training by the dry fuel storage personnel.

Documents Reviewed: DFS Craft and Supervisory Qualification Matrix dated 12/15/2005
Training Module RRR-DFS-INITIAL, "Dry Fuel Storage Procedure Issue Required Reading," Revision 2

Category: Welding **Topic:** Combustible Gas Monitoring

Reference: FSAR 1014, Table 8.0.1

Requirement Monitor the area around the canister lid for combustible gases prior to and during welding or cutting activities. For defense in depth, the space below the lid should be evacuated or purged prior to and during these activities.

Finding: Prior to the start of welding through completion of the root pass on the lid to shell weld, the space under the lid was continuously purged with air. Air entered the canister downward through the gap between the lid and shell and exited the canister through the lid vent port. From there it traveled through a water separator and then through an air driven explosion proof shop vacuum. The exhaust of the shop vacuum was monitored for hydrogen using an Industrial Scientific iTX Multi-Gas Monitor. The monitor was within its calibration interval.

Documents Reviewed: Multi-Gas Monitor iTX Instruction Manual, Revision 3

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

Reference: SER 1014, Sections F7.6, 8.4, 9.0; ANSI N14.5

Requirement Helium leak rate testing of the vent and drain port cover plates must be conducted in accordance with ANSI Standard N14.5. ANSI N14.5 provides two methods for determining the maximum acceptable leak rate. The first method is a calculation based on package contents. The calculation will yield a helium leak rate, below which radiological releases during normal and accident conditions will be within the 10 CFR 71 limits. The second method is application of a "leak tight" standard. The canister is leak tight when the helium leak rate is no greater than 2.0E-7 ref-cc/second at a minimum sensitivity of 5.0E-8 ref-

cc/second. The licensee may establish the maximum acceptable helium leak rate using either the calculation or the leak tight standard.

Finding: During the final pre-operational inspection, the licensee had not demonstrated helium leak rate testing of the vent and drain port cover plate welds. Inspection Follow-up Item #72-049/0504-05 was opened to track completion of the helium leak rate testing.

The helium leak rate testing demonstration was conducted on December 17, 2005 under Work Order #76989 and Procedure MPC-HMSLD-100. The demonstration was conducted in the River Bend machine shop using a Varian Model 956 Helium Mass Spectrometer Leak Detector (HMSLD) and a cover plate mock-up. This demonstration met the pre-operational testing requirement contained in Certificate of Compliance #1014, Condition 10.f. Section D.4.1.3 of the 10 CFR 72.212 evaluation report was added to reflect this. IFI #72-049/0504-05 is closed based on completion of the helium leak testing demonstration.

The actual canister vent and drain port cover plate welds were helium leak tested on December 19, 2005 by the same NDE examiner, using the same procedure and equipment used during the demonstration. The leak testing procedure specified a maximum acceptable leak rate of 2.0E-7 ref-cc/sec (He). The Varian HMSLD had a temperature corrected minimum sensitivity of 5.0E-10 ref-cc/sec (He) when operating in the hood mode. This was well above the minimum sensitivity of 5.0E-8 ref-cc/sec (He) required by the ANSI Standard N14.5.

The Varian HMSLD was calibrated using a permeation leakage standard manufactured by Vacuum Technologies, Inc. and certified by Applied Technical Services. Re-certification of the leakage standard was due on January 14, 2006.

Documents Reviewed: Work Order #76989
Procedure MPC-HMSLD-100, "Procedure For Leak Testing of Holtec Multi-Purpose Canister (MPC) Vent and Drain Port Cover Welds", Revision 0
Applied Technical Services Calibration Verification Certificate for the Permeation Leakage Standard, dated 05/20/05

Category: Welding **Topic:** Personnel Qualification

Reference: FSAR 1014, Sect 7.1.3

Requirement Confinement boundary welds are inspected and tested in accordance with ASME Section III, Subsection NB. ASME Section III, Article NB-5521 requires all NDE examiners to be qualified in accordance with SNT-TC-1A.

Finding: Welding Services Inc (WSI) had provided River Bend with a Non-Destructive Examination (NDE) examiner certified to Level III in Helium Mass Spectrometer Leak Detection (HMSLD). Review of the certification documentation and vision testing results confirmed that the NDE examiner was qualified in accordance with SNT-TC-1A.

Documents Reviewed: NDE examiner certification documentation and vision testing results