

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Inspection Report: 72-0011/95-01

License: None

Licensee: Sacramento Municipal Utility District  
Rancho Seco Nuclear Generating Station  
14440 Twin Cities Road  
Herald, California

Facility Name: Rancho Seco Nuclear Generating Station

Inspection At: Utility Vault, Pleasanton, CA and  
Rancho Seco Nuclear Generating Station, Herald, CA

Inspection Conducted: April 17-21, 1995

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

Accompanying

Personnel: Patricia Eng, Senior Transportation Project Officer  
Office of Nuclear Materials Safety and Safeguards

Michael Raddatz, Project Manager  
Office of Nuclear Materials Safety and Safeguards

Approved:

*Dale A. Powers*  
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Dale A. Powers, Chief, Maintenance Branch  
Division of Reactor Safety

*05/18/95*  
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Date

Inspection Summary

Areas Inspected: Routine, announced inspection of the horizontal dry spent fuel storage module and the pad for an independent spent fuel storage installation.

Results:

- The general configuration of the completed horizontal storage module roof slabs had been constructed appropriately to the design drawings and specifications (Section 2.1).

- The documentation of the Utility Vault (contractor) quality assurance training could not be provided for all Utility Vault personnel who had performed work on the horizontal dry spent fuel storage modules. Neither procedures nor formal methods had been developed to ensure that the training of employees involved in the construction of the modules was conducted. These observations were characterized as weaknesses. Otherwise, the VECTRA monitoring of the construction of the modules appeared to be effective (Section 2.1).
- The potential for liquefaction was appropriately considered by Environmental Geotechnical Consultants in the spent fuel storage pad foundation through soil review and analysis of soil boring samples (Section 3.2).
- Concrete placement activities had been generally constructed in accordance with the site specification. However, there was need for more control of contractors in that incorrect reinforcement steel had been placed by contractor personnel. Additionally, weaknesses were identified in concrete testing activities involving the failure to perform slump testing prior to concrete placement, and the failure to generate corrective action documentation upon notification of the deficiency, and the failure to record concrete water content (Section 3.2).
- There was no training for the licensee's construction inspector in regards to site specific quality assurance procedures (Section 3.2).

Summary of Inspection Findings:

- Not applicable.

Attachments:

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

## DETAILS

### 1 Plant Status

During this inspection period, the Rancho Seco Nuclear Generating Station was shut down and defueled in preparation for the decommissioning.

This inspection was conducted at the Rancho Seco site where the independent spent fuel storage installation pad was under construction, and at Pleasanton, California, where the horizontal dry spent fuel storage modules were under construction. The horizontal dry spent fuel storage modules were being fabricated by Utility Vault, a subcontractor to VECTRA. The utility has filed an application with the Commission for a specific license under the provisions of 10 CFR Part 72 for dry storage of spent fuel in an onsite independent spent fuel storage installation.

Construction activities of the horizontal storage modules were not in progress at the time of the inspection as a result of (1) a delay on receipt of the base form unit, and (2) concerns that arose during a recent NRC Region III licensee inspection. In regard to the latter issue, the decision by the licensee to utilize the VECTRA horizontal dry spent fuel storage modules was also shared by Toledo Edison for its Davis Besse Nuclear Generating Plant. Prior to this inspection, representatives from Toledo Edison had conducted an audit of Utility Vault's construction activities. Two of the concerns resulting from that audit were separately identified by the NRC inspectors during this inspection and are given below in paragraph 2.1 (2) and (3). Therefore, the inspection was limited to the review of the fabricator's procedures and records of completed activities.

### 2 Inspection Of The Horizontal Storage Module (60848)

The objective of this part of the inspection was to determine whether reinforced concrete horizontal storage modules for dry storage of spent nuclear fuel were being constructed according to the licensee's drawings, specifications, and procedures approved by the Office of Nuclear Materials Safety and Safeguards.

#### 2.1 Discussion

The inspectors observed the overall general configuration of the completed horizontal storage module roof slabs, and they appeared consistent with the design drawings. The inspectors spot-checked reinforcing steel for the side shield walls, and determined that the reinforcement appeared consistent with the design drawings.

The inspectors reviewed design drawings and the construction specification for the horizontal storage modules. The design drawings for the Rancho Seco horizontal storage modules identify construction steel as a Class B component, which is important to safety. In addition, Utility Vault procedures require that Class B materials be segregated and controlled separately from other

construction materials. The inspectors noted that although the construction steel designated for the Rancho Seco independent spent fuel storage installation was located in its own lay down area, the area was neither roped off nor identified as a segregated storage area. The inspectors verified that there were no other projects currently ongoing at Utility Vault that utilized materials as large as the steel specified for the Rancho Seco independent spent fuel storage installation. While those conditions minimized the chance of selecting the wrong materials, the inspectors noted that conditions could change where non-Class B material could be mixed in with the Class B Rancho Seco steel. The fabricator personnel acknowledged the inspectors' concern and stated that steps would be taken to clearly identify the Class B material storage area.

The contractors, VECTRA and Utility Vault, were very responsive to this issue, and the area was roped off and labelled before the end of the inspection.

The inspectors noted that quality assurance oversight of the work at Utility Vault was being performed under the provisions of a quality assurance procedure written and approved by the cask designer, VECTRA. In turn, the VECTRA quality assurance program relied on the licensee's previously approved 10 CFR Part 50, Appendix B quality assurance program, per the provisions of 10 CFR 72.140(d). However, when the inspectors asked to review the training records of employees performing work on safety related components, the records could not be provided. The Utility Vault quality assurance representative stated that training of Utility Vault employees on quality assurance procedures had taken place, but had not yet been documented. Criterion II (Quality Assurance Program) of Appendix B to 10 CFR Part 50 states "The program shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to assure that suitable proficiency is achieved and maintained." Utility Vault personnel were able to provide documentation to show that trained quality assurance personnel were present at the work site during construction of items that were important to safety. The inspectors also noted that neither procedures nor formal methods had been developed to ensure the documented training of all employees involved in construction of the horizontal storage modules.

Because trained personnel were present during the critical periods of construction, the inspectors characterized the above-described deficiencies as weaknesses. The inspectors were informed that the training of personnel in the quality assurance and quality control procedures would be documented.

The inspectors' review of VECTRA's Concrete Specification NUH-03-114, "Specification For Concrete Construction Of NUHOMS Precast Horizontal Storage Modules," Revision 0, indicated that some minor inconsistencies existed. However, the licensee was aware of these inconsistencies, and the licensee was reviewing and developing Revision 1 of the specification to correct the inconsistencies.

The inspectors toured Utility Vault's facility including the batch plant and concrete test laboratory. The inspectors, through discussions with VECTRA representatives, made several observations during the tour as discussed below:

- (1) The batch plant did not have a certification from the Ready Mix Concrete Association. Further review indicated that the fabricator's specification only requires Utility Vault to meet the requirements of American Society for Testing and Materials-C94, "Standard Specification for Ready-Mix Concrete." An abbreviated review of the batch plant by the inspectors determined that the batch plant appeared to meet the requirements of American Society for Testing and Materials-C94.
- (2) The review of Concrete Specification NUH-03-114 for the horizontal storage modules, and discussions with representatives from VECTRA and Utility Vault, determined that the minimum field-cured cylinder strength for lifting of the roof slabs was 1000 psi. The inspectors were informed by VECTRA personnel that the form work was removed after 24 hours of curing time. The inspectors reviewed whether the concrete had attained the required strength to be lifted within 24 hours. Vectra personnel justified lifting the roof slab at that time by calculations, which were required by the American Concrete Institute Code.
- (3) Through review of records, and discussions with VECTRA and Utility Vault personnel, the inspectors determined that the concrete test laboratory did not initially meet American Society for Testing and Materials-31, "Standard Practice for Making and Curing Concrete Test Specimens," as required by the fabricator's specification. However, it appeared that Vectra personnel had addressed this concern by installing a new strip chart to record temperature continuously, and a new heater to maintain a constant water temperature for the concrete cylinders. Review of records by the inspectors determined that the concrete test cylinders met the required strength; therefore, the inspectors had no technical concerns.

For the above-noted observations by the inspectors, VECTRA personnel appeared to have taken appropriate measures. Overall, the completed roof slabs for the horizontal storage modules appeared to have been constructed in accordance with design drawings and specifications. In addition, the construction progress, which was incomplete, of the shield walls for the horizontal storage modules appeared to be appropriate. The construction of the horizontal storage modules was being monitored by VECTRA's quality assurance organization. The quality assurance organization appeared to be effective. During this inspection, the licensee's personnel responsible for quality oversight were not present.

## 2.2 Conclusions

The overall general configuration of the horizontal storage modules' finished roof slabs appeared as specified in the design drawings. The reinforcing steel for the side shield walls appeared as specified in the design drawings.

Documented quality assurance training could not be provided for all Utility Vault personnel who had performed work on the horizontal storage module. Also, neither procedures nor formal methods had been developed to ensure the documented training of all employees involved in the construction of the horizontal storage modules. These deficiencies were identified as weaknesses.

The construction of the horizontal storage module was being monitored by VECTRA's quality assurance organization. With the exception of the above-described weaknesses, the quality assurance monitoring appeared to be effective.

### 3 Inspection Of The Storage Pad (60849)

The objective of this part of the inspection was to determine whether the reinforced concrete pad or other structures for supporting dry storage container systems for spent nuclear fuel and roadway modifications were constructed according to the specifications and procedures.

#### 3.1 Discussion

##### 3.1.1 Geological Review

The inspectors reviewed the geological study conducted by Environmental Geotechnical Consultants, Inc., for the storage pad foundation in order to determine whether the phenomenon of liquefaction was considered in the location and analysis of the storage pad foundation. Liquefaction was of concern because of the potential for earthquakes in the area. Discussions with the representative for Environmental Geotechnical Consultants, who developed the geological report, indicated that the site was susceptible to ground shaking in the event of an earthquake from the Hayward and San Andreas Faults (approximately 70 and 90 miles west of the site, respectively). However, the risk to the structure depends on the distance to the epicenter. Based on the distance from epicenter and the characteristics of the soil at the Rancho Seco site, Environmental Geotechnical Consultants had concluded the potential for significant damage due to liquefaction was low.

The inspectors reviewed the results of the core boring soil samples taken by Environmental Geotechnical Consultants, which indicated that the characteristics of the soil was more clay than sand, which would minimize the potential for liquefaction at this site.

The inspectors reviewed the field density tests and compaction test results of the soil conducted before the placement of reinforced concrete. The inspectors' review of the soil compaction test data determined that some soil compaction tests did not meet the required relative compaction of 95 percent. However, further review of records and discussions with the licensee's field engineers determined that soil that did not meet the compaction acceptance criteria was reworked until the required soil compaction acceptance criteria was met.

### 3.1.2 Concrete Placement Review

The goal of this inspection was to observe ongoing construction activities and review documentation regarding past activities related to the independent spent fuel storage installation support pad. Activities ongoing at the Rancho Seco site on April 17, 1995, were the installation of reinforcing steel (re-bar), and the placement of concrete for the independent spent fuel storage installation north apron pads. The independent spent fuel storage installation apron pads were adjacent to the horizontal storage module foundation pad and constituted the primary support for the transfer cask handling equipment used during the placement of the dry storage canisters in the horizontal storage modules.

The inspectors observed concrete placement activities conducted on April 17, 1995, for the north apron of the storage pad, and no problems were noted.

The inspectors reviewed the licensee's site acceptability documentation. The purpose of the review was to verify that the site had been properly characterized as required by the provisions of 10 CFR 72.212(b). Specifically, the inspectors reviewed the licensee's documentation to ensure that mechanisms which could cause independent spent fuel storage installation pad failure had been considered (e.g., liquefaction), and that the consequences of such events would not place the independent spent fuel storage installation, or its components, in an unanalyzed condition. In addition, the inspectors noted that licensee's quality assurance staff were present at the construction site and were actively monitoring construction activities, and that specific procedures for pouring the independent spent fuel storage installation pad concrete along with other related construction drawings were available at the site.

The inspectors also observed the implementation of quality control surveillance for the acceptance of concrete from the batch plants, including the taking of temperature measurements, and the performance of slump tests. The inspectors also verified the collection, and proper identification of concrete strength test cylinders for specified portions of the pour, as well as the preparation and storage of spare test cylinders on the site for possible future testing.

The inspectors reviewed the design drawings, construction specifications, procedures, and noted the following:

- Reinforcement steel was the correct size and grade, and correctly installed;
- Compressive strength samples of concrete were taken (with the exception of witnessing the strength tests);
- Concrete was properly placed in batches and consolidated; and

- Overall dimensions, orientation, and the levelness of the pad were correct.

At the time of the inspection, roadway modifications had not yet been initiated. No deficiencies were noted by the inspectors during the concrete placement activities.

The inspectors' review of concrete and reinforcement steel placement records of previous and current work activities identified the following deficiencies:

- (1) During a concrete placement on December 2, 1994, several slump tests exceeded the acceptance criteria of 5-inch maximum. The standard specification for structural concrete for the independent spent fuel storage installation requires that concrete placement commence only in the presence of and upon approval of, the licensee's construction inspector. The specification also requires that the slump of concrete shall not exceed 5 inches.

However, on two occasions the slump tests exceeded the specification requirements, and the licensee's construction inspector was not notified until the concrete had been placed.

- (2) Upon notification of the deficiency, the licensee's construction inspector did not generate a Potential Deviation from Quality as required by site quality assurance Procedure RSAP-1308, "Potential Deviation From Quality," Revision 9. Further discussions with the licensee personnel indicated that the construction inspector was not familiar with the site procedural requirements. The inspectors were informed that the construction inspector did not work solely for Rancho Seco Nuclear Generating Station, but he was a construction inspector for Sacramento Municipal Utility District in other non-nuclear areas.
- (3) Review of concrete inspection records for the placement of the north apron for the storage pad indicated that water content (%) was not recorded, but should have been. The inspectors were informed that the technician did not have the proper equipment to verify the water content.
- (4) Incorrect reinforcement steel was placed in the south apron slab by the contractor construction workers without engineering approval; however, the inspectors were informed by the field engineers that the work was in progress, and that the discrepancy would be reviewed.

Because the storage pad is a nonsafety-related structure, these deficiencies were considered weaknesses in the licensee's quality assurance program. The inspectors were concerned that there was some lack of control of contractors performing the work, and site specific training for the licensee's quality control construction inspector had not been conducted.

The licensee personnel acknowledged the inspectors' findings and informed the inspectors that these issues would be reviewed and addressed. There was no safety concern about the pad's concrete, because the concrete cylinder test samples had been determined to have met the required compressive strength.

### 3.2 Conclusions

The potential for liquefaction was appropriately considered by Environmental Geotechnical Consultants in the spent fuel storage pad foundation through soil review and analysis of soil boring samples.

Concrete placement activities for the north apron for the storage pad had been generally constructed in accordance with the site specification. However, on the south apron there was need for more control of contractors in that incorrect reinforcement steel had been placed by contractor personnel.

Additionally, weaknesses were identified in concrete testing activities involving the failure to perform slump testing prior to concrete placement, and the failure to generate corrective action documentation upon notification of the deficiency, and the failure to record concrete water content.

There was no training for the licensee's construction inspector in regards to site specific quality assurance procedures.

## ATTACHMENT 1

### 1 PERSONS CONTACTED

#### 1.1 Licensee Personnel

J. Delezenski, Quality Assurance and Licensing Superintendent  
J. Field, Technical Services Superintendent  
W. Hawley, Project Engineer  
\*R. Jones, Licensing Engineer  
W. Koepke, Quality Assurance Supervisor  
J. Meyer, Vendor Audit Supervisor  
K. Miller, Project Manager  
S. Redeker, Plant Manager  
J. Walkin, Principal Mechanical Engineer

#### 1.2 VECTRA, Inc.

R. Ayres, Director, Corporate Quality Assurance  
I. McInnes, Project Engineer  
W. Porter, Senior Quality Engineer  
\*D. Rodgers, Quality Assurance Manager  
\*S. Shakir, Project Engineer  
\*M. Taylor, Project Manager  
G. Williams, Quality Assurance Engineer

#### 1.3 Bartlet, Inc.

P. Terry, Field Engineer

#### 1.4 Utility Vault

R. Strand, Engineer  
G. Waite, American Concrete Institute Inspector

#### 1.4 NRC Personnel

\*S. Bajwa, Section Chief, Office of Nuclear Reactor Regulation  
\*R. Dudley, Project Manager, Office of Nuclear Reactor Regulation  
\*D. Powers, Chief, Maintenance Branch, Division of Reactor Safety  
\*M. Vasquez, Senior Health Physicist, Fuel Cycle/Decommissioning Branch  
Division of Reactor Safety and Safeguards

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

\*Denotes those persons that attended the telephonic exit meeting on April 25, 1995.

## 2 EXIT MEETING

A telephonic exit meeting was conducted on April 25, 1995. During this meeting, the inspector reviewed the scope and findings of the report. The licensee and contractor (Vectra) acknowledged the inspection findings documented in this report. The licensee did identify proprietary information provided to, or reviewed by the inspector. The inspector informed the licensee that any proprietary information given for review would be destroyed upon completion of review.

## ATTACHMENT 2

### DOCUMENTS REVIEWED

#### Specifications/Procedures

- NUH-03-114, "Specification For Concrete Construction Of A NUHOMS Precast Horizontal Storage Module," Revision 1
- Rancho Seco Independent Spent Fuel Storage Installation Design Criteria," Revision 0
- RSAP-0302, "Configuration Identification," Revision 13
- RSAP-1308, "Potential Deviation From Quality," Revision 9

#### Drawings

- M41.02-01 thru M41.02-07 (Pad)
- M41.02-18 thru M41.02-19 (Pad)
- NUH-03-6100 thru NUH-03-6110 (Horizontal Storage Pad)

#### Independent Spent Fuel Storage Installation Soil Test Report

- Document No. M41.02-36

#### Concrete Mix Design (Pad)

- Document No. M41.02-25

#### Main Slab (Pad) Inspection And Concrete Break Test Reports

- Document No. M41.02-38
- Document No. M41.02-34

#### Geotechnical Report

- Job No. ES-519/E306-01, dated June 1, 1993

#### Other Documents

- Safety Analysis Report (RDQ-93-052), dated 5, 1993
- Certificate of Compliance No. 1004, dated January 18, 1995

#### Horizontal Storage Module Inspection Record

- Roof Slab (R1,R5,R13,R21, and R22)