U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-312/85-16

Docket No. 50-312

License No. DPR-54

Licensee: Sacramento Municipal Utility District
P. O. Box 15830
Sacramento, California 95813

Facility Name: Rancho Seco Unit 1

Inspection at: Herald, California (Rancho Seco Site)

Inspection Conducted: June 1 - July 14 and July 20-31, 1985

Inspectors: _____ 8-13-85
J. H. Eckhardt, Senior Resident Inspector — Date Signed

_____ 8-13-85
G. P. Perez, Resident Inspector — Date Signed

Approved By: _____ 8-13-85
L. F. Miller Jr., Chief — Date Signed
Reactor Projects Section 2

Summary:

Inspection beteen June 1-July 14 and July 20-31, 1985 (Report No. 50-312/85-16)

Areas Inspected: This routine inspection by the Resident Inspectors involved the areas of operational safety verification, maintenance, licensee event followup, safety features review, and surveillance activities. During this inspection, Inspection Procedures 61726, 62703, 71707, 71710, 92700, 94703, 92704, and 92706 were covered. This inspection involved 183 hours onsite by two resident inspectors.

Results: Of the areas inspected, no violations or deviations were identified.

DETAILS

1. Persons Contacted

P. Oubre', Manager of Nuclear Operations
*G. Coward, Plant Superintendent
*N. Brock, Electrical/I&C Maintenance Supervisor
H. Canter, QA Engineer
*R. Colombo, Regulatory Compliance Supervisor
*S. Crunk, Associate Nuclear Engineer
*J. Field, Engineering and Quality Control Superintendent
J. Jurkovich, Site Resident Engineer
F. Kellie, Assistant Chemical and Radiation Superintendent
R. Lawrence, Mechanical Maintenance Supervisor
C. Linkhart, Senior Electrical Engineer
R. Miller, Chemistry and Radiation Protection Superintendent
S. Redeker, Shift Technical Advisor Supervisor
*R. McQuade, QA Engineer
L. Schwieger, Quality Assurance Director
W. Spencer, Operations Superintendent

Other licensee employees contacted included technicians, operators, mechanics, security and office personnel.

*Attended the Exit Meeting on July 31, 1985.

2. Operational Safety Verification

At the start of this report period the licensee was completing the activities scheduled for their refueling outage which started on March 15, 1985. The plant commenced heatup on June 10, 1985 and reached criticality on June 14, 1985. Zero and low power physics testing was performed. On June 18, 1985, reactor power was reduced from fourteen percent power and cooled down to repair a clogged turbine lube oil line. After completion of the lube oil system maintenance, the plant began heatup on June 23, 1985. The plant was approaching criticality again when an Unusual Event was declared due to a reactor coolant system leak. The plant was subsequently brought to cold shutdown, and remained in this condition throughout the remainder of this report period. The events surrounding the reactor coolant system leak will be discussed in a future inspection report (50-312/85-19).

The inspectors observed control room operations, reviewed applicable logs, and conducted discussions with control room operators. The inspectors verified from the control room that the appropriate decay heat removal requirements were being met. Tours of the auxiliary building, turbine building, and reactor building, including exterior areas, were made to assess equipment conditions and plant conditions. Also the tours were made to assess the effectiveness of radiological controls and adherence to regulatory requirements. The inspectors also observed plant housekeeping/cleanliness conditions, looked for potential fire and safety hazards, and observed security and safeguards practices.

No violations or deviations were identified.

3. Facility Staff Changes

On June 21, 1985 the Chemistry and Radiation Protection (CRP) Superintendent resigned from his position. In the interim, until the position is filled, the Assistant Chemistry and Radiation Protection Superintendent has assumed the duties and responsibilities of the CRP Superintendent.

On July 18, 1985 the SMUD Board of Directors announced the selection of two new members to the licensee's management staff. These were Messrs. Dewey K. Lowe, selected for Deputy General Manager, and Frank Hahn, selected for Assistant General Manager for Planning. Mr. Lowe recently retired as a Major General in the United States Air Force. Mr. Hahn has recently been the Chief of the Energy Division for the California Department of Water Resources.

The licensee has also announced a temporary position change in the nuclear training area. The Nuclear Training Superintendent was moved to a position devoted full time to acquiring a plant specific simulator, and the Nuclear Training Supervisor has been assigned the duties and responsibilities of the Nuclear Training Superintendent.

4. Followup on Headquarters Request (Temporary Instruction 2515/67) (Closed)

The inspectors were requested by NRC Headquarters to review the licensee's actions involving a safety issue addressed in IE Information Notice 83-75, "Improper Control Rod Manipulation". The notice dealt with the safety significance of control rod mispositioning events, including plant operation with a mispositioned control rod.

The licensee's procedures and training were reviewed and the following was identified:

- Procedures existed for recovery from a mispositioned rod
- Procedures existed for verifying rod position when one form of normal indication is lost
- Training has been provided for operators in the proper movement of control rods, the consequences of improper movement, and the consequences of operating with a mispositioned rod

It appeared that the licensee has provided the proper procedures and training to address the safety issue of a misposition control rod.

No violations or deviations were identified.

5. Failure of a Reactor Trip Breaker During Testing (LER 85-06 (Closed))

On June 5, 1985, while the licensee was performing surveillance and calibration on the "C" channel of the Reactor Protection System (RPS), the reactor trip breaker (RTB), see Figure 1, failed to trip open when its undervoltage trip attachment (UVTA) was actuated. The licensee stopped the test being performed, and observed that the undervoltage (UV)

armature was physically stuck in the energized condition. The licensee proceeded to the next portion of the surveillance test, actuated the shunt trip device of the RTB, and successfully tripped the RTB. Therefore, although the RTB had failed to trip with the undervoltage condition, the breaker was operable using the shunt trip device.

The licensee's design used General Electric (GE) AK-2-25 circuit breakers as RTBs. This design consists of six RTBs which must operate in a one-out-of-two-taken-twice logic to remove power from the control rod drive mechanisms (CRDMs) and release all control rods into the core. There are two AC breakers and four DC breakers. AC breakers control all the three-phase primary power to the control rod drives; two DC breakers control the DC power to safety rod groups 1 through 4; and the other DC breakers controls the DC power to safety rod groups 5 through 8. When any 2-out-of-4 protective channels trip, all reactor trip module logics trip, commanding all control rod drive breakers to trip.

The RTB's utilized both a UVTA and a shunt trip device to trip. Automatic actuation of the shunt trip was added as a response to NRC Generic Letter 83-28. A trip signal interrupts power to the UVTA and simultaneously applied power to the shunt trip device. During a loss of power or a low control voltage condition, the UVTAs would trip the RTBs.

The B&W design also utilized a silicon controlled rectifier (SCR) system to diversely remove power from the CRDMs and cause the plant to scram. Power to each of the regulating rod groups is provided through two separate sets of SCRs. This power may be interrupted by two separate methods: (1) open the two upstream AC RTBs that supply holding power to the rods via the SCRs; or (2) cut off the control power necessary for the SCRs to conduct holding power to the rods.

On June 6, 1985 the inspectors observed a bench check of the RTB that failed. The licensee was able to trip the breaker several times using the UVTA; but it was noted that the trip paddle (see figure 1) appeared to be loose. The licensee was able to move the trip paddle over the armature and prevent the armature from moving out of the energized position. This configuration appeared to have simulated the original failed condition of June 5, 1985, because the armature, could not engage the trip paddle when the UVTA was deenergized. However, the shunt trip was able to trip the breaker. The licensee then rotated the trip paddle to its proper position and was able to trip the breaker using the UVTA.

The licensee's Management Safety Review Committee (MSRC) met the evening of June 7, 1985, and decided to functionally test all reactor trip breakers in accordance with a special test procedure (STP-944) developed, which incorporated the recommendations of GE Service Bulletin 25-014, "Generic Preventative Maintenance and Surveillance Instructions for General Electric AK-2/2-15/25 Reactor Trip Breakers Incorporating Post-Salem Test and Operating Experience." The testing was performed by the licensee and observed by representatives from B&W and the GE Service Center in Atlanta, Georgia.

After successful completion of STP-944 it was determined that the licensee had six operable RTBs and that the cause of the breaker failure

appeared to be an excessive armature to rivet gap clearance. The armature to rivet gap was determined to be approximately .059 inches. The specification range was .001 to .010 inches. The greater armature to rivet gap has been shown to allow the trip paddle to move freely and possibly interfere with the proper operation of the armature.

It appears to date that the excessive armature to rivet gap could have been caused by vibrations of the breaker during transportation to and from the GE and B&W facilities.

The licensee sent the six RTBS and one spare to the GE Service Center at the commencement of the 1985 refueling outage. The breakers were sent in response to NRC Generic Letter 83-28 for refurbishment. The breakers, after completion of the refurbishment, were sent to B&W to be certified for seismic and electrical class 1E qualifications and for 10 CFR 21 considerations. The breakers returned to Rancho Seco and the first functional testing performed was on June 5, 1985, the day of the failure.

The licensee's investigation into the underlying cause of the failure of the UTVA was extensive. The failed RTB was quarantined and was not altered, so the licensee was able to identify the probable cause of its failure. The licensee's performance of STP-944 on the other six RTBs provided the MSRC with sufficient information to declare the breakers operable. The licensee also sent a member of their Quality Assurance department to both the GE Service Center and B&W to observe RTB testing and to reverify the work performed during breaker refurbishment.

The licensee identified that the GE Service Bulletin recommended the measurement of the armature to rivet gap, but did not specify the proper position of the armature when measured. The licensee discovered that GE technicians always measured this gap with the armature in the energized position.

The licensee has incorporated the guidance of the GE Service Bulletin into their surveillance procedure for the RTBs. Additionally it appears that the failure mechanism, excessive armature to rivet gap, has been appropriately identified and the corrective actions performed satisfactorily tested all RTBs before the licensee began withdrawing control rods.

The licensee reported this event in Licensee Event Report (LER) Number 85-06. The inspector verified that reporting requirements had been met, causes had been identified, corrective actions appeared appropriate, and generic applicability had been considered. This LER is closed.

No violations or deviations were identified.

6. Nuclear Service Cooling Water Pump Breaker

The 'A' nuclear service cooling water (NSCW) pump breaker experienced three trips during the period of June 11-13, 1985. The NSCW system removes heat from the decay heat removal system.

After each of the first two breaker trips, the breaker was tested, placed back into service, and successfully completed its surveillance test. The results of tests performed did not provide sufficient information on the causes for the breaker's actuation. On June 13, 1985, the licensee replaced the breaker and initiated bench testing of it. The licensee had the vendor troubleshoot the breaker; at the end of this report period the vendor's investigation had not conclusively determined the cause of the trips.

The licensee has appointed a failure investigation team consisting of three electrical engineers to review this event. Their investigation was not completed at the end of this report period. Therefore, this item remains open for future review of the team's findings (Open Item 85-16-01).

During the investigation of the NSCW pump breaker, the licensee determined that, due to an earlier impeller modification, the pump motor was drawing current slightly higher than the pump's original rating. Although the licensee has determined this higher current not to be the cause of the breaker's trips, a new overload unit setting has been made for both the A and B train breakers.

No violations or deviations were identified.

7. Reactor Heatup, Startup, and Zero Power Physics Testing

After the ninety day refueling outage, plant heatup commenced on June 12, 1985 and the reactor was brought critical on June 14, 1985. Zero power physics testing was performed and the plant was taken to 14 percent power on June 18, 1985. On that date, the plant was shutdown and taken to cold shutdown conditions to repair a flow blockage problem in the main turbine lubricating oil system.

During this period, the inspectors observed portions of the control room activities including plant heatup, deboration, and physics testing. The operators were knowledgeable of the plant conditions and were following applicable procedures.

No violations or deviations were identified.

8. Evaluation of Auxiliary Feedwater System

Because of a June 9 event at the Davis-Besse facility involving the auxiliary feedwater (AFW) system, the licensee performed an evaluation of the Rancho Seco AFW system to ensure its operability. This evaluation involved a review of the latest surveillance testing data, additional stroke testing of certain valves, refresher training of all operating crews regarding a loss of feedwater event, and additional valve lineups of the AFW systems. Additionally, the licensee sent a representative to Davis-Besse to obtain first hand information concerning their main feedwater and AFW systems and the events of June 9. The licensee concluded that there were significant differences between the Rancho Seco and Davis-Besse AFW systems, making the Rancho Seco system much more reliable. The inspectors agreed with the licensee's conclusions. The

licensee is continuing to evaluate the proposed emergency feedwater initiation and control (EFIC) system with respect to the Davis-Besse event.

The following were the major design differences between the systems at Rancho Seco and Davis-Besse:

- Rancho Seco does not have dedicated main steam isolation valves (MSIVs) other than the main turbine throttle valves.
- Actuation of the Rancho Seco main steam line break (MSLB) logic control did not affect the valve lineup of the auxiliary feedwater system, as did the Davis-Besse steam and feedwater rupture control system (SFRCS).
- Rancho Seco had two motor driven auxiliary feed pumps, one of which also has a tandem turbine drive. Davis-Besse used two turbine driven auxiliary feed pumps.
- Rancho Seco operated with the pressurizer electromatic relief valve (EMOV) blocked.

On June 15 and 16, the inspectors performed walkdowns of the AFW system. Included in the walkdown was a valve position check for each valve identified in the AFW system operating procedure A.51. The inspectors determined that all valves were positioned as required. The following minor anomalies were identified:

- Vent and drain valves FWS-135 and FWS-136 were not included in the valve line-up. These valves were located between two closed valves in the test line between the AFW pumps and the condenser.
- A pull box cover was missing on the heat tracing conduit.
- Calibration stickers for two flow transmitters had the same recalibration dates as the calibration dates.
- No valve tag was attached to bypass valve FWS-562.

These minor problems were immediately corrected by the licensee.

In addition to the system walkdowns, the inspectors attended the operator briefings and retraining on the AFW operation, reviewed recent AFW system surveillance test data, work requests and outstanding nonconformance reports to ensure operational readiness.

No violations or deviations were identified.

9. Diesel Generator Control Circuit Problem

After surveillance testing of diesel generator GEA, the bus unloading system caused the diesel generator output breaker to cycle, with the system in the maintenance stop mode because an undervoltage condition

existed on 4160V Bus S4A2. Bus S4A2 was deenergized for maintenance during this time.

To prevent the cycling in the future, in the event that an undervoltage condition would exist during the time the engine was in the maintenance stop mode, the licensee has modified the auto-start circuit for both GEA and GEB diesel generator engine control circuits. Time delay dropout relays were added in each auto-start circuit to allow the normal shutdown timer to time out, thus preventing the diesel generator breaker and bus unloading system from cycling. The new Class 1E relays were installed within panels H2DEA and H2DEB. It is noted that this condition would have been over-ridden if a safety features actuation signal would have occurred.

The inspectors reviewed the engineering change notice (A-5730) associated with this modification and observed the installed new relays.

No violations or deviations were identified.

10. Meetings with LRS Implementing Committee, MSRC, and SMUD Board of Directors

During this reporting period, four significant meetings were held with the licensee's management.

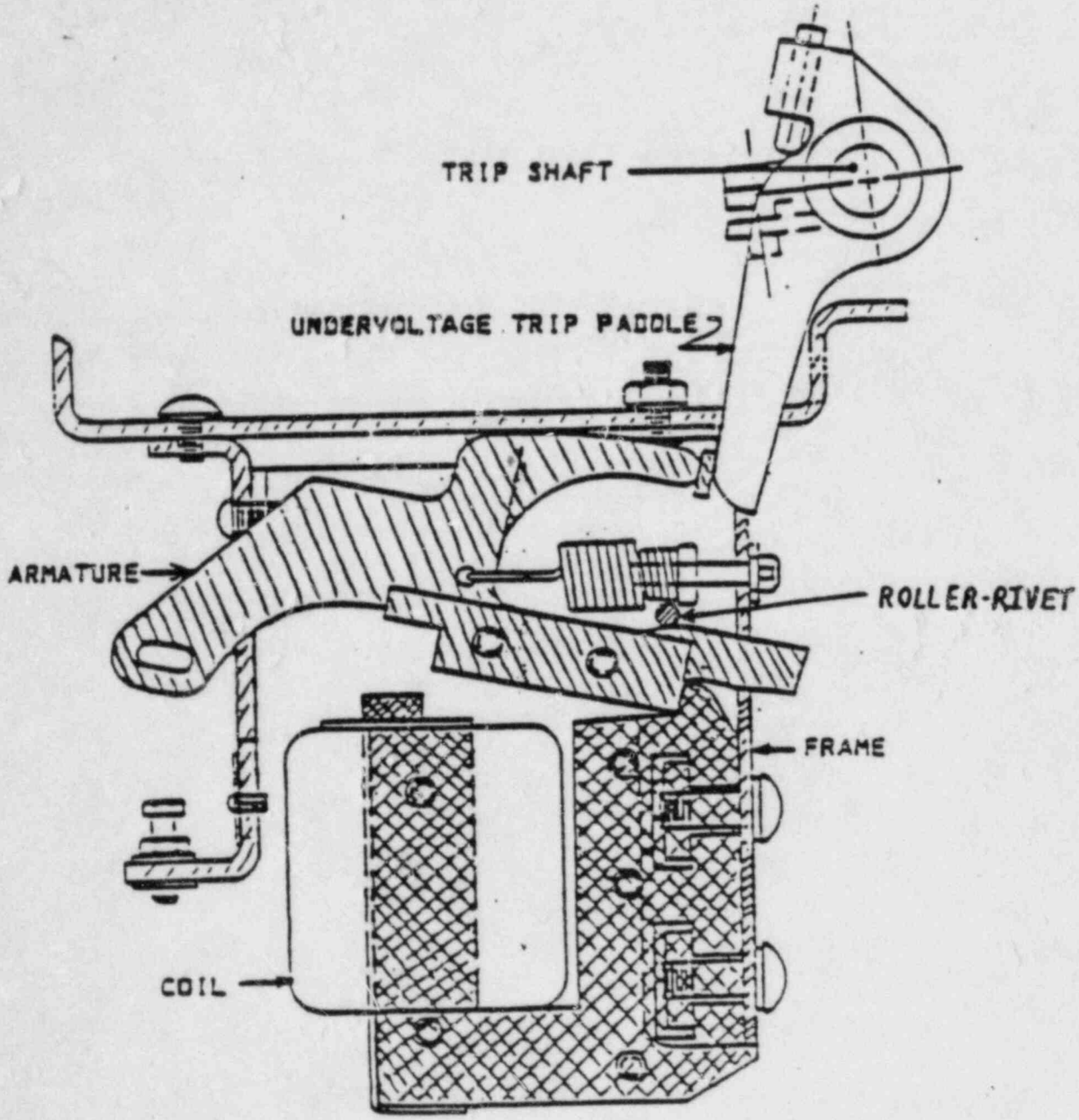
On June 1[illegible] resident inspectors and Region V management met with the [illegible]ectors subcommittee responsible for implementing the LRS recommendations at Rancho Seco. The purpose of this meeting was to discuss the progress and status of the implementation of the recommendations. The NRC took advantage of this meeting to discuss the need for continuing programs to ensure the recommendations are implemented and then to evaluate the effectiveness of the implementation.

On July 3 and July 10, 1985, the resident inspectors and Region V management attended MSRC meetings. The July 10 meeting was also attended by representatives of I&E and NRR. The purpose of these meetings was to discuss the vent pipe break event at Rancho Seco (which will be discussed in detail in inspection report 85-19) and other recent problems. The licensee presented their evaluation of the recent events, corrective action to ensure the problems are corrected, and long term corrective action.

On July 18, 1985, Region V management and representatives from I&E and NRR met with the SMUD Board of Directors to discuss the overall performance of Rancho Seco. Comparisons of the licensee's present performance with the performance a year ago were made. Areas covered were the licensee's concept of rising standards of excellence, technical adequacy, facing facts, respect for radiation, training, responsibility, and capacity to learn from experience. The licensee was encouraged to continue with the improving programs that have begun.

11. Exit Meeting

The resident inspectors met with licensee representatives (denoted in paragraph 1) at various times during the reporting period and formally on July 31, 1985. The scope and findings of the inspection activities as given in this report, were summarized at the meeting. Licensee representatives acknowledged the inspector's findings.



UNDERVOLTAGE TRIP DEVICE
COIL DE-ENERGIZED

FIGURE 1