UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

September 26, 2002

Craig Anderson, Vice President Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, Arkansas 72801-0967

SUBJECT: NRC INSPECTION REPORT 50-313/02-08; 50-368/02-08; 72-13/02-01

Dear Mr. Anderson:

On August 27, 2002, the NRC completed the routine annual inspection of your Independent Spent Fuel Storage Installation (ISFSI) located at the Arkansas Nuclear One, Units 1 and 2 facilities (ANO). The results of the inspection are documented in the enclosed inspection report and were discussed with you and members of your staff during the exit meeting held on August 27, 2002.

This inspection focused on ANO's compliance with regulatory requirements and license commitments associated with your ISFSI including activities associated with the loading of the 22nd cask. There were no violations identified during this inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

/RA/

Dwight D. Chamberlain, Director
Division of Nuclear Materials Safety

Docket Nos.: 50-313
50-368
72-13
License Nos.: DPR-51
NPF-6

Enclosure:
NRC Inspection Report
50-313/02-08; 50-368/02-08; 72-13/02-01

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

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

Manager, Washington Nuclear Operations
ABB Combustion Engineering Nuclear Power
12300 Twinbrook Parkway, Suite 330
Rockville, Maryland 20852

County Judge of Pope County
Pope County Courthouse
100 West Main Street
Russellville, Arkansas 72801

Winston & Strawn
1400 L Street, N.W.
Washington, DC 20005-3502

Bernard Bevill, Team Leader
Division of Radiation Control and
Emergency Management
Arkansas Dept. of Health
4815 W. Markham St., Slot 30
Little Rock, AR 72205-3867

Mike Schoppman
Framatome ANP, Inc.
Suite 705
1911 North Fort Myer Drive
Rossylin, Virginia 22209

bcc w/enclosure (via ADAMS by RIV):
EWMerschoff
KEBrockman
EECollins
RLBywater
LJSmith
Senior Project Engineer (JAC)
PHHarrell
NBHolbrook
SMorris
NRR Event Tracking System (IPAS)
VLHigh
DDChamberlain
DBSpitzberg
JVEverett
GKMorell
SCO'Connor
ERZiegler
FCDB

DOCUMENT NAME: s:\dnms\fcdb\morell\ANO02-01rp-jve.wpd

RIV:DNMS:FCDB	NMSS:DNMS:FCDB	C:FCDB	D:DNMS
GKMorell	JVEverett	DBSpitzberg	DDChamberlain
/RA/	***/RA/***	***/RA/***	***/RA/***
09/13/02	09/25/02	09/25/02	09/26/02

OFFICIAL RECORD COPY

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket Nos.:	50-313; 50-368; 72-13
License Nos.:	DPR-51; NPF-6
Report No.:	50-313/02-08, 50-368/02-08; 72-13/02-01
Licensee:	Entergy Operations, Inc.
Facility:	Arkansas Nuclear One, Units 1 and 2 Arkansas Nuclear One, Independent Spent Fuel Storage Installation
Location:	1448 S. R. 333 Russellville, Arkansas 72801
Date:	August 27, 2002
Inspectors:	J. V. Everett, Senior Health Physicist G. K. Morell, Health Physicist
Approved by:	D. Blair Spitzberg, Ph. D., Chief Fuel Cycle & Decommissioning Branch
Attachments:	1) Supplemental Information 2) List of Loaded VSC-24 Casks at ANO

EXECUTIVE SUMMARY

Arkansas Nuclear One, Units 1 and 2
NRC Inspection Report 50-313/02-08; 50-368/02-08; 72-13/02-01

Spent fuel dry cask storage operations have been underway at the Arkansas Nuclear One (ANO) site for the past 6 years. ANO management has dedicated a staff specific to the dry cask storage operations. The staff is knowledgeable and proficient. Compliance with technical specifications has been demonstrated through the use of detailed procedures, extensive documentation of work activities and an effective quality assurance process. Based on management's strong support and the technical knowledge of the ISFSI staff, ANO has continued to conduct loading and storage operations safely and in compliance with regulatory and licensing requirements.

Operation of an ISFSI

- During the inspection, the licensee was in the process of loading cask #22. A review was performed to verify compliance with the technical specifications related to the selection of spent fuel for loading in the cask and the verification of required boron concentrations in the Multi Assembly Sealed Basket (MSB) water during loading. The licensee was found to be in compliance with the technical specification requirements (Section 1).

- A review was conducted of the licensee's compliance with selected technical specifications relevant to the ISFSI operations including cask thermal performance, daily surveillances and the annual inspections. In addition, the results of the required five-year inspection for the first loaded cask was reviewed. The licensee was found to be in compliance with the technical specification requirements (Section 1).

- The ISFSI thermoluminescent dosimeter (TLD) environmental data and the annual radiological effluent report were reviewed during the inspection and were determined to be in compliance with the regulatory and license requirements (Section 1).

Review of 10 CFR 72.48 Safety Evaluations

- The licensee had conducted 19 safety screenings and one safety evaluation during 2001. In 2002, as of this inspection, 21 safety screenings had been performed. A review of the safety evaluation performed in 2001 and one of the safety screenings performed in 2002 determined that the licensee had adequately performed the required evaluation of the issues (Section 2).

Report Details

Summary of ISFSI Operations

At the time of the inspection, the licensee was in the process of welding the lid on the 22nd Sierra Nuclear Ventilated Storage Cask (VSC-24). ANO will load a total of 24 VSC-24 casks and anticipates loading the last two casks during the next several months. The licensee then plans during mid 2003 to begin loading a new cask design. Entergy has selected the Holtec Hi-Storm 100 cask system. Eight Holtec casks are planned for loading in 2003. A new concrete storage pad has been constructed adjacent to the concrete pad where the VSC-24 casks are stored. A new railcar is being constructed for use in transporting the Holtec casks from the plant's train bay to the storage pad.

A list of the VSC-24 casks that have completed the loading process and technical data concerning each cask is provided as an attachment to this report.

1 Operation of an ISFSI (60855)

1.1 Inspection Scope

Interviews with licensee personnel and review of licensee documents were performed to verify compliance with the technical specifications and regulatory requirements related to the safe storage of spent fuel at the ANO ISFSI.

1.2 Observation and Findings

The spent fuel currently in storage at the ANO ISFSI is stored in VSC-24 casks licensed under the general licensing provisions of 10 CFR Part 72. The current Certificate of Compliance in use at ANO for the VSC-24 casks is Certificate No. 1007, Amendment 3, dated May 21, 2001. During this inspection, the licensee was in the process of loading cask #22.

The spent fuel allowed for storage in the VSC-24 cask must meet the requirements in Table 1 of Technical Specification (T.S.) 1.2.1 "Fuel Specification." This technical specification required the licensee to perform an analyses for any fuel assemblies with burnup greater than 35,000 megawatt days per metric ton of uranium (MWd/MTU) to verify that the initial fuel clad temperature criteria and the neutron and gamma source strengths do not exceed the values in Table 1 and in Section 2.1 of the Safety Analysis Report for the VSC-24 cask. The licensee performed calculation 95-E-0083-067 "Evaluation for Greater than 35 gigawatt days per metric ton of uranium (GWd/MTU) Burnup Fuel," to establish a basis for the final selection screening criteria. This criteria required that spent fuel with burnup of 35,000 to 39,000 MWd/MTU had to be cooled for 6 years before placement into dry storage. For spent fuel with burnup between 39,000 to 45,000 MWd/MTU, the fuel had to be cooled for 7 years. The calculation also verified that for these cooling periods, the spent fuel would have a neutron and gamma source strength that met the requirement in Table 1.

The data for the spent fuel placed in casks #20 and #22 were reviewed. For cask #20, the highest burnup of any of the spent fuel assemblies was 41,204 MWd/MTU. The cask was placed on the ISFSI pad July 2001. The various fuel assemblies had been discharged from the reactor between March 1988 and March 1994. Therefore, the newest fuel would be approximately 8 ½ years old when placed in dry storage. This meets the 7 year minimum cooling requirement. Heat load of the cask was 14.24 kW.

Cask #22 had been loaded with spent fuel with a maximum enrichment of 3.46 percent, a maximum burnup of 38,909 MWd/MTU and a total heat load of 14.69 kW. The various fuel assemblies had been discharged from the reactor between December 1982 and September 1993. Therefore, the newest fuel would be approximately 9 years old when placed in dry storage. This meets the 6 year minimum cooling requirement.

Technical Specification 1.2.6 "Boron Concentration in the Multi-Sealed Basket (MSB) Cavity Water" required a specific minimum boron concentration to be maintained in the MSB during loading. Figure 2 of T.S. 1.2.6 provided a graph for determining the required boron level for fuel with enrichments greater than 3.3%. For the 3.46 per cent enrichment of the spent fuel in cask #22, the required boron concentration would be 3075 parts/million (ppm). T.S. 1.2.6 required a sample to be taken of the water within 4 hrs before inserting the first fuel assembly into the MSB. The sample data was reviewed for cask #22. Boron level was 3300 ppm. Samples were taken and independently verified within the 4 hrs prior to loading the first spent fuel assembly.

The licensee is required by T.S. 1.2.3 "Maximum Permissible Air Outlet Temperature," to verify on a daily basis that the cask outlet temperature does not exceed the ambient temperature by more than 110 degree F. This value is based on a 24 kW cask heat load. The licensee is required to adjust this limit for casks with lower heat loadings based on methodologies in the Safety Analysis Report. Technical Specification 1.3.4, "Cask Thermal Performance," also requires the licensee to monitor the thermal performance of the casks on a daily basis to ensure that the integrity of the fuel cladding and concrete is not compromised. The licensee had developed a computerized process that automatically calculated the allowable differential temperature for the casks based on the heat load and compared the outlet temperature with the ambient temperature to verify compliance with this technical specification. Temperature data for November 2001 and July 2002 were reviewed. The daily temperature monitoring was performed as required by T. S. 1.3.4 and the differential temperatures were within the limitations specified in T. S. 1.2.3.

To ensure adequate ventilation and thermal performance, the licensee is required to inspect the air inlets and outlets at least daily in accordance with T. S. 1.3.1, "Visual Inspection of Air Inlets and Outlets." The licensee conducted a visual inspection on each shift, resulting in two inspections per day. The inspections were performed in accordance with procedure OP-1015.003B "Unit Two Operations Log," Revision 047-03-0. Records were reviewed for April 1-30, 2002 and June 1-30, 2002. No blockage of the wire mesh screens covering the air inlets and outlets had been observed. All required surveillances had been conducted for the periods reviewed.

The licensee is required to perform an annual inspection of the Ventilated Concrete Cask (VCC) exterior in accordance with T.S. 1.3.2, " Exterior Surface Inspection." The

licensee is required to repair any defects larger than ½ inch in diameter (or width) and deeper than 1/4 of an inch. Discussions were held with the Quality Assurance Engineer that conducts the annual inspections. The most recent annual inspection was performed on December 15, 2001. No significant concrete problems had been observed with only minor patching of areas needed by re-grouting according to the grout manufacturer's recommendations.

Technical Specification 1.3.3, "Interior VCC Surface Inspection," required the licensee to perform an inspection of the VCC interior surfaces and MSB exterior surfaces for the first VSC cask after every five years in service to ensure that there is no air flow blockage or material degradation. Additionally, the licensee is required to document and submit a report summarizing the findings to the NRC within 30 days. The licensee completed their inspection on December 13, 2001. Small areas of light to medium oxidation were noted on both the VCC interior and the MSB. Small stalactite deposits were also noted on the VCC near the edge of one of the vents due to leaching of the concrete. No blockage of the air flow paths or degradation of the casks were found. On January 10, 2002, the licensee issued a letter to the NRC documenting the completion of the required 5 year interior inspection of the first cask loaded at ANO.

Technical Specification 1.2.4, "Maximum External Surface Dose Rate," required the licensee to perform a survey of the VCC prior to movement of the VCC to the ISFSI pad. The dose rate limits specified by the technical specification were 20 mrem/hr on the sides of the concrete cask, 50 mrem/hr on the top and 50 mrem/hr at the air inlets and outlets. The surveys performed on cask #21 were reviewed. The cask was surveyed in the train bay prior to movement to the ISFSI pad. The maximum dose rates measured on the sides were 1.2 mrem/hr gamma and 0.2 mrem/hr neutron. The dose rates on the top were 12 mrem/hr gamma and 10 mrem/hr neutron. The highest dose rate measured at an air inlet or outlet was 26 mrem/hr gamma and 0.7 mrem/hr neutron. All dose rates were within the required limits of the technical specification.

Technical Specification 1.2.5, "Maximum MSB Removable Surface Contamination," required the licensee to ensure that removable surface contamination levels were below 10^{-4} µCi/cm^2 beta-gamma and 10^{-5} µCi/cm^2 alpha prior to moving the cask to the ISFSI pad. This equates to approximately 22,000 disintegrations/minute (dpm)/100 cm^2 beta/gamma and 2,200 dpm/100 cm^2 alpha. A review of the survey data collected for cask #21 showed all smear survey results for smears taken of the MSB to be less than 1,000 dpm/100 cm^2 beta/gamma and less than 20 dpm/100 cm^2 alpha.

Technical Specification 1.2.11 required the licensee to place the casks on the storage pad in an array with spacing of at least 15 ft ± 1 foot center-to-center. During a tour of the ISFSI, placement of the casks was confirmed based on a visual inspection of the location of the casks. The casks had been placed in pre-marked locations that had been designated prior to the placement of casks on the pad.

Two thermoluminescent dosimeters placed at the fence boundary at approximately 45 feet from the ISFSI pad are evaluated by the licensee on a quarterly frequency to monitor ISFSI environmental radiation levels. The fenced area surrounding the ISFSI pad is located inside the licensee's protected area. The TLD data for the period between April 2001 and March

2002 was reviewed. The average doses were 291 mrem/quarter for one of the TLDs and 326 mrem/quarter for the other TLD. The licensee had not placed any casks on the pad since the last inspection and a comparison with previous TLD results concluded that the doses were consistent with previous TLD environmental data.

10 CFR 72.44(d)(3) requires, in part, that the licensee perform an annual estimation of the maximum dose commitment to the public resulting from possible ISFSI effluent releases and to submit the report to the NRC within 60 days of January 1. The licensee submitted their annual report to the NRC on February 27, 2002, and concluded that no effluent releases had occurred related to ISFSI operations.

In accordance with 10 CFR 72.212(b)(1)(ii), the licensee is required to register the use of each cask with the NRC no later than 30 days after using the cask to store spent fuel. A review of licensee documentation concluded that casks #19 and #20 were loaded on June 26 and July 25, 2001, respectively. The required notification was submitted to the NRC on August 9, 2001 for both casks. Although the registration report for cask #19 exceeded the 30-day criterion, the inspectors determined this to be a minor administrative error. The licensee had entered this condition into their corrective action program. On August 14, 2001, cask #21 was loaded and the required registration submitted to the NRC on August 30, 2001, well within the 30-day criterion.

The licensee is required to maintain certain records in accordance with 10 CFR 72.212(b)(8) concerning the spent fuel stored in the casks and maintenance performed on the casks. The licensee had not established a central file for the required records for the VSC-24 casks currently being loaded. However, the licensee was using the site-wide electronic records system, referred to as “IDEAS”, to maintain the required records. The records were retrievable. Procedure 1302.028 “Fuel Selection Criteria for Dry Storage,” provided the information required of the spent fuel stored in the casks. A separate 1302.028 document was generated for each cask. A computerized listing of all maintenance performed, listed by cask serial number, was included in the maintenance management system. Records being maintained also included all surveillances required by technical specifications. The records were being maintained as quality assurance records under the site’s Part 50 QA program.

For the new cask system planned for loading in 2003, the licensee had developed a draft procedure that will be used to control the required documents. This procedure established a central file concept to consolidate the records into one file referred to as a cask closure document file.

1.3 Conclusions

During the inspection, the licensee was in the process of loading cask #22. A review was performed to verify compliance with the technical specifications related to the selection of spent fuel for loading in the cask and the verification of required boron concentrations in the Multi Assembly Sealed Basket (MSB) water during loading. The licensee was found to be in compliance with the technical specification requirements.

A review was conducted of the licensee's compliance with selected technical specifications relevant to the ISFSI operations including cask thermal performance, daily surveillances and the annual inspections. In addition, the results of the required five-year inspection for the first loaded cask was reviewed. The licensee was found to be in compliance with the technical specification requirements.

The ISFSI thermoluminescent dosimeter (TLD) environmental data and the annual radiological effluent report were reviewed during the inspection and were determined to be in compliance with the regulatory and license requirements.

2 Review of 10 CFR 72.48 Evaluations (60857)

2.1 Inspection Scope

Safety screenings and evaluations performed by the licensee related to the ISFSI were reviewed to verify compliance with the requirements in 10 CFR 72.48.

2.2 Observation and Findings

10 CFR 72.48(d)(2) requires the licensee to submit to the NRC a report containing a brief description of any changes, tests or experiments related to the ISFSI including a summary of the evaluation of each. The report is to be submitted at intervals not to exceed 24 months. On January 31, 2002, the licensee submitted a report for the period from December 1, 2000, through December 31, 2001. During the period, one safety evaluation was performed. This safety evaluation related to the surface area of contact between VCC-018 and the ISFSI pad. A review of the licensee's evaluation determined that an adequate evaluation had been conducted by the licensee.

During 2001, the licensee had performed 19 safety screenings that were determined to not require a full safety evaluation. For 2002, as of this inspection, the licensee had performed 21 safety screenings. The list of safety screenings for 2001 and 2002 were reviewed with no significant issues identified. One safety screening from 2002 was selected for review. The issue pertained to the licensee's continued use of the spent fuel handling machine with a degraded hoist braking actuation after fuel manufacturer Framatome had informed licensees not to exceed a compression load of 500 pounds on fuel assemblies removed from the reactor if they are to be returned to the reactor for future use. The licensee had established administrative controls on the use of the fuel handling machine to comply with the 500 pound limit until the machine can be redesigned.

2.3 Conclusions

The licensee had conducted 19 safety screenings and one safety evaluation during 2001. In 2002, as of this inspection, 21 safety screenings had been performed. A review of the safety evaluation performed in 2001 and one of the safety screenings performed in 2002 determined that the licensee had adequately performed the required evaluation of the issues.

3 Exit Meeting

The inspectors presented the inspection results to members of the licensee management at the conclusion of the inspection on August 27, 2002. The licensee did not identify that any proprietary information was provided to, or reviewed by the inspectors.

ATTACHMENT 1

PARTIAL LIST OF PERSONS CONTACTED

Licensee

C. Anderson, VP
K. Dixon, Engineer
M. Cooper, Licensing Specialist
D. Eichenberger, Project Manager-Dry Fuel Storage Fabrication
M. Harris, Engineer
S. Pyle, Licensing Engineer
J. Stites, Quality Assurance
A. Tate, Reactor Engineer
J. Wellwood, Engineer
D. Williams, Project Manager-Dry Fuel Storage

INSPECTION PROCEDURES USED

60855	Operation of an ISFSI
60857	Review of 10 CFR 72.48 Evaluations

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS

ANO	Arkansas Nuclear One
GWd/MTU	gigawatt days per metric ton of uranium (i.e. 1,000 MWd/MTU)
ISFSI	Independent Spent Fuel Storage Installation
kW	kilowatts
mrem/hr	millirem/hour
MWd/MTU	megawatt days per metric ton of uranium
ppm	parts per million
TLD	Thermoluminescent Dosimeter
T.S.	Technical Specification
VCC	Ventilated Concrete Cask
VSC	Ventilated Storage Cask

ATTACHMENT 2

LOADED VSC-24 CASKS AT THE ANO ISFSI

LOADING ORDER	CASK #	UNIT	DATE PLACED ON PAD	HEAT LOAD (kW)	BURNUP MWd/MTU	FUEL ENRICHMENT	MANHOURS TO LOAD	Person-Rem DOSE
1	#1	Unit 1	12/96	5.2	19,905	2.067	not tracked	0.185
2	#3	Unit 1	1/97	10.7	32,599	3.190	1750	0.384
3	#5	Unit 2	4/97	4.18	20,318	1.930	1852	0.291
4	#6	Unit 2	4/97	6.2	30,149	2.939	1463	0.469
5	#12	Unit 2	9/98	10.8	34,938	3.384	2479	0.900
6	#11	Unit 2	10/98	8.0	33,075	2.938	1416	0.553
7	#7	Unit 2	10/98	8.0	34,891	3.328	1844	0.567
8	#2	Unit 2	11/98	8.1	34,773	3.337	1542	0.483
9	#4	Unit 1	4/99	9.1	33,051	3.059	2036	0.236
10	#8	Unit 1	4/99	9.2	33,255	3.059	1186	0.231
11	#9	Unit 1	5/99	9.1	33,194	3.205	1324	0.189
12	#13	Unit 1	6/99	7.3	33,066	3.048	1380	0.112
13	#14	Unit 1	7/99	10.7	34,646	3.213	1130	0.383
14	#10	Unit 2	4/00	12.16	40,211	3.374	1700	0.602
15	#15	Unit 2	6/00	9.86	40,220	3.372	1233	0.603
16	#16	Unit 1	7/00	13.37	40,180	3.206	1233	0.528
17	#18	Unit 1	1/01	14.67	38,794	3.454	1348	0.628

LOADING ORDER	CASK #	UNIT	DATE PLACED ON PAD	HEAT LOAD (kW)	BURNUP MWd/MTU	FUEL ENRICHMENT	MANHOURS TO LOAD	Person-Rem DOSE
18	#17	Unit 2	6/01	14.23	41,188	4.010	1225	0.695
19	#19	Unit 2	6/01	14.17	41,193	4.010	1000	0.659
20	#20	Unit 2	7/01	14.24	41,204	4.010	940	0.554
21	#21	Unit 2	8/01	14.26	40,931	4.010	936	0.666
22	#22	Unit 1	In Process	14.69	38,909	3.460	In Process	In Process

Unit 1: 9 casks loaded, average heat load = 9.9 kW; average man-hours to load = 1423 hrs; average dose = 0.320 person-rem
Unit 2: 12 casks loaded, average heat load = 10.3 kW; average man-hours to load = 1469 hrs; average dose = 0.587 person-rem
Note: Unit 2 fuel is 18 inches longer than Unit 1 fuel

Note:

- Heat Load (kW) is the sum of the heat load values for all 24 spent fuel assemblies
- Burnup is the value for the spent fuel assembly with the highest individual discharge burnup
- Fuel Enrichment is the spent fuel assembly with the highest individual enrichment per cent of U-235