ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket Nos.:	50-313 50-368 72-13
License Nos.:	DPR-51 NPF-6
Report No.:	50-313/99-10 50-368/99-10 72-13/99-01
Licensee:	Entergy Operations, Inc.
Facility:	Arkansas Nuclear One, Units 1 and 2
Location:	Junction of Hwy. 64W and Hwy. 333 South Russellville, Arkansas
Dates:	June 9-10, 1999
Inspector(s):	J. V. Everett, Sr. Health Physicist R. S. Carr, Health Physicist (in training)
Approved By:	D. Blair Spitzberg, Ph. D., Chief Fuel Cycle & Decommissioning Branch
Attachment:	1) Supplemental Information 2) List of Loaded VSC-24 Casks at ANO

EXECUTIVE SUMMARY

Arkansas Nuclear One, Units 1 and 2
NRC Inspection Report No. 50-313;-368/99-10; 72-13/99-01

The annual inspection of the ANO ISFSI was completed. Eleven casks were located at the ISFSI with the 12th cask in the process of being loaded with Unit 1 spent fuel. The ISFSI pad and the loaded casks were found to be in good structural condition. The licensee had a total of 14 casks available onsite for use at the ISFSI. No problems had been identified concerning the 11 loaded casks during the routine ongoing monitoring of temperature and radiological levels.

The licensee was in the process of resolving several problems related to the ISFSI. Cask No. 13 had been found during the pre-operational inspection to have a drain line shorter than required by the design. Replacement of the drain line will be completed. Cask No. 10 experienced a stuck fuel assembly during loading and was unloaded and declared inoperable until further analysis of the problem was completed. Cask No. 6 was found to have a possible weld deficiency that exceeded the criteria in ASME Section XI related to the design basis for a horizontal cask drop. Cask No. 6 was one of the original four casks that had been loaded by ANO prior to the problems related to weld cracking becoming a concern for the VSC-24 casks. Resolution of all the problems appeared likely. The licensee was tracking all the issues in their corrective action program.

Operations of an ISFSI

- Technical Specifications related to the ISFSI were reviewed including dose rates limits, thermal limits and condition of the casks on the pad. The licensee was found to be in compliance with the VSC-24 Technical Specifications (Section 1).

Design Control

- The licensee had performed several 10 CFR 72.48 safety evaluations related to the ISFSI. No concerns were identified during the review of the safety evaluations, including review of a number of issues that had been screened by the licensee and determined to not require safety evaluations (Section 2).

Report Details

Summary of Facility Status

Eleven VSC-24 casks were stored at the ANO ISFSI. The licensee was in the process of loading the 12th cask. Of the 12 VSC-24 casks, six contained Unit 1 fuel (Babcock and Wilcox) and six contained Unit 2 fuel (Combustion Engineering). Two additional VSC-24 casks were constructed and available onsite for future loading for a total of 14 casks currently owned by the licensee. The licensee was evaluating options for purchasing additional VSC-24 casks. The licensee was monitoring the performance of the 11 loaded VSC-24 casks at the ISFSI and was recording radiological and thermal data in accordance with Technical Specifications. A list of the loaded VSC-24 casks is provided as Attachment 2 to this report.

In response to welding concerns identified in Confirmatory Action Letter (CAL) 97-7-002A issued to Entergy Operations on September 5, 1997, the licensee had committed to performing ultrasonic tests of the closure welds on four previously loaded VSC-24 casks. As of this inspection, the licensee had successfully completed the ultrasonic testing of the welds on three of the four VSC-24 casks. The fourth VSC-24 cask had been examined, however, the results of the initial analysis of the weld did not demonstrate compliance with the criteria imposed by the American Society of Mechanical Engineers (ASME) Section XI code. This problem was documented by the licensee in Condition Report CR-ANO-C-1999-0081. Additional testing and analysis was underway by the licensee.

On May 21, 1999, during the loading of Cask No. 10 with Unit 1 fuel, the third fuel assembly became stuck approximately 16 inches from the bottom of the basket. The licensee successfully removed the fuel assembly, discontinued loading the basket and removed the other two fuel assemblies. The basket was declared inoperable and removed from the spent fuel pool. Condition Report CR-ANO-1-1999-0140 was issued. The licensee initiated an evaluation of the problem. Unit 1 fuel was larger than Unit 2 fuel and fits tighter in the basket. The NRC Resident Inspector was present during the licensee's investigation of the problem and during removal of the assembly. The event was documented by the NRC Resident Inspector in NRC Inspection Report 50-313/99-05;50-368/99-05 dated June 10, 1999. Visual inspection of the fuel assembly after removal found no damage to the fuel elements or assembly.

1 Operation of an ISFSI (60855)

1.1 Inspection Scope

Activities associated with the operations of the ANO ISFSI were reviewed. This included verification of the completion of required periodic surveillances for storage of the VSC-24 casks at the ISFSI.

1.2 Observations and Findings

Eleven loaded casks had been placed at the ISFSI with the 12th cask in the process of being loaded with Unit 1 fuel at the time of this inspection. A tour of the ISFSI was conducted to evaluate the condition of the pad and the concrete casks. Technical Specification 1.3.2 "Exterior Ventilated Concrete Cask (VCC) Surface Inspection",

established the requirement that any exterior surface defects or damage greater than one-half inch in diameter and deeper than one-quarter of an inch be repaired by regrouting. During the tour, the concrete casks were visually inspected to verify that no defects or damage was present. The condition of the pad was also evaluated to verify that no cracks were evident in the concrete that could effect movement of the concrete casks by the air pad system. Both concrete casks and the pad were in good physical condition.

The licensee was required by Technical Specification 1.3.1 "Visual Inspection of Air Inlets and Outlets" to verify daily that the screens on the air inlets and outlets were in good condition and had no blockage. During the tour of the ISFSI pad, all inlets and outlets were observed to be in good condition with no blockage observed. Records for the past year were reviewed documenting the daily inspections. The licensee had conducted surveillances during both day and night shifts, resulting in two tours of the ISFSI each day. No problems with the screens were identified.

During the daily surveillances conducted by the licensee, temperature measurements were recorded for the concrete casks. Measurements for each of the four outlet vents and the ambient temperature on the ISFSI pad were recorded. Technical Specification 1.3.4 "Cask Thermal Performance" required the licensee to monitor thermal conditions of the concrete casks to ensure that no significant unexplained increases in temperature occurred for any of the concrete casks. The data since September 1998 was reviewed by the NRC inspectors. Significant variations between morning readings and evening readings were noted on the data collected. The licensee's evaluation of the data using the criteria established in Technical Specification 1.3.4 demonstrated compliance with the requirements to maintain temperature below the 110°F limit established in Technical Specification 1.2.3, "Maximum Permissible Air Outlet Temperature," and to demonstrate that no significant unexplained temperature problems were occurring with the concrete casks.

Criteria was established for acceptable placement of the concrete casks on the ISFSI pad in Technical Specification 1.2.11 "Placement of the Ventilated Storage Cask (VSC) on the Storage Pad." The concrete casks were required to be placed 15 feet ± 1 foot apart. The requirement for placement of the concrete casks was based on dose calculations which took advantage of the arrangement of the casks to provide self shielding. Distance measurements made on several of the casks verified compliance with the spacing requirements of the Technical Specification.

A radiologically controlled area had been established around the ISFSI pad and was properly posted as a radiation area. Sign-in on a radiation work permit and dosimetry were required for entry onto the ISFSI pad. Measurements taken by the NRC inspectors along the roped boundary found dose rates to typically be around 0.2 mR/hr with the highest reading of 0.5 mR/hr. A review of the licensee's survey of the ISFSI, dated May 16, 1999, found the values observed by the NRC inspectors to be consistent with the readings obtained by the licensee. The licensee maintained an environmental thermoluminescent dosimeter (TLD) adjacent to the ISFSI pad. Data for the TLD was reviewed for the past 2 years through the 1st quarter of 1999. The readings for the 2 year period on the TLD ranged from 884 mrem/quarter to 1243 mrem/quarter with a

mean of 1059 ± 114 mrem/quarter. The TLD was adjacent to the ISFSI pad about 3 feet from the nearest cask.

Technical Specification 1.2.4 "Maximum External Surface Dose Rate" established maximum dose rates for the concrete casks. The dose rate on the side of the concrete cask at 5 feet was limited to 20 mrem/hr. Dose rate limits at the air inlets and outlets and for the lid was 50 mrem/hr. The dose rate survey for Cask No. 8 and Cask No. 9 were reviewed. The cask heat loads for the two casks were 9.2 kw and 9.1 kw, respectively. Cask No. 9 had the higher dose rates with 3.6 mrem/hr on the side and 28.8 mrem/hr at the air inlet. These dose rate totals included both gamma and neutron, however the dose rates were primarily from gamma radiation. For example, the 28.8 mrem/hr air outlet dose consisted of 28 mrem/hr gamma and 0.8 mrem/hr neutron.

Cask No. 12 was the hottest cask loaded to-date. This cask contained 10.8 kw of fuel. The dose rates on the sides were measured as 1.2 mrem/hr. The highest dose rate at an air inlet was 42.3 mrem/hr. The shield lid dose rate ranged from 10 mrem/hr to 90 mrem/hr, averaging 50 mrem/hr. The acceptability of averaging the dose rate for the lid to comply with this Technical Specification was confirmed with the NRC Spent Fuel Project Office. Dose rates for the casks were very dependent on the placement of the fuel assemblies in the baskets. A direct correlation between heat load in kw for an individual basket versus dose rates outside the concrete cask can not be made and are dependent on whether the hotter fuel is placed near the center of the basket or near the edges.

Technical Specification 1.2.14 "Minimum Temperature for Lifting the Multi-Assembly Transfer Cask (MTC)" established a minimum temperature limit for lifting the transfer cask while containing a loaded basket. Lifting was not allowed if the ambient temperature was below 40°F. Cask No. 7 was moved to the ISFSI in October, 1998. A review of Attachment 3, "VSC-24 Loading and Placement Tracking Log" to Procedure 1302.025, "Spent Fuel Removal and Dry Storage Operations," for Cask No. 7 documented the ambient temperature inside the train bay during lifting of the transfer cask as 80°F. Attachment 3 to procedure 1302.025 was also reviewed for Cask No. 2, which was moved to the ISFSI in November 1998. Ambient temperature in the train bay was recorded as 93°F. In addition to the limitation on temperature established in Technical Specification 1.2.14, a temperature limit is established for movement of the loaded concrete cask in Technical Specification 1.2.13, "Minimum Temperature for Moving the MSB." Temperature must be at least 0°F. For both Casks No. 2 and No. 7, the ambient outside temperature when the loaded concrete cask was moved to the ISFSI was 74°F.

1.3 Conclusions

Technical Specifications related to the ISFSI were reviewed including dose rates limits, thermal limits and condition of the casks on the pad. The licensee was found to be in compliance with the VSC-24 Technical Specifications.

2 Design Control (60851)

2.1 Inspection Scope

Safety evaluations performed by the licensee related to the ISFSI and issues that had been identified by the licensee that were determined not to require safety evaluations were reviewed.

2.2 Observations and Findings

In accordance with 10 CFR 72.48(b)(2), the licensee submitted the annual summary of 10 CFR 72.48 safety evaluations performed at ANO. The report covered the period from December 1997 through November 1998. Six safety evaluations were summarized in the report. These included:

- ANO MSB Bottom Plate Flatness Out of Tolerance "Use As Is"
- ANO MSB Tube Welding Fabrication Nonconformances Accepted as "Use As Is"
- Changes to Estimated MTC Dose Rates
- Design Change to the ANO MTC for Time of Flight Ultrasonic Testing
- VCC Liner Tile Installation Adhesive
- Modification to VCC Shield Ring

All six evaluations were reviewed by the NRC inspectors. In addition, the list of issues that had been identified by the licensee and determined to not require 10 CFR 72.48 safety evaluations was reviewed. No concerns were identified with the licensee's safety evaluations.

Prior to the recent initiation of loading Cask No. 13, the licensee discovered that the drain line for the basket was 1.5 inches too short. This would have prevented all the water from being drained out of the basket and would have significantly lengthened the time required for vacuum drying the basket. The licensee discovered the problem during their pre-loading inspection process. An error in the measurement of the drain line by the manufacturer during construction of the cask was determined to be the cause of the problem. The licensee planned to replace the drain line with one of the correct length.

On April 22, 1999, the NRC issued a letter to ANO concerning the documentation for closure of CAL 97-7-002A. The NRC letter stated that a future inspection at ANO would include a review of the adequacy of the documentation established by the licensee to certify that the VSC-24 casks being used at ANO met the requirements of the Safety Analysis Report and Certificate of Compliance. All 10 baskets that had not been loaded at ANO at the time CAL 97-7-002A was issued were acid etched and examined for undocumented welds. Eight had surface weld marks that were ground out and

inspected. Any areas that were ground out below minimum wall thickness were filled in with new weld material. During this inspection, a review of the paperwork for the examination performed on Cask No. 13 was completed. This included the paperwork for Job Order No. 00970915 dated 10/31/97; Procedure/Work Plan 1409.671, "Inspection of Multi-Assembly Sealed Basket Components," Revision 0; Weld Repair/Replacement Request WR No. 98-0815 dated 12/10/98; and WR No. 98-0830 dated 12/16/98. The packages included documentation of the weld examinations and the non-destructive testing that was performed. Documentation of the weld indications found on the casks and the process for evaluating the casks was detailed and complete.

2.3 Conclusions

The licensee had performed several 10 CFR 72.48 safety evaluations related to the ISFSI. No concerns were identified during the review of the safety evaluations, including review of a number of issues that had been screened by the licensee and determined to not require safety evaluations.

3 Follow-up on Open Items (92701)

3.1 (Discussed) Unresolved Item (URI) 50-368/9712-05: Potential Hydrogen Cracking on Previously Loaded Casks. In a letter to the NRC dated August 28, 1998, the licensee committed to complete an ultrasonic examination by September 21, 1999, of the structural lid welds of the four loaded baskets stored at the ANO ISFSI. As of this inspection, the licensee had completed their initial examination of the structural lid welds on the four baskets using the time-of-flight diffraction ultrasonic testing technique. Casks No. 1, No. 3 and No. 5 passed the initial screening exam, however, Cask No. 6 was found to have a possible weld deficiency that exceeded the criteria in ASME Section XI related to the design basis for a horizontal drop. Cask No. 6 was determined to be operable in its current configuration as long as it was not moved without repair or further analysis. The concrete cask was tagged at the ISFSI with a sign stating the concrete cask and loaded basket was not to be moved without permission from Dry Fuel Storage management. Based on material testing at the Palisades Nuclear Plant, additional analysis was predicted to show that the indications found on Cask No. 6 will be acceptable for all conditions including the design basis drop scenario. At worst, ANO expected the analysis to show that the minimum temperature for movement of Cask No. 6 may be a few degrees higher than the current ANO procedural restriction of 30°F. The licensee had established this issue as Condition Report CR-ANO-C-1999-0081. Weld material samples will be prepared for further testing and analytical analysis.

4 Exit Meeting

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on June 10, 1999. The licensee acknowledged the findings presented. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.

ATTACHMENT 1

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Dosa, Licensing Specialist
M. Harris, Dry Fuel Project Manager
T. Smith, Radiation Protection Specialist
B. Starkey, Radiation Protection Supervisor
D. Williams, Engineer
P. Williams, Senior Engineer

INSPECTION PROCEDURES USED

60851	Design Control
60855	Operations of an ISFSI

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None

Discussed

50-368/9712-05	URI	Potential Hydrogen Cracking of Previously Loaded Casks

Closed

None

LIST OF ACRONYMS

ASME	American Society of Mechanical Engineers
ANO	Arkansas Nuclear One
CAL	Confirmatory Action Letter
CFR	Code of Federal Regulations
CR	Condition Report
ISFSI	Independent Spent Fuel Storage Installation
MTC	Multi-Assembly Transfer Cask
mR/hr	milliRoentgen/hr
mrem/hr	millirem/hr
NRC	Nuclear Regulatory Commission
TLD	Thermoluminescent Dosimeter
URI	Unresolved Item
VCC	Ventilated Concrete Cask
VSC	Ventilated Storage Cask

ATTACHMENT 2

LOADED VSC-24 CASKS AT THE ANO ISFSI

LOADING ORDER	CASK #	UNIT	DATE LOADED ON PAD	HEAT LOAD (kw)	MANHOURS TO LOAD	MANREM DOSE
1	1	Unit 1	12/96	5.2 kw	not tracked	0.185 manrem
2	3	Unit 1	1/97	10.7 kw	1750 hrs	0.384 manrem
3	5	Unit 2	4/97	4.8 kw	1852 hrs	0.291 manrem
4	6	Unit 2	4/97	6.2 kw	1463 hrs	0.469 manrem
5	12	Unit 2	9/98	10.8 kw	2479 hrs	0.900 manrem
6	11	Unit 2	10/98	8.0 kw	1416 hrs	0.553 manrem
7	7	Unit 2	10/98	8.0 kw	1844 hrs	0.567 manrem
8	2	Unit 2	11/98	8.1 kw	1542 hrs	0.483 manrem
9	4	Unit 1	4/99	9.1 kw	2036 hrs	0.236 manrem
10	8	Unit 1	4/99	9.2 kw	1186 hrs	0.231 manrem
11	9	Unit 1	5/99	9.1 kw	1324 hrs	0.189 manrem

Note 1: The 12th cask (Cask No. 13) was being loaded during this inspection with Unit 1 fuel. Heat load was 7.3 kw.

Note 2: Casks No. 8, No. 9, and No. 13 were loaded with burnable poison rod assemblies.