SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT ☐ 6201 S Street, P.O. Box 15830, Sacramento CA 95852-1830, (916) 452-3211
AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

GCA 88-029

JAN 2 5 1988

U. S. Nuclear Regulatory Commission
Attn: Frank J. Miraglia, Jr.
Associate Director for Projects
Phillips Building
7920 Norfolk Avenue
Bethesda, MD 20014

Docket No. 50-312
Rancho Seco Nuclear Generating Station
License No. DPR-54
**REMOTE SHUTDOWN CAPABILITY**

References: Correspondence, Crutchfield to Andognini, January 7, 1988, Restart Inspection Findings. Inspection Report 87-24, Zimmerman to Andognini, October 16, 1987, Resident Inspection Report.

Dear Mr. Miraglia:

In response to various NRC inquiries, including those contained in the referenced documents, the following information is provided with respect to the District's actions to assure the adequacy of Rancho Seco's remote shutdown capability.

Prior to restart, the District will conduct integrated testing to demonstrate primary system inventory control and secondary heat transfer control from the remote shutdown panel. The District will also conduct, prior to restart, an in-plant walkdown of OP-C.13a, "Plant Shutdown from Outside the Control Room", with all operating crews. The combination of these actions, along with post-modification component and functional testing, will provide assurance that the plant and personnel are capable of performing a remote shutdown evolution. Attached is a description of accomplished and planned activities supporting remote shutdown capability.

Please contact me if you have any questions. Members of your staff with comments or questions requiring additional information or clarification may contact Mr. David Compton at (209) 333-2935, extension 4915.

Sincerely,

G. Carl Andognini
Chief Executive Officer,
Nuclear



A047
1/1

ATTACHMENT 1

REMOTE SHUTDOWN CAPABILITY

## ORIGINAL CAPABILITY AND TESTING

The original plant design provided the capability to shut the reactor down and maintain it in a safe condition (i.e., hot shutdown) if access to the control room were lost. This remote shutdown capability, described in USAR Section 1.4.11, was provided to satisfy General Design Criterion 11, "Control Room", as originally proposed in July 1967. The potential capability for placing the reactor in a cold shutdown condition is also described in USAR Section 1.4.11. Subsequent to FSAR filing in 1971, the Commission conducted its technical review against 10 CFR 50, Appendix A, Criterion 19, "Control Room", (see USAR Section 1.5.15), issued in 1971, and concluded that the plant design conformed to the intent of the revised criterion. The District received its Operating License for Rancho Seco on August 16, 1974.

Testing was performed during initial plant startup to demonstrate the remote shutdown capability. This test was conducted from above 10 percent of rated power with normal full power line up established (USAR Section 13.1.4, "Initial Startup Programs").

## 10 CFR 50, APPENDIX R MODIFICATIONS AND TESTING

Subsequent to the promulgation of 10 CFR 50.48, which requires plants licensed to operate before January 1, 1979 to comply with Sections III.G, III.J, and III.O of 10 CFR 50, Appendix R, the District re-evaluated the remote shutdown capability. Paragraph 50.48(c)5 requires NRC review and approval of modifications planned to meet the requirements of Section III.G.3 of Appendix R, "Fire protection of safe shutdown capability". Compliance with Section III.L of Appendix R, "Alternative and dedicated shutdown capability", is considered included by Section III.G.3 and therefore also required.

Generic Letter 81-12 provides a summary of the information required by the Commission to evaluate the adequacy of the remote shutdown capability relative to Appendix R. By letters dated November 30, 1983, April 5, 1985, July 12, 1985, September 27, 1985, and October 30, 1985, the District provided the information requested by Generic Letter 81-12, and responded to questions on the submittals (see also USAR Section 7.4.8.2, "Control Room Evaluation Emergency"). The information submitted by the District identifies and describes the modifications to the remote shutdown panel, the testing performed on the panel, and the procedures for safe shutdown from outside the control room. The District's re-evaluation concluded that equipment required for alternative shutdown capability to be the same or equivalent to that relied upon in the original Safety Analysis. The scope of the Appendix R modifications to the remote shutdown capability was limited to addition of indication, control, and electrical isolation of existing systems.

These modifications were completed prior to Cycle 7 startup in June 1985. Post-modification tests of the Control Room isolation switches and remote instrumentation and controls providing remote shutdown capability were performed following initial component installations.

The NRC Region V inspection of Appendix R compliance was conducted on August 12-16, 1985, and documented by Inspection Report 85-22, August 27, 1985. The inspection evaluated compliance with Appendix R Sections III.G.3 and III.L, and included a walkthrough of the hot shutdown procedures to verify effectiveness. No items of noncompliance were identified.

By letter dated May 19, 1986, NRR provided their Safety Evaluation Report of Rancho Seco's post-fire alternate shutdown capability. The evaluation concludes that, allowing for the exemption for 205 hours to reach cold shutdown, the safe shutdown capability meets the requirements of Sections III.G.3 and III.L of Appendix R.

## RECENT MODIFICATIONS AND TESTING

Since December 1985, modifications made to the remote shutdown panel/remote shutdown capability have been associated with installation of EFIC (Emergency Feedwater Initiation and Control). Remote EFIC control at the shutdown panel H2SD has been installed by Engineering Change Notice (ECN) A-5415P. The scope of ECN A-5415P includes:

- addition of hand/auto stations HIC-20527B and HIC-20528B for AFW control valves FV-20527 and FV-20528 to provide control via the EFIC cabinets.
- addition of hand/auto stations HIC-20561B and HIC-20562B for the six (6) Atmospheric Dump Valves (ADVs) to provide control via the EFIC cabinets.
- design modifications to the Steam Generator (SG) wide range level and pressure indicators (LI-20509/LI-20510, and LI-20547/LI-20548, respectively) to provide signal inputs from isolated outputs of the EFIC cabinets in the Nuclear Services Electrical Building.
- deletion of hand switch HS-20578A which previously provided control for AFW Bypass Valve SFV-20578.

These H2SD changes have been functionally demonstrated during post-modification testing. All H2SD instrumentation and controls to be demonstrated in planned integrated testing have been verified functional on a component basis. Attachment 2 provides a tabulation of H2SD instrumentation and controls with their associated pre-restart tests.

INTEGRATED TESTING

A recent review of the restart test program by the NRC (IR 87-24) concluded that planned testing was basically similar to that recommended by Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants." Regulatory Guide 1.68.2, "Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants" was issued in January 1977, after Rancho Seco's initial startup. However, integrated testing of the Rancho Seco remote shutdown panel through the restart test program is planned using the guidance of Regulatory Guide 1.68.2.

Integrated testing of the remote shutdown panel will be accomplished as part of STP.1113, "EFIC Hot Functional Test", to be performed prior to plant restart criticality. STP.1113 will provide a functional demonstration of primary system inventory control and secondary heat transfer control from the remote shutdown panel. STP.1113 will functionally demonstrate all remote shutdown panel indications and controls with the exception of the makeup isolation valve SFV-23508 and the DHR A BWST suction valve SFV-25003. Normal RCS makeup lineups will be maintained with HPI Loop A SFV-23811 controlling makeup rather than the normal makeup control valve. Normal Reactor Coolant Pump (RCP) Seal Injection will be controlled from the Control Room, with RCS letdown control maintained in the Control Room and not terminated.

The Control Room will maintain sufficient control of plant equipment during testing to take effective action to assure plant safety in the unexpected case that the test does not proceed as planned. The Control Room will maintain control of the ADV block valves, AFW motor-operated isolation valves, the normal makeup valve, and the HPI pump trip. The Control Room observers and test personnel at the H2SD panel will maintain an open channel for communications during testing.

STP.1113 will verify the following functions from panel H2SD, with the plant at hot shutdown and four RCPs running:

- Demonstrate that the Turbine Bypass Valve (TBV) Emergency Close solenoids cause the TBVs to close.
- Demonstrate that the Atmospheric Dump Valves (ADVs) will automatically control SG pressure at setpoint and can be controlled manually.
- Demonstrate that the RCS temperature can be reduced in a controlled manner by manual operation of the ADVs.
- Demonstrate that the RCS inventory can be maintained through the HPI LOOP A SFV-23811 control.

- Demonstrate that the EFIC signals to the AFW Flow Control Valves will automatically control SG level at setpoint and can be controlled manually.

- Demonstrate that the plant can be maintained in a stable Hot Shutdown condition with ADV manual pressure control and EFIC automatic SG level.

- Demonstrate the H2SD indicators are functional.

Attachment 3 provides the approved test outline for STP.1113, "EFIC Hot Functional Test". Attachment 4 provides a comparison of planned integrated testing with Regulatory Guide 1.68.2.

PROCEDURES AND TRAINING

Final restart procedure revisions on both OP-C.13a, "Remote Shutdown from Outside the Control Room" and OP-C.13b, "Remote Cooldown from Outside the Control Room" are complete and the procedures issued with Plant Review Committee (PRC) approval.

Plant Operators have received over 400 hours of classroom, on-the-job and simulator training relative to the plant modifications made during the restart outage. This has included training on both hardware and procedure revisions.

Operators have received extensive training on EFIC. Operators have received training on all modifications made to the remote shutdown panel. In addition to the hardware change training, Operators have received training on the two major procedures controlling the use of the shutdown panel, OP-C.13a and OP-C.13b.

Classroom training has been conducted on the procedures referenced above for all Operators. An in-plant walkdown of OP-C.13a is scheduled to be conducted for all operating crews prior to restart. This will consist of having each crew implement the procedure as if the event had actually occurred. Adjustment of plant controls will be simulated. Similar in-plant walkdowns of OP-C.13a were conducted in April and May of 1985 for all operating crews. The effectiveness of these training exercises is demonstrated by the Operations personnel evaluations provided in Inspection Report 85-22 (August 27,1985).

Operator training on OP-C.13a is an annual requirement of the Licensed Operator Continuing (Requalification) Training Program and will be conducted in accordance with that periodicity. This will ensure that the Operators remain proficient on the guidelines to be used to shut down the plant in a safe and controlled manner from outside the Control Room.

# ATTACHMENT 2

## REMOTE SHUTDOWN PANEL INSTRUMENTATION AND CONTROL

| | EQUIPMENT ID | DESCRIPTION | PRE-RESTART TESTING |
|---|---|---|---|
| | HIC-20527B | AFW VALVE LOOP A | STP-666 |
| | HIC-20528B | AFW VALVE LOOP B | STP-666 |
| | HIC-20562B | ADV LOOP B | STP-666 |
| | HIC-20571B | ADV LOOP A | STP-666 |
| | HS-20561 | TBV CONTROL | STP-1040 |
| | LI-20509 | OTSG A LEVEL | STP-666 |
| | LI-20510 | OTSG B LEVEL | STP-666 |
| | LI-21502C | MU TANK LEVEL | SP.200.14 |
| | LI-21503B | PZR LEVEL | STP-1115 (SP.200.14) |
| | LI-21503D | PZR LEVEL | SP.200.14 |
| | PI-20547 | OTSG A PRESSURE | STP-666 |
| | PI-20548 | OTSG B PRESSURE | STP-666 |
| | PI-21050 | RC PRESSURE | PM TASK #3922 |
| | PI-21051 | RC PRESSURE | PM TASK #3922 |
| | SWITCH SFV-23508 | MU TANK ISOLATION | STP-1091 |
| | SWITCH SFV-23811 | HPI LOOP A INJECT | STP-1091 |
| * | SWITCH SFV-25003 | DHR A BWST SUCTION | STP-1087 |
| | TI-21024C | COLD LEG TEMP | PM TASK #3357 |
| | TI-21025E | COLD LEG TEMP | PM TASK #3357 |
| | TI-21031C | HOT LEG TEMP | PM TASK #4515 |
| | TI-21032C | HOT LEG TEMP | PM TASK #4516 |

* All components have successfully completed functional testing, except Switch SFV-25003 which will be demonstrated prior to restart.

ATTACHMENT 3

TEST OUTLINE
REV. 1

EFIC HOT FUNCTIONAL TEST

ECN(s)/REV NO: A-5415 REV. 4, R-0861 Rev. 6

PREPARED BY: Larry Wittrup — SYSTEM ENGINEER — DATE 1/19/88

REVIEWED BY: (Deane) for J. Williams — NE DISCIPLINE ENGINEERING SUPERVISOR — DATE 1/19/88

APPROVED BY: J. R. Meeker — NUCLEAR TECHNICAL SUPPORT SUPERINTENDENT — DATE 1/19/88

PROCEDURE NO: STP.1113

## 1.0 TEST OBJECTIVE

1.1 To functionally demonstrate the operability of the Emergency Feedwater Initiation and Control (EFIC) system controls and indication under closed loop conditions with the plant in Hot Shutdown mode.

1.2 To document the relationship between the EFIC system and the Non-Nuclear Instrumentation (NNI) system steam generator level and pressure indications.

1.3 To functionally demonstrate the Appendix 'R' Hot Shutdown Panel (H2SD) indications and controls (except the MU TNK ISOL SFV-23508 valve and the DHR PUMP A SUCT. FROM BWST SFV-25003 valve) as committed to in letter GCA 88-029.

1.4 To functionally demonstrate the EFIC system and the Auxiliary Feedwater (AFW) system response time from EFIC initiation of AFW to the time that 475 gpm AFW flow is achieved.

## 2.0 ACCEPTANCE CRITERIA

2.1 Demonstrate, with the plant at Hot Shutdown (HSD), that the EFIC controller gain operating settings result in stable (not diverging) steam generator (SG) level control under closed loop conditions. (Reference: DBR A-5415 MAJOR, Calculation Z-EFI-0146)

2.2 Document the relationship between the EFIC and NNI steam generator level and pressure indications. (Reference: DBR A-5415 MAJOR)

2.3 Verify, with the plant at HSD and four Reactor Coolant Pumps (RCPs) running, that EFIC AFW initiation and flow control will not result in excessive overcooling of the Reactor Coolant System (RCS). RCS temperature should be maintained at > 500° F and the cooldown rate within the technical specification limits. Stable level control (not diverging) will be demonstrated. (Reference: DBR A-5415 MAJOR, Technical Specification 3.1.2 and Emergency Operating Procedure E.05)

2.4 Verify the following functions from Panel H2SD, with the plant at HSD and four RCPs running:
(Reference: DBR A-5415 MAJOR, DBR R-0861, Calculation Z-EFI-0146, USNRC Regulatory Guide 1.68.2)

2.4 .1 Demonstrate that the Turbine Bypass Valve (TBV) Emergency Close solenoids cause the TBVs to close.

2.4 .2 Demonstrate that the Atmospheric Dump Valves (ADVs) will automatically control SG pressure at setpoint and can be controlled manually.

2.4 .3 Demonstrate that the RCS temperature can be reduced in a controlled manner by manual operation of the ADVs.

2.4 .4 Demonstrate that the RCS inventory can be maintained through the HPI LOOP A SFV-23811 control.

2.4 .5 Demonstrate that the EFIC signals to the AFW Flow Control Valves (FCVs) will automatically control SG level at setpoint and can be controlled manually.

2.4 .6 Demonstrate that the plant can be maintained in a stable HSD condition with ADV manual pressure control and EFIC automatic SG level.

2.4 .7 Demonstrate the remote indicators are functional.

2.5 Demonstrate that the time interval between initial EFIC AFW initiation and establishing an AFW flow of 475 gpm is not greater than 70 seconds, including the maximum EFIC Time Delay module setting. (Reference: EAR SY87-119)

## 3.0 CONDITIONS PRIOR TO TEST

3.1 The EFIC and AFW systems are operable in accordance with existing operating procedures.

3.2 The EFIC controls and associated components receive normal electrical power throughout the test.

3.3 STP.667, EFIC Cold Preoperational Test is complete and the test results are satisfactory.

3.4 The Remote Shutdown Panel, H2SD, is available for service.

3.5 The Interim Data Acquisition Display System (IDADS) is in service.

3.6 The plant is in Hot Shutdown per Operating Procedure B.2, Section 4.3.

## 4.0 TEST METHOD

4.1 The NNI and EFIC system SG levels and Main Steam line pressure outputs will be monitored by IDADS during the testing. The pressure readings will be documented in the critical region near the TBV post trip setpoint and the ADV setpoint.

4.2 The EFIC low level initiate and control test will be started by reducing Main Feedwater to one SG until EFIC initiates AFW on low SG level. The other SG will be at a level sufficiently above the low level control setpoint such that the EFIC FCV demand signal will close the AFW FCVs to that SG.

4.3 The functional testing of the Remote Shutdown panel, H2SD, will be accomplished by transferring the following controls from the Main Control Room to panel H2SD (All EFIC FCV, pressure and initiation controls and their respective indications will be isolated from the Control Room):

4.3 .1 HPI LOOP A SFV-23811

4.3 .2 EFIC AFW CONTROL VALVE LOOP A

4.3 .3 EFIC ADV CONTROL LOOP A

4.3 .4 EFIC AFW CONTROL VALVE LOOP B

4.3 .5 EFIC ADV CONTROL LOOP B

4.4 The ADV automatic control setpoint verification will be accomplished from panel H2SD by isolating the TBVs through the use of the H2SD TURBINE BYPASS VALVE MANUAL CLOSE, HS-20561, handswitch. The OTSG pressures will increase to the ADV setpoint and be verified individually.

4.5 The ADV manual control will be demonstrated from panel H2SD after each ADV automatic setpoint is verified by using the H2SD HIC, in manual, for each valve.

4.6 The RCS temperature will be decreased a minimum of $10^{o}$ F through the manual control of the ADVs from the H2SD panel. The RCS inventory will be controlled during the cool down through the use of the H2SD HPI LOOP A SFV-23811 control.

4.7 Demonstration of stable HSD control will be accomplished from the H2SD panel with EFIC maintaining SG level.

4.8 Demonstration of the time from EFIC initiation to minimum AFW flow will be by manually initiating the EFIC Channel "B" to cause flow via the AFW turbine driven pump, P-318, through the most restrictive flow path, FV-20532, to the "B" SG. The maximum EFIC time delay, 9.9 seconds, will be incorporated into the final test results.

ATTACHMENT 4

COMPARISON TO REGULATORY GUIDE 1.68.2

| REG. GUIDE 1.68.2 | RANCHO SECO STP.1113 |
|---|---|
| 3. Hot Standby Demonstration Procedure<br><br>The test should be initiated from a location outside the control room with the reactor at a moderate power level (10-25%) sufficiently high that plant systems are in the normal configuration with the turbine generator in operation. The test should be performed with the minimum of personnel required to be at the reactor unit at any one time (minimum shift crew). Data should be obtained at locations outside the control room to verify:<br><br>a. That the plant has achieved hot standby status. | Testing will begin at stable hot shutdown (Tave greater then 525°F, reactor subcritical). Data will be obtained at the hot shutdown panel H2SD to verify that the plant is in a a hot shutdown condition. All H2SD indicators will be demonstrated functional.<br><br>Testing will be conducted prior to plant restart criticality, with four RCPs operating and essentially no decay heat in the core. Remote shutdown testing initiated at power was performed during initial plant startup. The remote shutdown Casualty Procedure C.13a instructs operators to trip the reactor and verify rod insertion prior to Control Room evacuation.<br><br>In-plant walkdowns of C.13a in 1985 considered minimum shift staffing. Planned in-plant walkdowns of C.13a with all operating crews will be performed considering minimum shift staffing. |

| REG. GUIDE 1.68.2 | RANCHO SECO STP.1113 |
|---|---|
| b. That the plant can be maintained at stable hot standby conditions for at least 30 minutes.<br><br>During the demonstration only that equipment for which credit would be taken in performing an actual remote shutdown should be used. | Stable hot shutdown conditions will be maintained for at least 30 minutes with ADV manual pressure control and EFIC automatic SG control. All applicable instrumentation and controls at panel H2SD will be demonstrated, with the exception of the controls for makeup tank isolation valve SFV-23508.<br><br>During a CR evacuation, RCP seal injection would be controlled by local manual operation of the valve handwheel, observing a local flow meter. During STP.1113, RCP seal injection control will be maintained in the Control Room, rather than transfer to local manual, to minimize unnecessary risk to the pump seals. RCS letdown control will be maintained in the Control Room and not terminated.<br><br>Normal RCS makeup lineups will be maintained with HPI Loop A valve SFV.23811 controlling makeup rather than through the normal makeup valve. Timing and communications for manual valve lineups and electric power lineups required in C.13a will be demonstrated during in-plant walkdowns.<br><br>Certain train B equipment required to be isolated from the Control Room during performance of Casualty Procedure C.13a will not be isolated. The Control Room will maintain sufficient control of plant equipment during testing to take effective action to assure plant safety in the unexpected case that the test does not proceed as planned. |

| REG. GUIDE 1.68.2 | RANCHO SECO STP.1113 |
|---|---|
| 4. Cold Shutdown Demonstration Procedure<br><br>The licensee should demonstrate a potential capability for cold shutdown by partially cooling down the plant from the hot standby condition using controls and instrumentation located outside the control room.<br><br>The test should demonstrate that:<br><br>a. The reactor coolant temperature and pressure can be lowered sufficiently to permit the operation of the core decay heat removal system that is to be ultimately used to place the reactor in a refueling shutdown mode. | Control of secondary heat transfer will be demonstrated by an RCS cooldown of at least 10°F. The RCS temperature will be reduced in a controlled manner by manual operation of the ADVs. AFW flow control will be demonstrated in both automatic (EFIC) and manual. RCS inventory will be controlled from panel H2SD using SFV-23811.<br><br>This partial RCS cooldown is considered sufficient to demonstrate the potential capability for remote cold shutdown. |
| b. Operation of this decay heat removal system can be initiated and and controlled.<br><br>c. A heat transfer path to the ultimate heat sink can be established.<br><br>d. Reactor coolant temperature can be reduced approximately 50°F using this decay heat removal system at a rate that would not exceed technical specification limits. This cooldown should show that the potential for achieving cold shutdown from outside the control room is available. | Transfer to the decay heat removal system and subsequent continued cooldown are slowly-unfolding evolutions, well within the plant equipment and personnel capabilities. Operators have received training on the remote cooldown Casualty Procedure C.13b. Functionality of panel H2SD control of DHR A BWST suction valve SFV-25003 will be demonstrated prior to restart.<br>The design adequacy of the decay heat removal system is considered sufficiently demonstrated, therefore, a further demonstration of this capability is considered unnecessary. The benefits of performing this further demonstration are considered minimal in comparison to the time and manpower required for such a demonstration. |