October 3, 1994

Dockets: 50-313
50-368
Licenses: DPR-51
NPF-6

Entergy Operations, Inc.
ATTN: J. W. Yelverton, Vice President
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1448 S.R. 333
Russellville, Arkansas 72801

SUBJECT:
NRC INSPECTION REPORT 50-313/94-22; 50-368/94-22 , 72-13/94-02

This refers to the inspection conducted by Mr. C. E. Johnson and the personnel identified in the enclosed report on August 29 through September 2, 1994, with in-office inspection until September 15, 1994. The inspection included a review of activities authorized for your Arkansas Nuclear One, Units 1 and 2, facility. At the conclusion of the inspection, the findings were discussed in a telephone conference with those members of your staff and a Sierra Nuclear Corporation representative identified in the enclosed report.

Areas examined during the inspection are identified in the report. The inspection reviewed the fabrication and installation activities for the Ventilated Storage Casks-24 for spent fuel as well as several open items. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress. The results of this inspection are documented on page 1, in the enclosed report.

This inspection identified a violation related to reinforcing steel placement and spacing in Cask No. 1. The violation was attributed to activities conducted by Sierra Nuclear Corporation (your contractor, Docket No. 07201007). Consequently, the Notice of Violation is documented in a separate cover letter forwarded to Sierra Nuclear Corporation.

The review of quality assurance oversight of your contractor and subcontractors indicated that you were doing an excellent job of monitoring the fabrication and installation activities of the ventilated storage cask both on site and at the vendors' facilities. It was noted that you placed additional requirements on the contractor to

assure that problems which occurred at another nuclear power plant facility would not occur at Arkansas Nuclear One. Additionally, we recognize the conservative action of your staff when a hold was placed on construction activities in response to the identification of deficiencies.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC Public Document Room.
Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

Thomas P. Gwynn

Thomas P. Gwynn, Director
Division of Reactor Safety

Enclosure:
Appendix - NRC Inspection Report
50-313/94-22; 50-368/94-22 w/Attachments

cc w/enclosure:
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09/23/94	09/26/94	09/26/94	09/28/94	09/28/94

D:DRP	D:DRS			
ABBeach	TPGwynn			
10/03/94	10/03/94			

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-313/94-22
50-368/94-22

Licenses: DPR-51
NPF-6

Licensee: Entergy Operations, Inc.
Route 3, Box 137G
Russellville, Arkansas

Facility Name: Arkansas Nuclear One, Units 1 and 2

Inspection At: Arkansas Nuclear One Site, Russellville, Arkansas

Inspection Conducted: August 29 through September 2, 1994, with in-office inspection until September 15, 1994

Inspectors: C. E. Johnson, Reactor Inspector, Maintenance Branch
Division of Reactor Safety

F. C. Sturz, Leader, Irradiated Fuel Section
Storage and Transport Systems Branch
Division of Industrial and Medical Nuclear Safety
Office of Nuclear Materials Safety and Safeguards

J. E. Whittemore, Reactor Inspector, Maintenance Branch
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Accompanying
Personnel: W. K. Cheng, Atomic Energy Counsel, Taiwan,
Republic of China

Approved: Dale A. Powers _____
Dr. Dale A. Powers, Chief, Maintenance Branch Date Division of
Reactor Safety

Inspection Summary

Areas Inspected (Units 1 and 2): Nonroutine, announced inspection of the fabrication and installation activities for the Ventilated Storage Casks-24 for spent fuel at the Arkansas Nuclear One, Units 1 and 2, facility. The inspection included followup of previous inspection findings.

Results (Units 1 and 2):

- Plant Operations

  Not applicable during this inspection.

- Maintenance

  There were several inconsistencies between the Sierra Nuclear Corporation (contractor to Entergy Operations, Inc.) Specification AVCC-92-001 and Van Horn Construction, Inc. (subcontractor to Sierra Nuclear Corporation) installation procedures for the ventilated storage cask (Section 2.2.1).

  The Van Horn Construction, Inc. installation checklist (Form VHC-003-A) for the ventilated storage cask did not clearly identify completed work (Section 2.2.1).

  The concrete design mix for the construction of the ventilation storage cask was determined to appropriately satisfy specification requirements (Section 2.2.1).

  In general, the ventilated storage cask was being constructed according to the design drawings and the fabrication specifications (Section 2.2.2.1).

  Deficiencies in the placement and positioning of reinforcing steel in Cask No. 1 were a procedural violation (Section 2.2.2.1).

  The general configuration of the independent spent fuel storage installation pad appropriately complied with the design drawings (Section 2.2.2.2).

  The concrete batch plant was fully capable of supplying an adequate concrete design mix for the construction of the ventilated storage casks (Section 2.2.2.3).

- Engineering

  Installation procedures lacked detail; however, with the use of design drawings, they were adequate for installation (Section 2.2.1).

The cask design was conservative in that some ventilated storage cask components were classified by the licensee as safety-related although the safety analysis report did not require them to be of that quality (Section 2.3).

- Plant Support

  Site quality assurance overview of contractor and subcontractor fabrication and installation activities of the ventilated storage cask was excellent (Section 2.3).

  The licensee was doing an excellent job conducting surveillance audits of contractor and subcontractors' activities (Section 2.3).

- Management Overview

  Management oversight of contractor and subcontractors' activities for fabrication and installation of the ventilated storage cask were excellent. Strong oversight was exemplified when management placed a hold on construction activities pending certain contractor corrective actions (Section 2.3).

Summary of Inspection Findings:

- Violation 313/9422-01; 368/9422-01 cited against Sierra Nuclear Corporation was opened (Section 2.2.2.1).
- Inspector Followup Item 368/9310-01 was closed (Section 3.3).
- Inspector Followup Item 368/9414-01 was closed (Section 3.4).
- Violation 313/9306-03 was closed (Section 3.5).
- Violation 368/9307-01 was closed (Section 3.6).
- Violation 313/9309-01 was closed (Section 3.7).
- Violation 313/9412-01 was closed (Section 3.8).

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting
- Attachment 2 - Documents Reviewed

DETAILS

1 PLANT STATUS

During this inspection period, both units were operated at or near full-rated power.

2 INSPECTION OF THE VENTILATED STORAGE CASKS (VSC)-24 FABRICATION AND INSTALLATION ACTIVITIES (92902)

2.1 Background

The licensee contracted with Sierra Nuclear Corporation to design and construct a dry cask spent fuel storage facility to be partially constructed onsite for interim storage of spent fuel. The Sierra Nuclear Corporation cask design consists of a steel multi-assembly basket which holds 24 spent fuel assemblies (sealed) and a steel-clad VSC-24, which provides biological shielding and protection. The licensee was documenting a 10 CFR 50.59 evaluation as required by 10 CFR 72.212 (Subpart K), showing that use of the general license for storage of spent fuel at the power reactor site will not involve an unreviewed safety question or Technical Specification change. The licensee planned to construct 14 VSC-24s.

The Sierra Nuclear Corporation cask design was approved by the NRC under Certificate of Compliance No. 1007, "Dry Spent Fuel Storage Cask," on May 7, 1993.

Sierra Nuclear Corporation subcontracted Van Horn Construction, Inc., to perform the onsite fabrication and installation of the VSCs at Arkansas Nuclear One. Data Testing, Inc., was subcontracted to perform the concrete testing activities onsite.

The objective of this inspection was to determine if VSCs for the storage of spent fuel was being constructed according to the approved design drawings' specifications.

2.2 General Issues

2.2.1 Procedures and Records Review

The inspector reviewed 12 construction procedures written by Van Horn Construction, Inc., related to the installation and erection of the VSCs. The inspector also reviewed Specification No. AVCC-92-001, "Fabrication Specification For The Ventilated Concrete Cask," Revision 4, which had been developed by the Sierra Nuclear Corporation. The inspector compared the governing procedures of Van Horn Construction, Inc., to Sierra Nuclear Corporation Specification AVCC-92-001 to assess consistency. Review of these procedures and the specification indicated the following inconsistencies:

- Procedure VHC-003-2, "Application of Form Oil," Revision 1, referenced a form oil to be thoroughly coated on all form surfaces, as required by Specification AVCC-92-001, Section 3.8 and 3.8.1. Sections 3.8 and 3.8.1 of Specification AVCC-92-001 did not address any form oil.

- Step 2 of Procedure VHC-003-4, "Procedure For Removing Forms," Revision 2, required an 18-hour wait, if minimum temperature overnight was greater than 50°F, for side forms to remain in place after a concrete pour as stated in Specification AVCC-92-001. Specification AVCC-92-001 required the temperature to be 60°F.

The inspector determined that the above procedures had been approved by the licensee.

The inspector informed the licensee representative of these inconsistencies. Licensee representatives stated that these inconsistencies would be corrected.
The inspector reviewed Van Horn Construction, Inc., installation inspection checklist for Cask No. 1. The inspector could not determine by review of this checklist that all work (e.g., rebar installation) had been completed. A licensee representative was informed of this observation. Licensee and contractor representatives informed the inspector that they would modify the checklist to clearly indicate work completed.

The inspector determined that, of the procedures reviewed, the majority lacked detail. However, procedures did reference the appropriate American Standard for Testing and Materials standards and codes for installation and testing requirements. Licensee representatives informed the inspector that procedures would be demonstrated by the subcontractor before the start of any concrete placement activities. Procedures by Data Testing, Inc., were not reviewed by the inspector because they were in draft form and not approved by the licensee.

Generally, the procedures reviewed lacked detail. However, with the planned use of the design drawings, American Standard for Testing and Materials standards, and the demonstration of procedures before any concrete placement activities, the inspector concluded that the correct construction of the ventilated concrete cask could be assured.

The inspector also reviewed material certification records for the steel liner, reinforcing steel and concrete mix. The certifications attested to the required pedigree for the liner and reenforcing steel. Additionally, material certifications for concrete ingredients of cement, fly ash, and admixtures were approved by the manufacturer and met the specification requirements.

The inspector reviewed the concrete mix design compressive strength records and concluded that specification requirements were met. The compressive strength records for the concrete placement were not reviewed because the concrete placement did not occur during this inspection. Records reviewed were sufficient. Those records certifying the material and reporting successful test results were adequate.

2.2.2 Field Observation

2.2.2.1 Ventilated Storage Cask (VSC)

The inspector used contractor installation drawings to inspect the VSC for correct reinforcing steel placement, and general configuration of the steel liner and ventilation ducts. The inspector also examined the following:

- Liner assembly and lid: Drawing No. VSC-24-002, Detail A;
- Air Inlet Assembly: Drawing No. VSC-24-003 (visible portions only);
- Air Outlet: Drawing No. VSC-24-005, Detail A;
- VSC bottom plate assembly: Drawing No. VSC-24-005, Detail A, and visible portions of Section B-B and C-C only; and
- Reinforcing cage: Drawing No. VSC-24-006, Section B-B, D-D, and C-C.

Inspection of the completed work of the VSC indicated that, in general, the VSC was being constructed as required by the design drawings and fabrication specifications. The manufacturer's shop welds on the steel liner appeared to be adequate. No physical measurements of the welds were made, only visual observations. Ventilation ducts appeared to be correctly oriented. Material type and thickness of the steel liner was as specified by the design drawings. Most of the deficiencies identified by the inspector had previously been identified and documented by the licensee on nonconformance reports and design change requests. However, two deficiencies were identified by the inspector that were not documented by a nonconformance report or design change request.

- Drawing No. AVCC-24-006, Sheet 1 of 2 requires Item 8 (No. 5 size rebar) to be located in Section B-B on the inside leg of Item 12 (No. 5 size rebar); however, the installed location of Item 8 was on the outside leg of Item 12.
- Drawing No. AVCC-24-006, Sheet 2 of 2 requires a 12-inch spacing with ± 2-inch tolerance between Item 19 pieces (No. 3 size rebar); however, the installed spacing between two pieces was 15 inches.

Procedure VHC-004-1, "Reinforcement Procedure," Revision 2, requires that all reinforcement be according to the design shop drawings as presented by Lofland Steel Company and approved by Sierra Nuclear Corporation to meet all requirements of the specification. These deficiencies were a potential violation (313;368/9422-01) of the procedure.
The inspector also identified what appeared to be a deficiency on Drawing No. AVCC-24-006. Field measurements taken by the inspector of Item No. 3 (No. 6 size rebar) indicated a U-bend dimension of 4 inches. The drawing indicated a 6-inch U-bend dimension. Further discussions with the licensee representatives and review of Design Change Request No. DCN-ANO-074 indicated that Note 7 for Drawing No. AVCC-24-006 addressed this deficiency but was not clear, because Item 3 was inadvertently omitted. The inspector was satisfied with this explanation. However, the licensee representative informed the inspector that this Note 7 would be changed to clearly indicate Item 3. The inspector was assured that the licensee representatives were informed of all inspector-identified deficiencies.

The inspector noted that there were no hold points in the cask assembly procedures or checklists. The inspector believed that the use of verification hold points at various times during reinforcing steel installation may have resulted in the licensee or its contractors identifying these deficiencies. Subsequently, the licensee representatives informed the inspector that they were considering adding verification hold points on the remaining VSC installation activities.

2.2.2.2 Independent Spent Fuel Storage Installation Pad

The inspector walked down the independent spent fuel storage installation pad. The excavation of soil and placement of the concrete pad had been completed. The pad was located inside the protected area enclosed by a separate fence. The general configuration of the pad conformed to the design drawings. A licensee representative informed the inspector that a soil check just before concrete placement verified soil compaction requirements were satisfactory.

2.2.2.3 Concrete Batch Plant

The inspector toured the Mobley Construction Company concrete batch plant located in Russellville, Arkansas. Mobley Construction Company was contracted to provide concrete for the casks at Arkansas Nuclear One. The batch plant was automated and approximately 2 years old. Records showed that scales and weights were calibrated as required. The stockpile of large aggregate for the VSC was segregated to prevent contamination.

The batch plant supervisor showed the inspector current calibration records of various equipment. The inspector reviewed the plant certification checklist and found it to be

certified by a registered professional engineer. The plant tour confirmed that the batch plant was fully capable of supplying an adequate concrete design mix for the VSCs.

2.3 Quality Assurance

The inspector reviewed implementation documents for quality assurance as it related to the fabrication of the VSCs. The objective was to verify that the quality assurance functions complied with regulatory requirements. Additionally, the inspector wanted to determine if the VSCs were being fabricated to meet the commitments made to NRC. The inspection focused on the extent to which control measures for material procurement, fabrication processes, and inspections were implemented. The inspector further evaluated program effectiveness by interviewing appropriate licensee and contractor personnel.

Sierra Nuclear Corporation Specification AVCC-92-001, "Fabrication Specifications for the Ventilated Concrete Cask," Revision 4, dated May 1994, was reviewed against commitments made in the Safety Analysis Report No. PSN-91-001, "Safety Analysis Report for the Ventilated Storage Cask System," Revision 0-A, dated December 1993. The NRC initial staff assessment was documented in "Safety Evaluation Report for the Sierra Nuclear Associates Safety Analysis Report for the Ventilated Storage Cask System," Revision 0, dated April 1993. The inspector noted that the revised Specification AVCC 92-001 incorporated a change not initially addressed in the safety analysis report. This change resulted in adding Specification Section 1.5, "Safety Related Items." This new section listed all of the VSC components and their individual safety classification requirements. Additionally, the section indicated that the full quality assurance program requirements did not apply to all component items of the VSC, which had an overall classification of importance to safety. This new specification section had been added to the requirements of the Safety Analysis Report, Appendix 2.1, Specification VCC 87-001, "Fabrication Specifications for the Ventilated Concrete Cask, Revision 5, October 1991.

The inspector noted that Safety Evaluation Report, Section 1.2, and Safety Analysis Report, Section 1.1, identified the VSC as a component important to safety, and that Safety Evaluation Report, Section 10.0, and Safety Analysis Report, Section 13.1, indicated that the quality assurance system will be used to assure traceability and control quality of all materials used in the production of equipment and components important to safety for the storage casks. However, Safety Analysis Report, Section 1.2.1.2, Table 1.2-5, "Concrete Cask Construction Specification Summary," states, in part, that "Parameters important to safety that are to be covered by the quality assurance program are density, wall thickness, compressive strength, and reinforcing material strength."

Based on the above review, the inspector determined that Section 1.5 to Specification AVCC-92-001 was a clarification of Safety Analysis Report, Table 1.2-5, and that the licensee's design specifications were conservative in that some VSC components were classified as safety-related while the safety analysis report did not require them to be safety-related.

The inspector reviewed Nonconformance Reports VCC-1-01 through -03 and VCC-M-01 through -06 and noted that some should be closed out before concrete placement. From discussions with licensee representatives, the inspector learned that these nonconformance reports were to be resolved before concrete placement.

The inspector reviewed documentation related to the design of the independent spent fuel storage installation pad and concrete placement required by 10 CFR 72.212(b)(2) and 10 CFR 72.212(b)(3). Calculation No. 92-D-2001-02 included a static load analyses of the pad according to American Concrete Institute, Code 318. The maximum allowable acceleration components due to earthquake loads were determined to be 0.55g vertical and 0.825g horizontal. The October 1992 "Geotechnical Investigation Proposed ISFSI Pad, Arkansas Nuclear One Plant, Russelleville, Arkansas" included soil boring data from the proposed independent spent fuel storage installation site. The data was assessed for its suitability, and recommendations were made for excavation and backfill. The inspector discussed with licensee representatives the assumptions about cask weight and pad size contained in this report and the future comparison to actual as-built conditions to verify the conclusions reached were still valid.

The inspector also discussed with licensee representatives the future evaluation of the correlation of the geotechnical investigation to Licensee Report CEQN-00001-1, Section 4.0, "Site Conditions and Development." Licensee Report CEQN-00001-1 contains general civil and structural requirements for the ANO site. The inspector noted that the documented evaluation required by 10 CFR 72.212(b)(3) did not include a dynamic analysis of the independent spent fuel storage installation foundation and pad under the site design earthquake conditions. This evaluation is to determine that the response spectra and intensity are bounded by the cask design analyses and that the storage cask will not be in an unanalyzed condition. From discussions with the licensee representative, the inspector learned that this has been considered in the siting of the independent spent fuel storage installation, but the written evaluation had not been completed. Licensee representatives stated that this evaluation would be completed before cask use, as required by the regulations.

The inspector reviewed several audit reports conducted by the licensee. Review of these audit reports showed that the licensee had identified many deficiencies in the subcontractors' quality assurance programs. In many instances, the licensee identified that the subcontractors had no written work procedures or formal quality assurance

programs. The subcontractors were informed by the licensee that a formalized quality assurance program must be in place for the fabrication and installation activities of the VSC. Audits were also conducted by licensee corporate office personnel at the various vendor sites. The licensee appeared to be performing excellent audits, and its initiative in this area was commendable.

The licensee's quality assurance overview of the contractor and subcontractors fabrication and installation activities of the VSC were excellent. During this inspection, the licensee placed a hold on cask construction at Arkansas Nuclear One because of additional identified discrepancies. The licensee imposed additional requirements on its contractor that also required that the problems at another nuclear power plant facility be addressed.

3 FOLLOWUP OF PREVIOUS INSPECTION FINDINGS

3.1 (Open) Inspection Followup Item 368/9317-02: Failure to Evaluate Repetitive Failure of Rosemount Transmitter for ECCS Flow

The NRC identified Low Pressure Safety Injection Flow Transmitter 2FT-5091 as a component that had experienced periodic failure but had not been evaluated to determine the cause of the repetitive failure. The licensee performed troubleshooting and a root cause analysis which determined that the transmitter was being over-ranged. Additional analysis revealed that the over-ranging occurred because of unique hydraulic conditions that transpired during flow surveillance testing, and possibly, system water hammer at other times. Engineering personnel were confident that the unique conditions, ie., pressure wave propagation, would not occur during system initiation in response to accident conditions. The root cause analysis proposed corrective actions to revise testing procedures to protect the transmitter during testing and evaluate the system for water hammer that contributed to transmitter failure.

The inspector verified that procedures had been revised to address transmitter over-ranging. Procedures 2104.005, "Containment Spray System," Revision 31, and 2104.040, "LPSI System Operations," Revision 27, presently required equalizing across the transmitter prior to starting a pump with only a recirculation flow path.

However, the licensee had not yet addressed the water hammer issue identified by the root cause analysis. This item cannot be closed until the licensee has completed the proposed action to address system water hammer as the potential cause for the periodic failure of Transmitter 2FT-5091.

3.2 (Open) Inspection Followup Item 313/9326-02: Failure of Unit 1 Polar Crane Hoist to Reestablish Vertical Motion After Pausing During Lift of Reactor Vessel Head

During the latest Unit 1 refueling, the reactor vessel head was initially lifted with the polar crane main hoist. After a pause during the lift, vertical upward motion could not be reinitiated with the hoist loaded. To place the vessel head in its proper refueling location, it was necessary to place the vessel on cribbing in an intermediate location, and relift from a near unloaded condition. Once the hoist reached normal lift speed, it continued to move at normal speed. After placing the vessel head in the refueling location, licensee personnel initiated troubleshooting, analysis, and corrective action.

The licensee retrieved past corrective action documents associated with the Unit 1 polar crane. It was discovered that other anomalies had been identified in the past and addressed only to the extent necessary to solve immediate problems. For example, the auxiliary hoist that was rated at 25,000 pounds, had not been able to lift 15,000 pounds in the recent past. This had not been considered a problem because the main hoist was available for these lifts.

The licensee obtained vendor assistance and reviewed procedures, technical information, vendor drawings, and hoist control system configuration. Licensee personnel discovered that the polar crane control system setup procedure did not agree with the vendor-supplied technical manual and drawings for the installed configuration of the hoist control system.

The licensee consulted with the vendor and developed the correct control system setup procedure for both hoists of the Unit 1 polar crane. To address the generic implications, the licensee checked other cranes on site, supplied by the same vendor. The Unit 2 polar crane, was supplied by the same vendor, but had a different hoist control system. While the as-found Unit 1 setup procedure did not address the proper configuration of the control system, the Unit 2 procedure was missing control system setup steps specified by the vendor manual. As a result, both polar crane control system setup procedures were revised to meet vendor requirements. The inspector verified that the licensee had implemented control system setup procedures recommended by the vendor.

According to documentation reviewed, the auxiliary hoist of the Unit 1 polar crane had successfully lifted 15,000 pounds (60 percent of rated load) during recovery from refueling. However, neither hoist was required to reinitiate upward hoist motion from a near capacity loaded condition. This item cannot be closed until the licensee validates the successful performance of both crane hoists under loaded conditions.

3.3 (Closed) Inspection Followup Item 368/9310-01: Inspector Concerns About Maintenance of Catch Containers for Contaminated Valve Packing Leakage

An inspector observed that the status of a Unit 2 valve located in the auxiliary building, with a catch container installed, could not be readily determined. Personnel were

unaware as to whether or not a work request had been generated or work had actually been performed. Responsible decontamination personnel were not fully apprised of the status of valves with catch containers.

In order to address the finding, the licensee initiated action to modify an existing administrative system. The normal scheduling function caused a monthly blanket work order to be issued to the maintenance organization to replace or adjust packing on valves that exhibited external leakage. However the initiation or completion of work was not routinely communicated to personnel responsible for containment of the leakage, ie., decontamination personnel. Therefore, the licensee proposed adding a step to the monthly work order requiring maintenance personnel to notify decontamination personnel to remove catch containers when work was completed. Additionally, the decontamination group was assigned the responsibility of providing the scheduling organization a continually updated list of active leaking valves with catch containers installed.

The inspector observed that a licensing information request, with an attached memorandum, dated February 8, 1994, from Unit 2 operations to licensing, documented the implementation of these two programmatic improvements. The inspector was also provided a current list of leaking valves with catch containers. However, when the inspector reviewed the current and previous monthly work orders, there was not a step requiring maintenance to inform decontamination personnel to remove catch containers.

The inspector informed a licensee representative of this failure to implement planned corrective action. Within hours, the inspector was provided documentation indicating that the database used for generating the blanket work request had been modified to include the planned step. The inspector informed licensee management of this oversight during a debrief of inspection results.

3.4 (Closed) Inspection Followup Item 368/9414-01: Licensee Response To NRC Information Notice 88-92, Supplement I, "Potential for Spent Fuel Pool Draindown

The supplement was issued to report the failure of a pneumatic bladder gate seal for a spent fuel pool gate upon the loss of the air system supporting the seal. The unplanned deflation of the seal bladder resulted in a significant decrease in fuel pool level. This inspection followup item was initiated because inspector was unable to address the licensee's response to NRC Information Notice 88-92, Supplement I, during the Unit 2 Fuel Integrity Reactor Subcriticality (FIRS) inspection. The inspector interviewed engineering personnel, reviewed applicable procedures, and walked down spent fuel support systems to assess the adequacy of the licensee's response.

The inspector noted the configuration of the Unit 2 spent fuel pool and supporting systems. The spent fuel pool was constructed with a stainless steel liner with three penetrations at a depth greater than 6 inches below the normal surface level. The inspector verified syphon break holes in all three of these service lines within 6 inches of the normal surface level. All other penetrations terminated within 6 inches of the normal pool surface level.

The spent fuel pool was constructed with pneumatic seal gates to isolate the pool from the cask storage pit and the tilt fuel pit (transfer canal). The two gate seals were supported by a regulated air supply from the instrument air system. Inflated seals were periodically checked by operations personnel for indication of bladder leakage. The common supply line to the two gate seals contained a check valve to prevent seal bladder depressurization in the event of instrument air header depressurization. This check valve was installed in 1981 in response to an event that resulted in a pool level decrease. The thrust of the licensee's response to the supplement had been to rely on the previously installed check valve to prevent seal deflation. In discussions with system engineering personnel, the inspector discovered that a design modification to provide backup nitrogen to the seal bladders was in the review process and would soon be ready for implementation.

A review of drawings and discussion with personnel indicated there were no penetrations greater than 6 inches below the normal level or drains in the tilt fuel pit. Draining the tilt pit fuel required the use of a portable submersible pump. The only passages for water out of the tilt pit was through the gate to the fuel pool or through the transfer tube gate valve to the containment.

The inspector reviewed procedures and documents alluded to in the licensee's response to the supplement, that would be used if work was performed on the fuel transfer tube gate valve with the tilt pit drained. The licensee's outage management manual contained checklists and guidelines which cued operators and managers to provide for containment integrity or establish mitigating capabilities if integrity could not be quickly regained due to unexpected conditions. Procedure 1015.008, "Unit 2 Shutdown Cooling," Revision 9, provided attachments to predict time to boiling and core uncovery. The procedure also required the maintenance of a containment impairment list which required a specifically tailored response for regaining containment integrity or mitigating the effects of a loss of integrity resulting from abnormal conditions.

During a walkdown of the Unit 2 spent fuel pool facility, the inspector noted the licensee's process and policy for foreign material exclusion from the spent fuel pool to be excellent. The inspector further concluded that the licensee's existing facility design, administrative requirements, and procedures addressed the concerns of the supplement, and therefore, the response to the supplement was satisfactory.

3.5 (Closed) Violation 313/9306-03: Licensee Corrective Action in Response to Three Examples of Improper Valve Alignment on Unit 1

During the period June 3-24, 1993, three separate occurrences of misaligned valves in Unit 1 safety-related systems were identified. The licensee had addressed each example as a separate violation and took corrective action specific to each example plus overall action to address the issues common to all occurrences. The inspector reviewed documentation to verify that all corrective action committed to had been performed. These actions are noted below:

- Counselling individuals involved in the mispositioning events regarding correct methodology for checking valve position, and expectations for communication and self-checking.

- In addition to reviews conducted with Unit 1 operators, peer discussions were conducted between involved individuals and other crews.

- A read and sign memorandum was issued to the Unit 1 operating staff.

- Procedure 1000.027, "Hold and Caution Card Control," was revised to require adding the tagged component name in addition to the number on the tag-out record sheet.

- Unit 1 operations adopted a new self-checking program. Stop, Think, Act, Review (S. T. A. R.).

- Unit 1 operating personnel were required to review Communications Standards for Operations.

- The licensee's operations performance monitoring program was revised to incorporate communications monitoring as an objective of the program.

- The Unit 1 operations surveillance test schedule was revised to equalize shift work loads.

- A human performance evaluation was performed for each of the three events. The majority of the recommended corrective actions were adopted.

- An evaluation on the use of alternate, diverse, or additional means of checking the position of Category E valves was performed. Information gained from this effort was placed in the relevant procedures and checklists.

The inspector concluded that licensee's actions to address each misaligned valve occurrence and the issues common to all occurrences were satisfactory.

3.6 (Closed) Violation 368/9307-01: Licensee Corrective Action in Response to Violation of Reactor Coolant Sampling Procedure

A chemist was observed to ignore the procedure requirements while obtaining a liquid sample from the reactor coolant system hot leg. Specifically, the chemist flushed the sample system at the wrong rate and performed steps out of correct sequence. The inspector verified through a review that the licensee's corrective action had addressed the specific and generic issues associated with this event.

To address the specific violation, licensee management immediately counselled the individual involved, conducted briefings with chemistry crew personnel, and issued a memorandum to all chemistry personnel at craft and supervisory levels emphasizing management expectations regarding procedural adherence. Additionally, Procedure 1052.023, "Conduct of Chemistry," was revised to clarify the procedural adherence expectations. Procedure 2607.001, "Unit II Reactor Coolant Sampling," was reviewed. This review identified several valves in the sample system that were incorrectly labelled. These labelling deficiencies were corrected.

To address generic implications and provide assurance against recurrence, the licensee implemented other actions. The chemistry job observation program was strengthened by developing objectives for procedure compliance, work practices, safety practices, equipment material condition, and radiation worker practices. A review of frequently used chemistry procedures was completed and all chemistry department procedures were enhanced by upgrading to current format and requirements.

To assure consistent training, on-the-job training qualification cards were reviewed and revised to assure that qualifying chemists were required to have solid basic knowledge and skills. Classroom Lesson Plan AZ10070-010, "Introduction to Nuclear Chemistry," was reviewed and enhanced to provide additional information and requirements regarding procedure use and adherence.
Finally, human factor enhancements were installed on pressure and flow indicators in the primary and secondary sample rooms. These enhancements consisted of indicating the proper ranges and values of pressure and flow for sampling activities.

After review of the licensee's response to the violation, the inspector concluded that the implemented corrective action to address the violation were satisfactory.

3.7 (Closed) Violation 313/9309-01: Failure to Implement Previously Proposed Corrective Action

This violation resulted when the licensee failed to replace a safety-related component prior to the end of its qualified life because previous corrective action to address the failure of the component was not implemented. An emergency diesel generator speed sensing relay (speed switch) failed and prevented the diesel generator from being started and loaded from the control room. In response to a condition report initiated for speed switch failure in 1989, the licensee had established the expected life of the speed switch at 5 years and revised the preventive maintenance program to require switch replacement every 4 1/2 years. The component replacement requirement was then inadvertently omitted before it was approved and integrated into the preventive maintenance program.

The inspector reviewed the licensee's corrective action to address this violation. A human performance enhancement system evaluation was performed to positively establish the sequence of events leading to the oversight. A review of preventive maintenance and environmental qualification tasks for safety-related components was performed to identify any tasks that might not have been approved and had no past accomplished dates. Additional review was performed to identify any tasks that had been approved but had no assigned due dates. A sample of tasks in these categories was identified, but all replacement tasks had been completed. Procedure 1000.115, "Preventive Maintenance Program," had been revised to define responsibilities and requirements for tracking all unapproved preventive maintenance tasks for both units.

The licensee evaluated broad concerns related to preventive maintenance and initiated the development of a detailed action plan to implement an improved preventive maintenance program. The project plan was approved in February 1994 and a implementation schedule was put in place. The inspector reviewed a summary of the plan and the implementation schedule. The improvement plan implementation was ahead of the schedule, which indicated an external audit of the new program after January 1, 1995. The inspector concluded that the process changes already implemented would prevent a similar oversight until the new program tracking and review elements were in place.

3.8 (Closed) Violation 313/9412-01: Failure to Recognize and Cease Operation Outside of a Facility License Limit

This violation occurred when a safety-related steam generator level transmitter was not identified as inoperable for an excessive time period, rendering one train of emergency feedwater technically inoperable. The inoperability occurred because the transmitter output differed significantly from other transmitters measuring the same parameter. As a result of the failure to identify the inoperable condition, the unit was not brought to hot shutdown within the required 36 hours.

The licensee determined the root cause of the failure to identify the inoperable level transmitter to be inattention to detail on the part of Unit 1 licensed operators. Contributing causes were identified as vague procedural requirements for log taking and instrument operability determination. The licensee's actions to address the violation were numerous and varied.

Immediate action was to take the unit to hot shutdown and restore the faulty transmitter on January 31, 1994. Within a week of the event, the licensee accomplished the following:

- A review of January 1994 logs was performed to find any additional channel check errors. No errors were identified.

- Several meetings were conducted involving licensed operators, operations supervisors, and management personnel. These meetings reviewed the event, emphasized Technical Specification requirements, operator responsibilities, and discussed self-checking techniques for log-taking activities.

Additionally, a human performance enhancement system evaluation was performed. Findings and implications were identified and discussed with operating personnel assigned to both units. Human factors enhancements were added to the control room logs which eliminated mental calculations and comparisons. Also, Procedure 1015.003A, "Unit 1 Operations Logs," was revised to clarify requirements and responsibilities for end-of-shift reviews. The above actions were completed prior to April 1, 1994.
By May 1, 1994, the licensee had revised the job request priority system to track log deficiencies in the same manner as control room deficiencies. The desk guide for liaison between operations and planning-scheduling was revised to require periodic audits of operating log notes, status boards, and disabled control room annunciators.

All involved operators responded to a questionnaire to provide their perspective of the event, acceptance of responsibility and accountability for their actions, and recommendations for enhancing operator log taking practices. The license commenced an evaluation of proposed computerized log taking. Other actions were completed to evaluate log-taking problems of Unit 2 and to assure a similar event could not occur.

The inspector concluded that the licensee had adequately addressed the root and contributing causes for this event and considered the generic implication for Unit 2.

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 Licensee Personnel

#*S. Bennett, Acting Supervisor, Licensing
#*J. Dosa, Licensing Specialist
*B. Eaton, Unit 2 Plant Manager
*J. Gallegos, Shift Engineer
#*L. Humphrey, Director, Quality Assurance
G. Javier, Shift Engineer
#*R. Lane, Director of Engineering
*D. Lomax, Manager, Engineering Programs
*D. Mims, Director, Licensing
W. McKelvy, Superintendent, Chemistry
*J. Miller, Manager, Nuclear Engineering Design
#*G. Parks, Supervisor, Quality Assurance
S. Pyle, Licensing Specialist
J. Selva, Technical Assistant to Plant Manager
M. Smith, Supervisor, Licensing
J. Sutterluld, Control Room Supervisor
D. Wagner, Supervisor, Quality Assurance
#*D. Williams, Project Manager, High Level Waste

1.2 Sierra Nuclear Corporation

#*W. Lee, Vice President

1.3 NRC Personnel

#A. Hodgdon, Acting Region IV Counsel
#G. Pick, Project Engineer, Division of Reactor Projects
#D. Powers, Chief, Maintenance Branch
*L. Smith, Senior Resident Inspector

In addition to the personnel listed above, the inspector contacted other personnel during this inspection period.

*Denotes personnel that attended the debrief meeting on September 2, 1994.

#Denotes personnel that attended the exit meeting by telephone conference on September 15, 1994.

2 EXIT MEETING

A debrief meeting was conducted on September 2, 1994. Subsequently, an exit meeting was held by a conference call on September 15, 1994. During both of these meetings, the inspector reviewed the scope and findings of the inspection. The licensee expressed the position that the potential violation, documented in this report, should be cited to Sierra Nuclear Corporation (Certificate of Compliance Holder) and not Entergy Operations, Inc., because Entergy Operations, Inc. had not yet accepted the cask. The licensee stated that the drawings and specifications of the ventilated storage cask were proprietary. The inspector informed the licensee that those documents retained by the inspector would be destroyed after further review.

ATTACHMENT 2

DOCUMENTS REVIEWED

CORRESPONDENCE

- Entergy letter dated December 12, 1992, from Robert M. Angelo, Manager Quality, to Mr. Richard Gulierres, Quality Assurance Manager, Sierra Nuclear Corporation, CEXO-92/00680
- Entergy letter dated November 16, 1993, from Robert M. Angelo, Manager Quality, to Mr. Bill Lee, VP, Sierra Nuclear Corporation, CEXO-93/00648
- Entergy letter dated May 5, 1994, from Connie Wells, Acting Manager Quality, to Mr. David Everly, Quality Assurance Manager, Sierra Nuclear Corporation, CEXO-94/00259
- Entergy letter dated June 3, 1994, from Connie Wells, Manager Quality, to Mr. David Everly, Quality Assurance Manager, Sierra Nuclear Corporation, CEXO-94/00331
- Entergy Surveillance Report SS94-23-2, July 5, 1994
- Entergy Inter-Office Correspondence, NQ-94-00257, July 18, 1994, Quality Control Special Surveillance QCR-94-A21424

PROCEDURES/SPECIFICATIONS

- Fabrication Specification AVCC-92-001, Revision 4, May 1994
- VHC-003-1, "Application for Installing Air Vent Ducts," Revision 1
- VHC-003-2, "Application of Form Oil," Revision 1
- VHC-003-3, "Cask Metal Form Erection," Revision 3
- VHC-003-4, "Procedure for Removing Forms," Revision 2
- VHC-002-1, "Welding Procedure," Revision 1
- VHC-004-1, "Reinforcing Procedure," Revision 2
- VHC-005-2, "Super-plasticizer Additive Procedure," Revision 2
- VHC-008-2, "Concrete Pumping Procedure," Revision 3
- VHC-008-3, "Concrete Vibration Procedure," Revision 2
- VHC-008-5, "Concrete Finishing Procedure," Revision 2
- VHC-008-8, "Application of Curing Seal Procedure," Revision 1
- VHC-009-8, "Nonconformance Procedure," Revision 2

NONCONFORMANCE REPORTS

- VCC-1-01

- VCC-1-02
- VCC-1-03
- VCC-M-01
- VCC-M-02
- VCC-M-03
- VCC-M-04
- VCC-M-05
- VCC-M-06

MISCELLANEOUS

Material Certifications for:

- Reinforcing steel
- Steel liner
- Concrete materials
- Welding rod

National Ready Mixed Concrete Association Checklist for Mobley Batch Plant

Sieve Analysis Report for Fine Aggregate - Concrete Sand, and Coarse Aggregate

Concrete Compressive Strength Report for Concrete Mix Design

Van Horn Construction Company, Inc., Ventilated Concrete Cask System for Arkansas Nuclear One, Sierra Nuclear Corporation Master Construction Log

Calculation No. 92-D-2001-02, "HLW Storage Project ISFSI Concrete Pad," February 19, 1994. Enclosures: "ANO ISFSI Pad Analyses," SNC No. ANO-109.002.401, Revision 1, October 1992.

Grubbs, Garner, and Hoskyn, Inc., "Geotechnical Investigation Proposed ISFSI Pad, Arkansas Nuclear One Plant, Russelleville, Arkansas"

CEQN-00001-1 Section 4, "Site Conditions and Development"

Drawings

AVCC-24-001 through AVCC-24-007

Licensee Audit Reports

NQ-94-00308
V93-003
V94-06

V94-07
V94-08
V94-12