OPERATING DATA REPORT

DOCKET NO. 50-312
DATE 82-07-31
COMPLETED BY R. Colombo
TELEPHONE (916) 452-3211

OPERATING STATUS

1. Unit Name: Rancho Seco Unit 1
2. Reporting Period: July 1982
3. Licensed Thermal Power (MWt): 2772
4. Nameplate Rating (Gross MWe): 963
5. Design Electrical Rating (Net MWe): 918
6. Maximum Dependable Capacity (Gross MWe): 917
7. Maximum Dependable Capacity (Net MWe): 873
8. If Changes Occur in Capacity Ratings (Items Number 3 Through 7) Since Last Report, Give Reasons:

N/A

Notes

9. Power Level To Which Restricted, If Any (Net MWe): N/A
10. Reasons For Restrictions, If Any: N/A

	This Month	Yr.-to-Date	Cumulative
11. Hours In Reporting Period	744	5087	63,888
12. Number Of Hours Reactor Was Critical	0	2218.3	37,454.9
13. Reactor Reserve Shutdown Hours	744	2404	8,862.6
14. Hours Generator On-Line	0	2152.9	35,923.3
15. Unit Reserve Shutdown Hours	0	0	1,210.2
16. Gross Thermal Energy Generated (MWH)	0	4,702,938	90,598,050
17. Gross Electrical Energy Generated (MWH)	0	1,576,517	30,337,946
18. Net Electrical Energy Generated (MWH)	0	1,479,078	28,636,195
19. Unit Service Factor	0	42.3%	56.2%
20. Unit Availability Factor	0	42.3%	58.1%
21. Unit Capacity Factor (Using MDC Net)	0	33.3%	51.3%
22. Unit Capacity Factor (Using DER Net)	0	31.7%	48.8%
23. Unit Forced Outage Rate	0	0.7%	29.8%

24. Shutdowns Scheduled Over Next 6 Months (Type, Date, and Duration of Each):
Refueling and TMI Modifications, January 1983, 6 Months.

25. If Shut Down At End Of Report Period, Estimated Date of Startup: Aug 16, 1982
26. Units In Test Status (Prior to Commercial Operation):

	Forecast	Achieved
INITIAL CRITICALITY	N/A	N/A
INITIAL ELECTRICITY	N/A	N/A
COMMERCIAL OPERATION	N/A	N/A

(9/77)

AVERAGE DAILY UNIT POWER LEVEL

DOCKET NO. 50-312
UNIT Rancho Seco Unit 1
DATE 82-07-31
COMPLETED BY J. Edwards
TELEPHONE (916) 452-3211

MONTH July 1982

DAY	AVERAGE DAILY POWER LEVEL (MWe-Net)	DAY	AVERAGE DAILY POWER LEVEL (MWe-Net)
1	0	17	0
2	0	18	0
3	0	19	0
4	0	20	0
5	0	21	0
6	0	22	0
7	0	23	0
8	0	24	0
9	0	25	0
10	0	26	0
11	0	27	0
12	0	28	0
13	0	29	0
14	0	30	0
15	0	31	0
16	0		

INSTRUCTIONS

On this format, list the average daily unit power level in MWe-Net for each day in the reporting month. Compute to the nearest whole megawatt.

(9/77)

REFUELING INFORMATION REQUEST

1. Name of Facility: Rancho Seco Unit 1

2. Scheduled date for next refueling shutdown: January 1983

3. Scheduled date for restart following refueling: July 1983

4. Technical Specification change or other license amendment required:

   a) Change to Rod Index vs. Power Level Curve (TS 3.5.2)

   b) Change to Core Imbalance vs. Power Level Curve (TS 3.5.2)

   c) Tilt Limits (TS 3.5.2)

5. Scheduled date(s) for submitting proposed licensing action: November 1982

6. Important licensing considerations associated with refueling: None

7. Number of fuel assemblies:

   a) In the core: 177

   b) In the Spent Fuel Pool: 196

8. Present licensed spent fuel capacity: 579

9. Projected date of the last refueling that can be discharged to the Spent Fuel Pool: 1987

UNIT SHUTDOWNS AND POWER REDUCTIONS

DOCKET NO. 50-312
UNIT NAME Rancho Seco Unit 1
DATE 82-07-31
COMPLETED BY J. Edwards
TELEPHONE (916) 452-3211

REPORT MONTH July, 1982

No.	Date	Type[1]	Duration (Hours)	Reason[2]	Method of Shutting Down Reactor[3]	Licensee Event Report #	System Code[4]	Component Code[5]	Cause & Corrective Action to Prevent Recurrence
07	82-04-03	S	744	B	1	82-010-01T	CH	XXXXX	Repair and Modify OTSG Auxiliary Feedwater Ring Headers.

1
F: Forced
S: Scheduled

2
Reason:
A-Equipment Failure (Explain)
B-Maintenance or Test
C-Refueling
D-Regulatory Restriction
E-Operator Training & License Examination
F-Administrative
G-Operational Error (Explain)
H-Other (Explain)

3
Method:
1-Manual
2-Manual Scram.
3-Automatic Scram.
4-Other (Explain)

4
Exhibit G - Instructions for Preparation of Data Entry Sheets for Licensee Event Report (LER) File (NUREG-0161)

5
Exhibit I - Same Source

(9/77)

SUPPLEMENT TO MONTHLY PLANT OPERATIONS REPORT

EDDY CURRENT INSPECTION OF OTSG TUBES - 1982 MAINTENANCE OUTAGE

DESCRIPTION	A-OTSG	B-OTSG
Number of Tubes Inspected	467 (3% Random) 366 Lane 447 Peripheral } Special Interest 1280	465 (3% Random) 370 Lane 447 Peripheral } Special Interest 1282
Number of Tubes Plugged	10	9
Location of Tubes Plugged	2-22, 6-1, 29-1, 29-2, 51-124, 75-7, 104-1, 104-1, 104-123, 105-122, 146-1	6-1, 6-51, 47-1, 74-3, 77-18, 97-1, 104-1, 105-1, 146-1
Locations of Indications	≥20% , <40% 8-57 20% OD within UTS 33-1 29% OD within UTS 46-1 34% OD within UTS 141-10 20% OD between 10th & 11th TSP	77-13 28% OD at 15th TSP

General: All tubes in the random 3% samples and special interest lane and peripheral tubes were examined at 400 KHZ. In addition, the peripherals were examined at 10 KHZ to locate any Auxiliary Feedwater Header/Bracket within 1/4" of a tube face. All tubes plugged were within the special interest groups.

REVIEW OF PROPOSED 50.59 FACILITY CHANGE — Log No. 267

1. DESCRIPTION:

Replacement of the Rancho Seco LP-1 rotor with a refurbished rotor having six discs that are of a different design from those on the rotor it is replacing.

NCR S-2450 ECN ______

2. SAFETY ANALYSIS:

SEE ATTACHED SAFETY ANALYSIS

Roger Powers 9/30/81 — Licensing Engineer / Date

[signature] 9/30/81 — Manager Generation Engineering / Date

3. PRC RECOMMENDATION: 50.59(a) Yes ☐ No ☒ 50.59(b) Yes ☒ No ☐

DISPOSITION OF PRC: ______

a. Unanimously recommends proposal ☒
b. Send to MSRC for concurrence ☒
c. Recommends not to proceed ☐
d. Safety analysis inadequate ☐
e. MSRC review prior to implementing ☐
f. Test of system required ☐

[signature] 10-9-81 — PRC Chairman / Date

4. ANALYSIS: 50.59(a) Yes ☐ No ☒
50.59(b) Yes ☒ No ☐

Recommend to Proceed Yes ☒ No ☐
Refer to MSRC ☐
Test of system reqgired ☐

[signature] 10-9-81 — Plant Superintendent / Date

5. MSRC FINDINGS: 50.59(a) Yes ☐ No ☒ 50.59(b) Yes ☒ No ☐

DISPOSITION OF MSRC: ______

a. Recommends proposal ☒
b. Send to NRC for approval ☐
c. Recommends not to proceed ☐
d. Safety analysis inadequate ☐

[signature] 10/20/81 — MSRC Chairman / Date

6. COMMISSION APPROVAL OBTAINED

N/A

______ Date ______ MSRC Chairman

7. RETEST COMPLETE AND ACCEPTABLE: Test results approved

N/A

______ Supervisor Engineering and Quality Control

8. OVERALL REVIEW: Plant modification change complete.

SC 59 not related to an ECN; no document change necessary. [signature]

[signature] 7/12/8[illegible] — Manager Nuclear Operations

9. DOCUMENTATION COMPLETE:

[signature] 7-[illegible] — Quality Assurance Director

SMUD-0498 9/80

Log No. 267

SAFETY ANALYSIS FORMAT

RANCHO SECO NUCLEAR GENERATING STATION UNIT NO. 1

ECN _____ NCR S-2450 Work Request _____

DESCRIPTION:

Replacement of the Rancho Seco LP-1 rotor with a refurbished rotor having six discs that are of a different design from those on the rotor it is replacing.

REASON FOR CHANGE:

On August 13, 1981 the LP-1 rotor of the Rancho Seco turbine generator suffered major damage to the fifth rotating and stationary blading, generator end.

EVALUATION AND BASIS FOR THE SAFETY FINDINGS:

Appendix 5C of the FSAR does not evaluate the effects of missile generation of a failed rotor. What Appendix 5C does is state that the manufacturer (Westinghouse) has carried out analyses and tests and concluded that system reliability and equipment redundancy make generation of missiles which penetrate the casings highly improbable.

[X] The proposed change will not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR or create the possibility for an accident or malfunction of a different type than any evaluated previously in the FSAR or reduce the margin of safety as defined in the basis for any Technical Specification.

SAFETY FINDING:

[ ] The proposed change does not involve a change in the Technical Specifications or an unresolved safety question.

Licensing Engineer Roger Powers Date 9/30/81

Review Engineer [signature] Date 9/30/81

Log No. 267

DESIGN BASIS REPORT

ECN _____ NCR 5-2450 Work Request _____

Discipline Materials Engineering Date 9-30-81

I. PURPOSE OF DESIGN CHANGE:

To replace the failed LP-1 rotor of the turbine/generator at Rancho Seco.

II. DESIGN CRITERIA USED:

The replacement rotor is a refurbishment of the LP-2 rotor from the 1975 turbine failure. The refurbishment consisted of replacing the first three discs on both the generator and governor ends of the rotor.

III. CALCULATIONS AND DESIGN INFORMATION: The first three discs on each end of the LP rotor were replaced with a new Westinghouse design. The design criteria considered by Westinghouse were: stress at running speed, shrink fit required for disc to hold at design overspeed, steeple stresses, torsional response of system, short circuit torque, shaft bending because of increased weight, thermal stresses, and bearing loading. Based on these considerations, the material strength of the disc material was reduced, the hub area was strengthened, keyways were not used, and a key plate added for low speed transients. All of these should reduce susceptibility to stress corrosion cracking. It is estimated that P_1 will go from 10^{-4} to an estimated 10^{-6}.

THE YIELD STRENGTH OF DISK MATERIAL WAS CHANGED FROM 120,000 PSI TO 90,000 PSI USING DIFFERENT HEAT TREATING PROCESS THUS MAKING THE DISK MATERIAL LESS BRITTLE & LESS SUSCEPTIBLE TO SSC. LRK

IV. FAILURE MODE: The failure mode of the disc removed from the failed LP-1 rotor was stress corrosion. The failure mode of the blading on August 13, 1981 was fatigue. The most probable failure mode of the refurbished disc is stress corrosion. Although the P_1 calculation for the redesigned discs has not been completed, it is estimated to be no larger than 10^{-6}.

V. COMMENTS:

The modification to the turbine only involves modifications to discs 1-3. The limiting case has always been discs 4 and 5. Since these are unchanged, the consequences have not increased. The energy content for discs 4 and 5 are approximately double that of discs 1-3, which is substantially greater than the increase in mass of these dics.

10/9/81

Design Engineer _____ Date 9/30/81

Review Engineer _____ Date 9/30/81

SMUD-0912 11/77

A2400 2178 I 50.59 log #267

RANCHO SECO
NONCONFORMING REPORT

QUALITY CLASS 1 NO. S-2450

I. SYSTEM Main Low Pressure Turbine Rotor
EQUIPMENT I.D. NO. Main Turbine LP#1 K-303A
EQUIPMENT NAME Main Low Pressure Turbine Rotor
ECN/DCN NO.
WORK REQUEST NO.

PREPARED BY Dan Whitney DW
LOCATION Rancho Seco
DATE 8-25-81
PURCHASE ORDER NO. (if applicable)

II. DESCRIPTION OF NONCONFORMANCE

The #1 LP Turbine has suffered extensive blade damage. It is proposed that the "Universal" Low Pressure Rotor be installed in its place. This rotor is considerably heavier than the one it is to replace; hence, the question of turbine generated missiles must be addressed.

IIA. DESIGN REVIEW AND 10 CFR Section 50.59 review required.
YES ☒ NO ☐
SIGNATURE 8/26/81

IIB. COGNIZANT ENGINEER ASSIGNED
J. SULLIVAN

III. DISPOSITION (check one)
ACCEPT ☒ 1 REJECT ☐ REPAIR ☐ REWORK ☒ 2 REPLACE ☐

IV. DISPOSITION INSTRUCTIONS AND TECHNICAL JUSTIFICATION

1. Replacement with the refurbished rotor should provide additional safety by reducing mechanical failure and failure due to stress corrosion. See 50.59 Review attached.

2. Nuclear Operations is to analyze the ability of the oil lube pumps to carry the ~12,000 lbs additional weight of the refurbished rotor. Verified by test RPL 12/7/81

DRAWING NO.
TRANSMITTAL NO.

THIS DISPOSITION WILL REQUIRE:

A Drawing Change	A Retest of the System/Unit	Test No. (if applicable)
Yes ☒ No ☐	Yes ☐ No ☒	

Sullivan 9/3/81
COGNIZANT ENGINEER DATE

V. ENGINEERING REVIEW BOARD (required on all accept/repair dispositions)

MANAGER, NUCLEAR OPERATIONS 11/24/81 DATE

SMUD QAD 11/8/81 DATE

MANAGER, GENERATION ENGINEERING 12-7-81 DATE

VI. SCHEDULING OFFICE (if applicable)
Work Requests N/A ECN/OCN

VII. REPAIR/REWORK/REPLACE COMPLETE and ACCEPTABLE
RPL 12-9-81
INSPECTOR DATE

VIII. RETEST COMPLETE and ACCEPTABLE
TEST RESULTS APPROVED BY
DATE

IXA. CAUSE

EXTENSIVE BLADE DAMAGE ON EXISTING LP#1 ROTOR

9/8/81
QA ENGINEER DATE

IXB. CORRECTIVE ACTION

REPLACE ROTOR WITH UNIVERSAL LP ROTOR. ATTACHED SAFETY ANALYSIS CONCLUDES PROBABILITY OF FAILURE WILL NOT BE INCREASED.

9/8/81
QA ENGINEER DATE

REVIEW OF PROPOSED 50.59 FACILITY CHANGE Log No. 267

1. DESCRIPTION:

Replacement of the Rancho Seco LP-1 rotor with a refurbished rotor having six discs that are of a different design from those on the rotor it is replacing.

NCR S-2450 ECN

2. SAFETY ANALYSIS:

SEE ATTACHED SAFETY ANALYSIS

Licensing Engineer Date 5/30/91

Manager Generation Engineering Date 5/30/91

3. PRC RECOMMENDATION: 50.59(a) Yes ☐ No ☒ 50.59(b) Yes ☒ No ☐

DISPOSITION OF PRC:

a. Unanimously recommends proposal ☒
b. Send to MSRC for concurrence ☒
c. Recommends not to proceed ☐
d. Safety analysis inadequate ☐
e. MSRC review prior to implementing ☐
f. Test of system required ☐

PRC Chairman Date 10-9-91

4. ANALYSIS: 50.59(a) Yes ☐ No ☒ Recommend to Proceed Yes ☒ No ☐
Refer to MSRC ☐
50.59(b) Yes ☒ No ☐ Test of system required ☐

Plant Superintendent Date 10-9-91

5. MSRC FINDINGS: 50.59(a) Yes ☐ No ☒ 50.59(b) Yes ☒ No ☐

DISPOSITION OF MSRC:

a. Recommends proposal ☒
b. Send to NRC for approval ☐
c. Recommends not to proceed ☐
d. Safety analysis inadequate ☐

MSRC Chairman Date 10-10-91

6. COMMISSION APPROVAL OBTAINED

Date MSRC Chairman

7. RETEST COMPLETE AND ACCEPTABLE: Test results approved

Supervisor Engineering and Quality Control

8. OVERALL REVIEW: Plant modification change complete.

Manager Nuclear Operations Date

9. DOCUMENTATION COMPLETE:

Quality Assurance Director Date

SMUD-0498 9/30

Log No. 267

SAFETY ANALYSIS FORMAT

RANCHO SECO NUCLEAR GENERATING STATION UNIT NO. 1

ECN _____ NCR S-2450 Work Request _____

DESCRIPTION:

Replacement of the Rancho Seco LP-1 rotor with a refurbished rotor having six discs that are of a different design from those on the rotor it is replacing.

REASON FOR CHANGE:

On August 13, 1981 the LP-1 rotor of the Rancho Seco turbine generator suffered major damage to the fifth rotating and stationary blading, generator end.

EVALUATION AND BASIS FOR THE SAFETY FINDINGS:

Appendix 5C of the FSAR does not evaluate the effects of missile generation of a failed rotor. What Appendix 5C does is state that the manufacturer (Westinghouse) has carried out analyses and tests and concluded that system reliability and equipment redundancy make generation of missiles which penetrate the casings highly improbable.

☒ The proposed change will not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR or create the possibility for an accident or malfunction of a different type than any evaluated previously in the FSAR or reduce the margin of safety as defined in the basis for any Technical Specification.

SAFETY FINDING:

☐ The proposed change does not involve a change in the Technical Specifications or an unresolved safety question.

Licensing Engineer _____ Date 9/30/81

Review Engineer _____ Date 9/30/81

SMUD-0913 11/77

About 1978 Westinghouse recognized that discs in low pressure rotors in turbine building blocks 80, 81, and 281 (BB281 is used at Rancho Seco) were generically susceptible to stress corrosion cracking (SCC). To solve this problem Westinghouse redesigned the discs holding the first five stages of the low pressure rotors of the above building blocks. The main features of the redesigned discs were that it is much sturdier, the strength level of the metal was reduced, keyways were eliminated, and a key plate was added. The basic metal formulation was not changed.

The above changes were based on material fracture analysis, computer analysis of bore, hub and run stresses, thermal stresses, torsional response, short circuit torque, and shaft bending. It is estimated that the probability of failure of the redesigned disc is one to two orders of magnitude lower than the discs on the damaged rotor.

Based on the information furnished to the Users Disc Integrity Task Force, it is my opinion that the refurbished rotor is less likely to experience mechanical failure or failure due to stress corrosion.

ATTACHMENT TO
NCR S-2450

The original building block 281 disc designed was susceptible to bore keyway cracks for two reasons.

The primary problem was a heat treat to raise the tensile strength to a high level which also made the steel very susceptible to stress corrosion cracking even at extremely low levels of contaminants.

Also with a high shrink fit of the discs to the shaft, there was a high stress level at the keyway between the shaft and disc.

To resolve these problems and produce a disc less susceptible to massive failure, Westinghouse has made two basic changes: (1) The heat treat requirements for the disc material have been altered to lower the tensile strength which increases the steel's tolerance to minor amounts of contaminants and therefore produces greater resistance to stress corrosion cracking. (2) In addition, the keyway at the bore of the discs which was a significant stress riser has been eliminated; and the disc is now attached to the shaft through a separate plate having different metallurgy.