

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-312/85-30

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: September 28 - October 31, 1985

Inspectors:

[Signature]
J. W. Eckhardt, Senior Resident Inspector

11-19-85
Date Signed

[Signature]
G. P. Perez, Resident Inspector

11-19-85
Date Signed

Approved By:

[Signature]
L. F. Miller Jr., Chief
Reactor Projects Section 2

11-19-85
Date Signed

Summary:

Inspection between September 28 - October 31, 1985 (Report No. 50-312/85-30)

Areas Inspected: This routine inspection by the Resident Inspectors involved the areas of operational safety verification, maintenance, reactor startup, essential safety feature system walkdown, and surveillance. During this inspection, Inspection Procedures 30703, 61726, 62703, 71707, 92706, 71710, 42700, and 93702 were used. This inspection involved 222 hours including 24 hours on back shift onsite by two resident inspectors.

Results: Of the areas inspected, two violations were identified concerning the reactor coolant system cooldown rate and procedural compliance.

8512060420 851120
PDR ADOCK 05000312
Q PDR

DETAILS

1. Persons Contacted

G. Coward, Manager of Nuclear Operations
S. Redeker, Acting Plant Superintendent
*N. Brock, Instrumentation and Controls Maintenance Supervisor
R. Colombo, Regulatory Compliance Supervisor
*S. Crunk, Incident Analysis Group Supervisor
*J. Field, Technical Support Supervisor
J. Jurkovich, Site Resident Engineer
F. Kellie, Acting Chemical and Radiation Superintendent
R. Lawrence, Mechanical Maintenance Supervisor
L. Schwieger, Quality Assurance Director
J. McColligan, Acting Assistant Manager of Nuclear Operations
*M. Hieronimos, Assistant to the Operations Superintendent
*D. Comstock, Assistant to the Operations Superintendent
*J. Delrue, Shift Technical Advisor

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

*Attended the Exit Meeting on October 31, 1985.

2. Operational Safety Verification

On September 28, 1985, at 2237 hours the reactor achieved criticality. The reactor operated at approximately forty percent power until October 2, 1985, when, in the process of bringing the main generator off line to perform an overspeed trip test of the main turbine, the reactor automatically tripped. The reactor was brought into a hot shutdown condition and remained in this status throughout the rest of the report period. The details of the October 2, 1985 reactor trip are discussed in paragraph 3 of this report.

The inspectors observed control room operations, verified proper control room staffing, reviewed applicable logs, and conducted discussions with control room operators. The inspectors verified the operability of selected emergency systems, reviewed tagout records, verified proper removal from service of affected components, and verified the licensee's adherence to limiting conditions for operations. Tours of the auxiliary building, turbine building, and reactor building were conducted to observe plant equipment conditions, including potential fire hazards, fluid leaks, lubrication levels and excessive vibrations, and to verify that maintenance requests had been initiated for equipment in need of maintenance. The inspectors examined plant housekeeping/cleanliness conditions; further details are discussed in paragraph 6 of this report.

The inspectors reviewed portions of non-licensed operator logs, conducted various discussions with the non-licensed operators and observed them performing their assigned duties. The inspectors verified the licensee's

compliance to approved procedures. One concern in this area is further discussed in paragraph 7 of this report.

During tours of the facility, the inspectors frequently entered radiologically controlled areas. The inspector verified compliance with the licensee's radiation protection program. The inspectors discussed the radiation work permit requirements and the radiological conditions of the work areas with workers in the radiologically controlled areas. Also, the inspector verified proper clothing requirements and observed the method of personal frisking when exiting radiological controlled areas. The inspectors randomly examined selected radiation protection instruments to verify operability and adherence to calibration frequency.

The physical security plan was evaluated on a daily basis during this period by observing security performance during the inspectors' daily entry through the monitoring area, observing personnel with proper wearing of photo identification badges, observing visitors with proper escorts, and security personnel taking compensatory measures when security doors were out of service.

The licensee took adequate corrective action to eliminate the deficiencies the inspectors identified during this inspection period.

No violations or deviations were identified.

3. Reactor Trip Due to Loss of Main Feedwater

On October 2, 1985, with the reactor at approximately 15 percent power, a loss of main feedwater (MFW) caused a high reactor coolant system pressure, resulting in a reactor trip. An automatic start of the auxiliary feedwater (AFW) system occurred as a result of the loss of main feedwater. The AFW system functioned properly. Several other problems occurred either immediately prior to or subsequent to the loss of main feedwater. Condenser vacuum was lost, the main turbine did not trip at the low vacuum setpoint, the fourth point feedwater heater relief valves lifted and remained open, the reactor cooled down greater than 100°F per hour, and a flow anomaly was observed when high pressure injection was manually initiated due to decreasing pressurizer level.

Due to the many and varied problems that occurred, Region V issued a Confirmatory Action Letter on October 4, 1985, to ensure that these problems were well understood and corrected prior to restart.

Mainly due to the prolonged opening of the fourth point feedwater heater relief valves, the reactor coolant temperature decreased below the normal post reactor trip temperature of approximately 550°F to approximately 490°F in 20 minutes. This cooldown exceeded the 100°F per hour cooldown rate limit given in Figure 3.1.2-2 of the Technical Specifications. The fourth point feedwater heater relief valves were required to be set at 160 ± 5 psig. The pegging steam which supplies these heaters at low power was controlled at 150 ± 5 psig. The set points on these non safety related relief valves were not checked since plant construction according to the licensee. After the event the licensee determined that one relief valve lifted at 151 psig and the other at 158 psig. It appears that the

prolonged opening was due to a lack of set point surveillance (which allowed drift) and inadequate design margin for the relief valve setpoint above system working pressure of 150 ± 5 psig. The licensee's corrective action included raising the relief set points to 175 ± 5 psig and reducing the pegging steam set point to 130 ± 5 psig.

The resulting excessive cooldown rate is considered a violation (50-312/85-30-01).

As a result of this event, the licensee formed an investigation organization to determine the cause of each problem, correct the problems, and ensure readiness for restart. The details of their investigation are documented in several reports to the NRC.

To independently ensure readiness for restart, the resident inspectors performed the following:

- a. Reviewed in detail all licensee correspondence regarding the event.
- b. Reviewed the licensee's final reactor trip report.
- c. Reviewed and observed the special tests regarding high pressure injection flow.
- d. Reviewed operations standing orders concerning safety related pump lube oil levels, high pressure injection flow characteristics, control room communications, and details of transferring from AFW to MFW operation.
- e. Detailed walkdowns of the AFW system.
- f. Detailed walkdowns of the safety related pump rooms in the auxiliary building.
- g. Partial valve lineup checks of the high pressure injection, decay heat removal, core flood tank, and containment spray systems.
- h. Discussions with numerous non-licensed and licensed operators concerning the event.
- i. Evaluated the licensee management's analysis of the event.

No further violations or deviations were identified.

4. Maintenance

a. AFW Pump P-319

On October 7, 1985, after approximately two hours of operation, the thrust bearing of auxiliary feedwater (AFW) pump P-319 failed. During the repair of this pump, the following attributes were observed, reviewed, or examined:

- 1) The repair was conducted in a time frame such that limiting conditions for operation were not violated.
- 2) The redundant AFW pump P-318 was operable.
- 3) An approved procedure (M.22 Rev. 4) was used to perform the work.
- 4) The procedure was well written, detailed, and adequate to control the work.
- 5) The craftpersons performing the work appeared knowledgeable of the requirements and were using good work practices.
- 6) Quality Control (QC) inspection points were identified in the procedure. The job was 100 percent observed by QC.
- 7) Appropriate testing was performed after completion of the repair.
- 8) Supervisor involvement in the activity was evident.

The licensee determined that the cause of the thrust bearing failure was the inappropriate positioning of the lubricating oil slinger ring such that lubrication of the thrust bearing was inadequate. Review of the maintenance history of this pump indicated that the pump had undergone a major disassembly and repair in November 1974, and also an inspection of the thrust bearing assembly in March 1978 in response to a vendor's bulletin. Based on the history, these two dates appeared to be the only times the oil slinger ring could have been mispositioned. The licensee therefore concluded that the ring was mispositioned either in November 1974 or in March 1978 due to inappropriate assembly of the parts.

The October 7, 1985, as found position of the oil slinger ring, after failure of the thrust bearing, was on a machined portion of the bearing housing. The required position of the ring is to hang from the oil sleeve attached to the shaft. This is shown in the Babcock and Wilcox Canada Ltd. sectional arrangement drawing for this pump (DV-4x6x10H-6 stage pump). In the as found position, the ring remained stationary, i.e., it did not rotate with the shaft. Visual inspection of the ring indicated that it had not been functional for some time, which was further evidence that the mispositioning occurred in 1974 or 1978. It is noted that even without the slinger ring, the thrust bearing would receive a slight amount of lubrication from oil flowing along the shaft from the adjacent radial bearings. This slight amount of lubrication, plus the fact that this pump had only about 100 hours of operation (mainly from the periodic surveillance testing), is thought to be the reason the thrust bearing had survived until the October 7 failure.

Technical Specification section 6-8.1 requires that procedures specified in Appendix A of Reg. Guide 1.33, 1972, be established and

implemented. Appendix A of Reg. Guide 1.33 section I.1 requires that maintenance which can affect the performance of safety related equipment should be properly preplanned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Failure to properly reassemble the pump (in 1974 or 1978) in accordance with the Babcock and Wilcox Canada Ltd. drawing which resulted in the October 7, 1985 thrust bearing failure is considered a licensee identified violation.

It was noted that the licensee's current procedure for auxiliary feed pump maintenance (M.22 Rev. 4), which was used for the recent repair, was a recently issued procedure (effective date July 23, 1985) and was not used for the 1974 and 1978 work. The current procedure was considered by the inspectors to be well written with appropriate detail and QC inspection points. It was an appropriate type of procedure to be used for safety related equipment maintenance.

b. Main Feedwater Line Fitting Leak Repair

On October 3, 1985, with the plant in a hot shutdown condition, a pinhole leak was discovered in a weld on a one inch sockolet on the B main feedwater piping inside of the reactor building. The leaking weld was a fillet weld between the sockolet and plug. The licensee radiographed the weld to determine the nature of the leak and concluded that the weld contained porosity. The inspector viewed the radiograph and agreed with the licensee's conclusion. The repair of the leak consisted of welding a cap over the sockolet and then filling the void inside of the cap with furmanite.

The inspector reviewed the documentation associated with this repair including the engineering calculation sheets, maintenance inspection data report (MIDR), and welding inspection check list. The inspector noted that the applicable code, inspection points, and hydrostatic test were identified on the MIDR and that the applicable inspection points and non destructive examination were identified on the welding inspection checklist.

The inspector visually examined the completed welds on the newly installed cap and observed the hydrostatic test in progress.

No violations or deviations were identified.

c. Modification of AFW Control Valve Actuation

During this period, the enable circuit for actuation of the auxiliary feedwater (AFW) Integrated Control System (ICS) control valves was modified. Previously, the valves received an enable signal when both main feedwater pumps were in the trip condition. The modification changed the circuit so that the valves will now receive an enable signal when the discharge pressure of each main feedwater pump drops to 850 psi. This pressure is now the same parameter that starts the AFW pumps.

The inspectors reviewed the Engineering Change Notice associated with this modification, observed a portion of the work in progress, and reviewed the retest. The craftpersons involved in the modification were knowledgeable of the requirements, the work was 100 percent covered by QC, and supervisory involvement was evident.

No violations or deviations were identified.

5. Monthly Surveillance Observation

The inspectors observed technical specifications required surveillance testing on the auxiliary feedwater pump (AFW) P-319, and a heat balance calculation at 2.5 percent power. The inspector verified the following: that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that limiting conditions for operation were met, that removal and restoration of the affected components were accomplished, that test results conformed with technical specifications and procedure requirements and were reviewed by personnel other than the individual directing the test, and that any deficiencies identified during the test were properly reviewed and resolved by appropriate management personnel.

No violations or deviations were identified.

6. Safety System Walkdowns

The inspectors performed several walkdowns of portions of the auxiliary feedwater, high pressure injection, decay heat removal, core flood tank, and containment spray systems. Numerous housekeeping and minor material deficiencies were identified. These included missing fasteners on electrical equipment, thread engagement deficiencies, oil leaks, and other similar type deficiencies. The licensee subsequently made more detailed walkdowns and corrected all observed problems.

The inspectors did not identify any mispositioned valves or conditions that would make the equipment or systems inoperable. The need to pay attention to housekeeping and material condition was discussed with licensee management.

No violations or deviations were identified.

7. Procedures

On September 29, 1985 while the licensee was performing the Power Range Calibration procedure I.103, Rev. 7, on the reactor protection system (RPS) channel A, the inspector observed the technicians using a hand written procedure to perform a specific step of the I.103 procedure. During the low power physics testing, the licensee performed a heat balance calculation at approximately 2.5 percent power. This test entailed increasing the multiplier gain from 1x to 10x on the power range instrument, in the RPS cabinets. This allowed for a better reading of the power level. However, when the technicians were reducing the gain from 10x to 1x, the inspector observed them using a handwritten note which described the steps needed to be performed. The inspector verified

these steps were not part of the approved procedure I-103, and notified the Shift Supervisor. The licensee stopped work and made a temporary change to I-103 and also wrote an occurrence description report documenting this event.

The licensee's Technical Specification (TS) section 6.8.1 states, "Written procedures shall be established, implemented and maintained covering the activities referenced below: ...c. Surveillance and test activities of safety related equipment." In addition Administration Procedure 2 (AP.2) "Review, Approval and Maintenance of Procedures" establishes the licensee's guidelines for new procedures and revisions or temporary changes.

Contrary to the above on September 29, 1985 while performing the power range calibration procedure I-103, rev. 7 the licensee used an unapproved and uncontrolled procedure to perform the reduction in the power range instrumentation gain. This appears to be a violation (85-30-02).

8. Licensee Action on Previous Inspection Findings

(Closed) Violation 83-02-02 - Failure to notify the NRC within time limits of a radioactive release. The licensee has trained the operators on the reporting requirements of 10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors." In addition the resident inspectors have verified that recently the licensee has been identifying and performing the appropriate phone notifications. The inspector had no further questions. This item is closed.

(Closed) Violation 83-10-01 - Delay of management's response to a failure of a local leak rate test. The licensee has performed local leak rate tests on the penetrations that had failed, and the tests were successful. The cognizant engineers who review the results of local leak rate tests are aware of the importance of issuing an occurrence discrepancy report on all failed leak rate tests. The inspector had no further questions. This item is closed.

(Closed) Violation 84-07-01 - Control Room controlled copy of the surveillance procedure manual did not contain the latest revision of a procedure. The licensee has reviewed this incident and has found it to be a result of an internal audit of all procedure manuals. During the audit, the licensee had all newly approved procedures and did not issue them until the audit was complete. This included the two procedures cited. The inspector verified the proper revision of the procedures were used for the subsequent surveillances. The licensee's method of control for approved procedures appears to be functioning adequately to date; the inspector had no further questions. This item is closed.

(Closed) Violation 85-08-04 - Drawings not properly identified on a nonconforming report. The licensee has revised a Quality Control Instruction No. 1 to require the applicable engineering change notice number to be identified on the nonconforming report. The inspector verified the revision to the instruction; the inspector had no further questions. This item is closed.

9. Followup of Previously Identified Items

(Closed) 84-19-06 - Specific schedule for electrical maintenance needs to be developed. This item concerned the need for a more definitive scheduling of electrical maintenance work. During this report period a maintenance survey was conducted by the NRC and an NRC contractor of current maintenance practices. An NRC RV inspector participated in this survey and concluded that scheduling practices for electrical maintenance were currently satisfactory. This item is closed.

(Closed) 85-04-04 - Procedural error. The inspector verified that the licensee had revised procedure SP 205.67. This open item concerned a reference to record valve data on a procedure which had been previously deleted. The revised procedure has the data recorded in the valve records. This item is closed.

(Closed) 85-04-05 - Root cause program evaluation. The inspectors have reviewed and documented many root cause evaluations performed by the licensee. The licensee's program has provided adequate root cause analysis on many events since its start in the beginning of 1985. The inspector had no further questions. This item is closed.

(Closed) 85-08-03 - Minor procedure errors need correcting. The licensee has issued many management memos discussing the need for all employees to be aware of the content of procedures and initiate changes if errors are identified. The inspectors have observed, recently, the staff's concern for detail. The errors identified by the inspectors have been or are in the process of being corrected. This item is closed.

(Closed) 84-19-07 - Reactor coolant system vent installation. The inspectors verified the installation of the reactor coolant system high point vents following the pipe break accident of June 23, 1985. Details of the inspection can be found in inspection report 50-312/85-19. This item is closed.

10. Exit Meeting

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