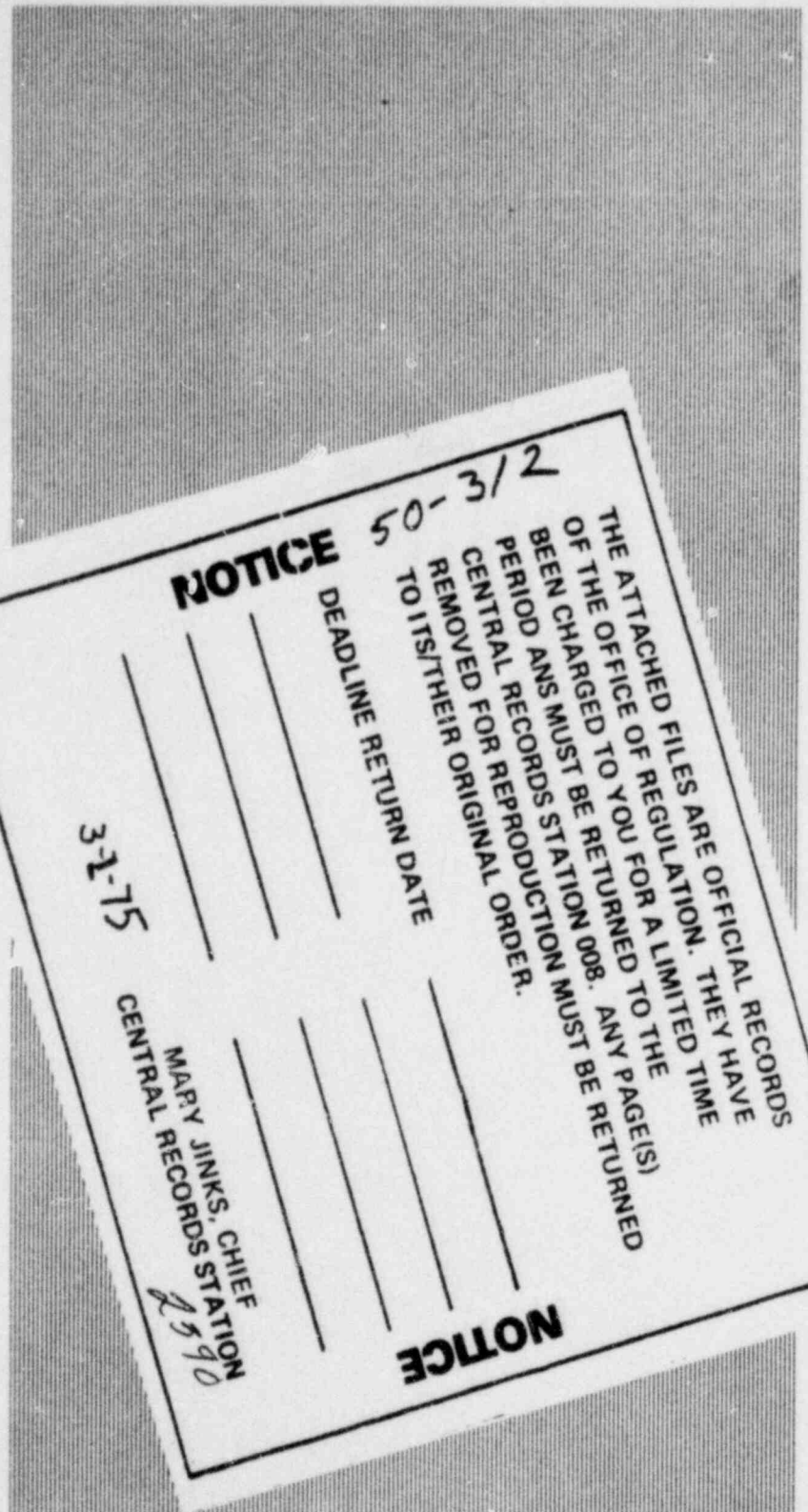


RANCHO SECO
nuclear generating station

UNIT ONE
CLAY STATION, CALIFORNIA

ANNUAL REPORT

MARCH 1975

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

RANCHO SECO
nuclear generating station

UNIT ONE

UNITED STATES NUCLEAR REGULATORY COMMISSION DOCKET NUMBER 50-317

OPERATING LICENSE DPR-54

ANNUAL REPORT

MARCH 1975

APPROVED: _____
R. J. Rodriguez, Plant Superintendent

APPROVED: _____
J. J. Mattimoe, Assistant General Manager, Chief Engineer

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

PART I

OPERATIONS SUMMARY

Introduction

This report has been prepared for submittal to the Nuclear Regulatory Commission in accordance with Proposed Appendix A, Section 6.9, and Appendix B, Section 5.6 to Operating License DPR-54 for the Ranch Seco Nuclear Power Station.

The Operating License for the Rancho Seco Nuclear Station was granted to the Sacramento Municipal Utility District on August 16, 1974. This report is intended to summarize all significant activities from the date of obtaining the Operating License to the end of the annual reporting period on December 31, 1974.

During the reporting period, the major plant activities involved the completion of the preoperational testing, fuel loading, startup testing and power escalation.

INDEX

SECTION I

ANNUAL OPERATING REPORT

1.0 CHRONOLOGICAL HISTORY

August 16, 1974 - Operating License Issued

August 19, 1974 - Commenced Fuel Loading

August 23, 1974 - Completed Fuel Loading

September 16, 1974 - Initial Criticality

October 3, 1974 - Completed Zero Power Physics Test

October 11, 1974 - Initial Turbine Roll

October 13, 1974 - Synchronized to Grid

November 18, 1974 - Completed 15% Testing

January 4, 1975 - Completed 40% Testing

1.1 Report for July

1.1.1 OPERATIONS SUMMARY

1.1.1.1 Changes in Design

There were no significant safety related changes in plant design during July.

1.1.1.2 Performance Characteristics

The primary effort this month was completion of the hot functional test program.

1.1.1.3 Changes in Operating Methods

The following significant safety related changes were made to Rancho Seco Unit 1 operating procedures in July, 1974:

1. Procedure B-4, "Plant Shutdown and Cooldown".

   Revision 1 - Revised system limits and precautions and rewrote Plant Shutdown section; rewrote Plant Cooldown section to provide more detail.

1.1.1.4 Surveillance Tests

All equipment successfully passed the scheduled surveillance testing during July.

1.1.1.5 Periodic Containment Leak Rate Tests

There were no periodic containment leak rate tests performed in July.

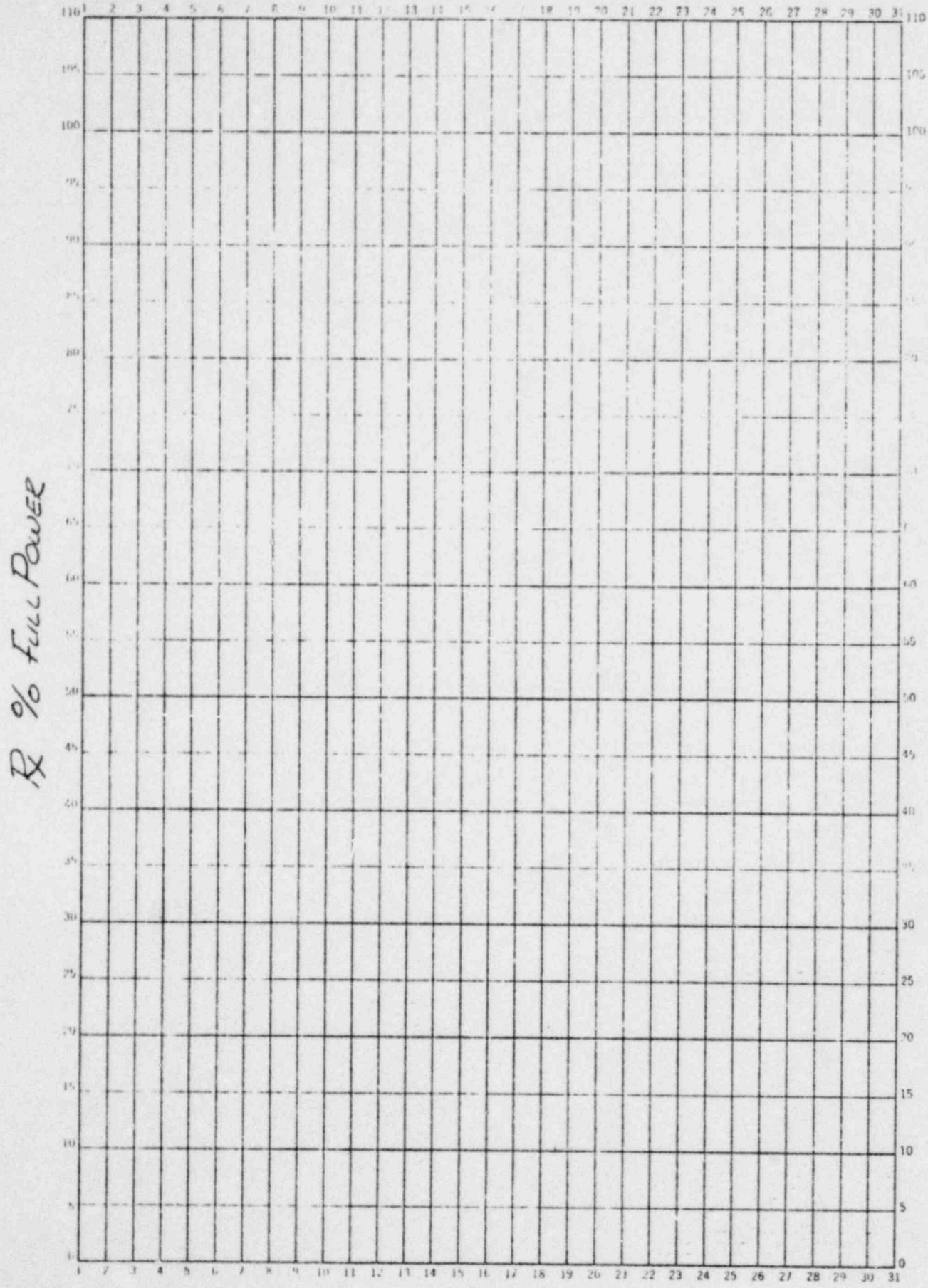
1.1.1.6 Changes, Tests, and Experiments Authorized by NRC

No changes, tests, or experiments requiring authorization from Nuclear Regulatory Commission, pursuant to 10 CFR 50.59a, were performed during July, 1974.

1.1.2 POWER GENERATION

Nuclear		July, 1974	Cumulative
1.	Number of hours the reactor was critical	0	0
2.	Number of times the reactor was made critical	0	0
3.	Gross thermal power generated (MWH)	0	0
4.	Effective full power hours	0	0

Electrical			
1.	Gross electrical power generated (MWH)	0	0
2.	Net electrical power generated (MWH)	0	0
3.	Number of hours the generator was on line	0	0


% Full Power
Month July 1974

1.1.3 **UNIT 1 SHUTDOWNS** - July, 1974

There were no shutdowns greater than 20% this month

Date	Type	Status During Outage	Reason	Corrective Action	Duration

1.1.4 MAINTENANCE OF SAFETY RELATED EQUIPMENT

	Description:	Date
1.1.4.1	Inadvertent Operation and Damage to High Pressure Injection Pump.	7-8-74

High Pressure Injection pump started inadvertently when a short strand of wire fell across terminals, accidentally jumpering the control switches in the control room. The pump started and ran dead-headed for 15 minutes prior to tripping on overcurrent. The lack of flow recirculation heated the pump internals which resulted in complete seizure of the shaft to the casing. This incident occurred during performance of the Integrated Safety Features Actuation System Test. No fuel was loaded and the coolant system was at ambient temperature and depressurized. The failed pump was sent to the vendor, Byron-Jackson, where it is undergoing repair in the Los Angeles shop. The pump was dissasembled and inspected for damage. One impeller was found ruined and replaced. The new impeller meets all the original design specifications. All new wear rings and shaft seals have been installed. Shaft bearings were rebabbitted and fitted to the new shaft sleeves. The shaft was checked for straightness and rebalanced with the new impeller installed. The pump casing was hydrostatically tested satisfactorily. The pump was reassembled and is expected to be returned to the site in early March, 1975. A surveillance test will be performed on the pump prior to returning it to service.

1.1.5 CHANGES IN PLANT OPERATING ORGANIZATION - JULY , 1974

There were no changes in the plant operating staff for those positions which are designated as key supervisory personnel on Figure 6.2-1 of the Technical Specifications.

1.2 Report for August

1.2.1 OPERATING SUMMARY

1.2.1.1 Changes in Design

There were no significant safety related changes in plant design during August.

1.2.1.1 Performance Characteristics

The primary effort this month was completion of the initial fuel loading.

1.2.1.3 Changes in Operating Methods

The following significant safety related changes were made to Rancho Secc Unit 1 operating procedures in August, 1974:

1. Procedure A.8, "Decay Heat System".

   Revision 1 - Added pertinent system limits and precautions and rewrote "Decay Heat Removal During RCS Cooldown" section to include detailed steps as recommended by B&W; also included Decay Heat section valve/RCS pressure interlock modification and revised valve lineups per latest P&ID revisions.

2. Procedure A.23, "Waste Gas System".

   Revision 1 - Updated system limits and precautions; rewrote normal operations section to provide more operator information and revised valve lineups per latest P&ID revisions.

1.2.1.4 Surveillance Tests

Diesel Generator B failed to start on August 29, 1974 during Surveillance Test 206.03B. An Abnormal Occurrence Report No.. 74-1 was filed with NRC.

1.2.1.5 Periodic Containment Leak Rate Tests

There were no periodic containment leak rate tests peformed in August, 1974.

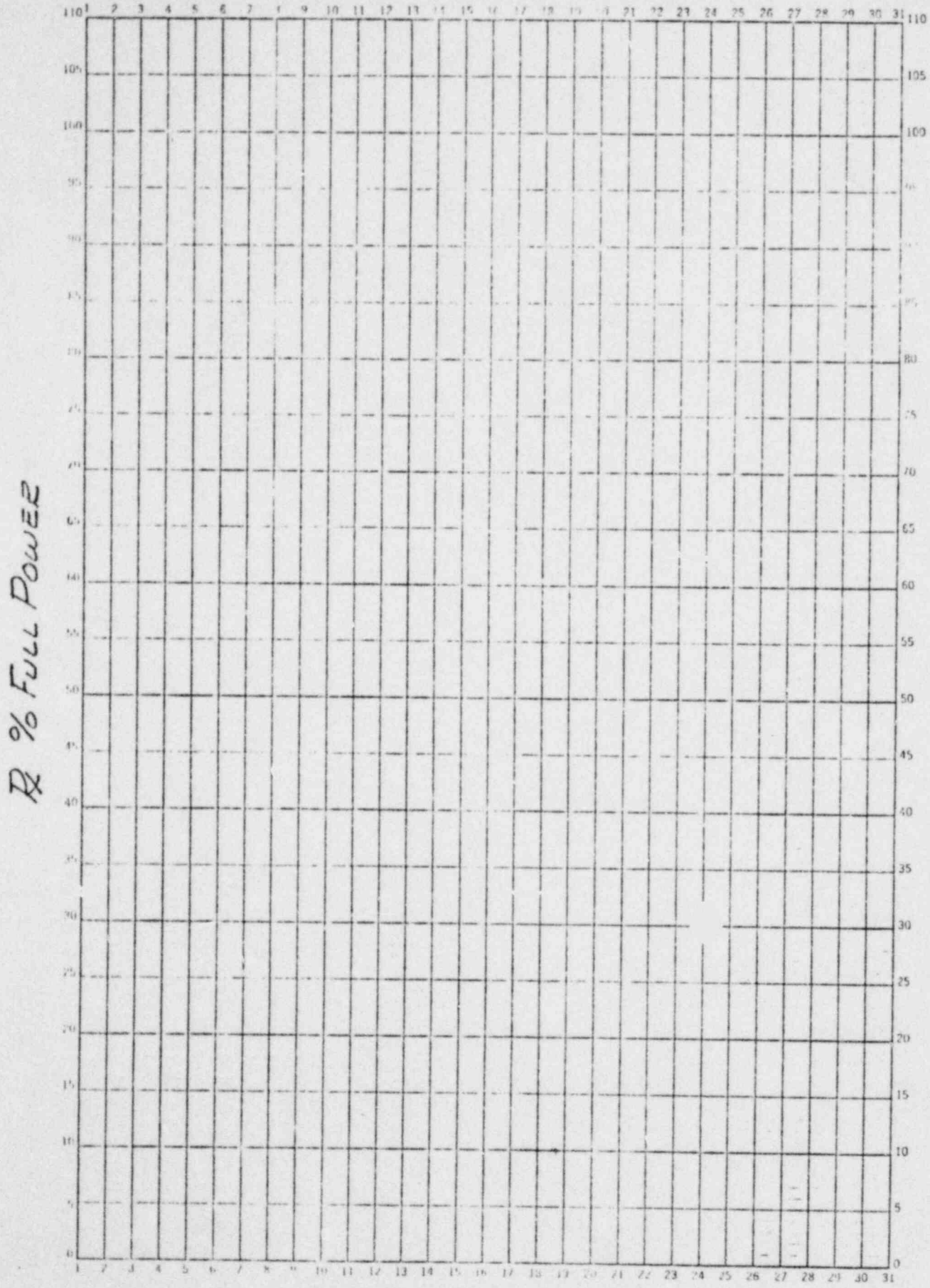
1.2.1.6 Changes, Tests, and Experiments Authorized by NRC

No changes, tests, or experiments requiring authorization from Nuclear Regulatory Commission, pursuant to 10 CFR 50.59a, were performed during August, 1974.

1.2.2 POWER GENERATION

Nuclear		August, 1974	Cumulative
1.	Number of hours the reactor was critical	0	0
2.	Number of times the reactor was made critical	0	0
3.	Gross thermal power generated (MWH)	0	0
4.	Effective full power hours	0	0

Electrical			
1.	Gross electrical power generated (MWH)	0	0
2.	Net electrical power generated (MWH)	0	0
3.	Number of hours the generator was on line	0	0



Month August 1971

1.2.3 UNIT 1 SHUTDOWNS - August, 1974

There were no shutdowns greater than 20% this month.

Date	Type	Status During Outage	Reason	Corrective Action	Duration

1.2.4 MAINTENANCE OF SAFETY RELATED EQUIPMENT

	Description:	Date
1.2.4.1	Diesel Generator "B" did not start as required by the surveillance test procedure.	8-29-74

During the performance of the monthly surveillance test procedure, it was found that the "B" Diesel Generator would not start manually in three successive attempts. On the fourth attempt the diesel started, but did not reach operating speed and the field did not flash. No indication of voltage nor speed on the tachometer were observed. The diesel was then shut down and the problem analyzed. A loose connection inside the relay tachometer was found and resoldered. During a bench test of the relay tachometer it was found that an internal high temperature resistor was affecting the proper operation of other components inside the relay tachometer which are temperature sensitive. The high temperature resistor was removed from the unit and mounted externally where the temperature would not affect the tachometer. The tachometer was reinstalled in the control circuitry and functioned properly during successive starts of the Diesel Generator on August 31, 1974, September 1, 2, and 3, 1974. Reactor fuel was loaded in the reactor vessel and reactor head installation was in progress.

1.2.5 CHANGES IN PLANT OPERATING ORGANIZATION - AUGUST, 1974

There were no changes in the plant operating staff for those positions which are designated as key supervisory personnel on Figure 6.2-1 of the Technical Specifications.

1.3 Report for September

1.3.1 OPERATIONS SUMMARY

1.3.1.1 Changes in Design

There were no significant safety related changes in plant design during September, 1974.

1.3.1.2 Performance Characteristics

The primary effort this month was completion of the Zero Power Physics Test Program.

1.3.1.3 Changes in Operating Methods

The following significant safety related changes were made to Rancho Seco Unit 1 operating procedures in September, 1974.

1. Procedure A.69, "Reactor Protection System".

   Revision 1 - Added system limits and precautions and made detailed changes to the entire procedure to incorporate B&W comments.

2. Procedure B.1, "Plant Precritical Check".

   Revision 1 - Corrected specifications and verification frequencies and added applicable surveillance procedure numbers to reflect latest Technical Specification requirements.

1.3.1.4 Surveillance Tests

1. The isolation valve HV-26106 to the Reactor Building Emergency Sump failed to open on September 7, 1974 during performance of Surveillance Procedure 203.06B. An Abnormal Occurrence Report No. 74-2 was filed with NRC.

2. Reactor Protection System Channel A was found out of calibration on the "imbalance function generator" when Surveillance Procedure 1-108 was performed September 19, 1974. An Abnormal Occurrence Report No. 74-4 was filed with NRC.

1.3.1.5 Periodic Containment Leak Rate Tests

The following Local Leak Rate Testing was performed during September, 1974:

1. The Emergency Hatch Outer Seal was tested on September 4, 1974. No leakage was found.

2. The South Fuel Transfer Tube was tested on September 7, 1974. No leakage was found.

1.3.1.5 Periodic Containment Leak Rate Test (Continued)

3. The North Fuel Transfer Tube was tested on September 8, 1974. No leakage was found.

4. The Equipment Hatch was tested on September 9, 1974. No leakage was found.

5. The Personnel Hatch Outer Door was tested on September 10, 1974. No leakage was found.

6. Emergency Sump Valves HV-26105 and HV-26106 were tested on September 12, 1974. No leakage was found.

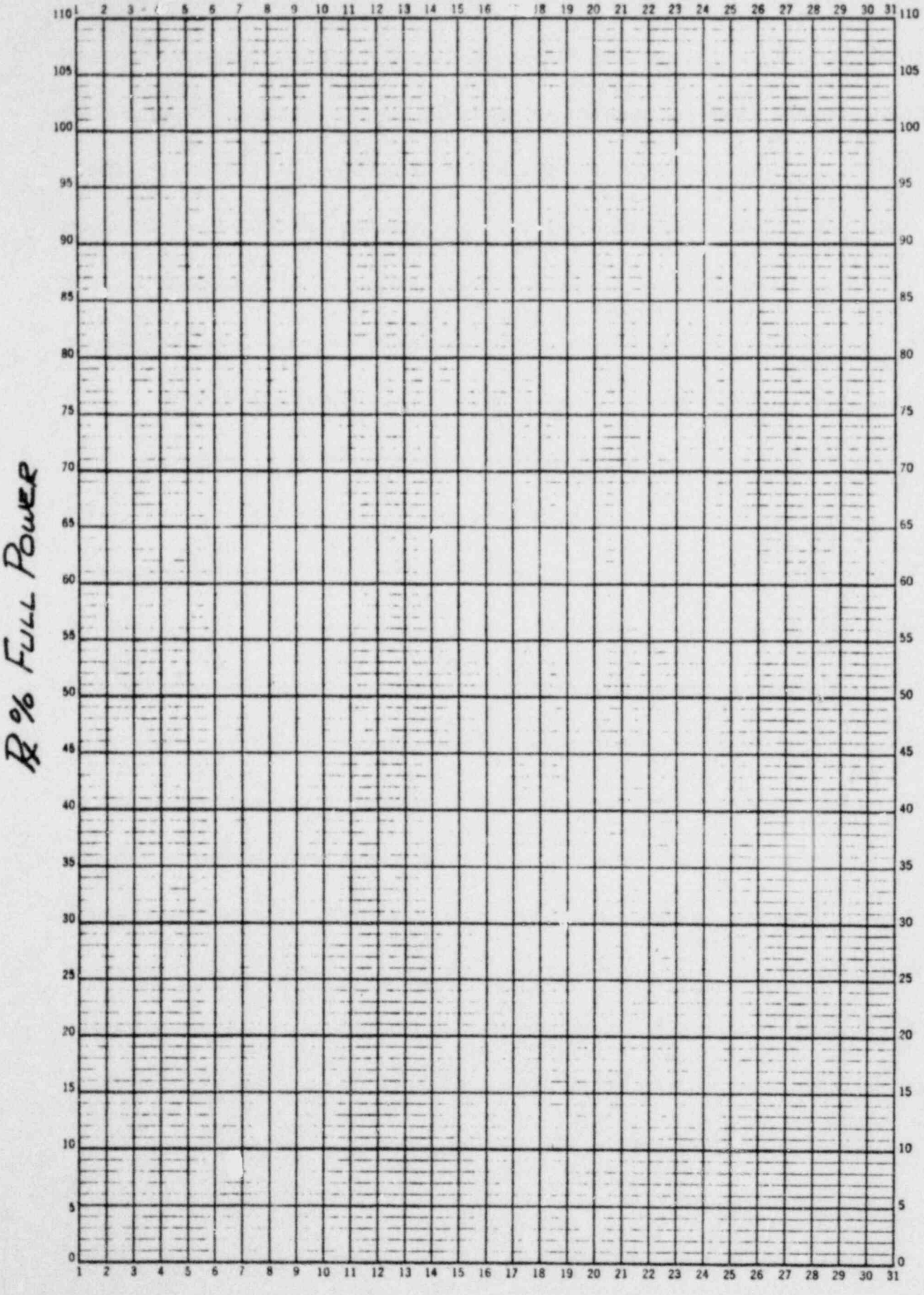
1.3.1.6 Changes, Tests, and Experiments Authorized by NRC

No changes, tests, or experiments requiring authorization from Nuclear Regulatory Commission, pursuant to 10 CFR 50.59a, were performed during September, 1974.

1.3.2 POWER GENERATION

Nuclear		Sept., 1974	Cumulative
1.	Number of hours the reactor was critical	59	59
2.	Number of times the reactor was made critical	26	26
3.	Gross thermal power generated (MWH)	0	0
4.	Effective full power days	0	0

Electrical			
1.	Gross electrical power generated (MWH)	0	0
2.	Net electrical power generated (MWH)	0	0
3.	Number of hours the generator was on line	0	0



K&E 1 MONTH BY DAYS 46 2290
X 110 DIVISIONS
KEUFFEL & ESSER CO.

Month SEPTEMBER 19 74

1.3.3 UNIT 1 SHUTDOWNS - September, 1974

There were no shutdowns greater than 20% this month

Date	Type	Status During Outage	Reason	Corrective Action	Duration

1.3.4 MAINTENANCE OF SAFETY RELATED EQUIPMENT

	Description:	Date
1.3.4.1	Emergency Sump Valve would not open.	9-7-74

Two unsuccessful attempts were made to cycle open one of the two Emergency Sump Valves during performance of a quarterly surveillance test procedure. An operator observed that during the test that stem travel was only 1/4 inch when complete travel should have been 20 inches. The valve was removed and inspected. Inspection showed the motor and drive gears to be in excellent condition. With the motor operator off, the valve stem was manually pulled to open the valve. The stem did not move, indicating the gate was binding to the seat. After further valve disassembly, a hydraulic jack was attached to the stem and with a moderate force the stem started out. Once loose the stem was easily removed. The gate and seat were carefully inspected and all components were found in perfect condition. The valve was reassembled and the motor operator attached. The torque limit switches were adjusted and the valve tested. Numerous open and close cycles were performed without signs of binding. The valve successfully passes its surveillance test on September 14, 1974. It is assumed that since the valve had not been operated in 9 months, bond had formed between the seat and gate seal surfaces. The valve is dry and lacks lubrication which would be provided by water under actual operating conditions. Valve cycling frequency was increased to ensure valve operates freely. The plant was at cold shutdown completing final testing prior to initial criticality.

1.3.4.2	High Pressure Injection Pump Lube Oil Piping Failure.	9-8-74

High pressure injection pump was started and taking suction from the Borated Water Storage Tank in order to increase makeup tank level by use of pump recirculation. One minute after the pump started a Lo Lube Oil Pressure Alarm was received in the Control Room. The pump was immediately shut down. Upon investigation a bearing oil pipe joint was found to have separated. The pipe joint was repaired, the Lube Oil Reservoir refilled and the pump was started and bearing temperatures monitored. Pump performance was determined satisfactory and the pump was placed back in service. The plant was in cold shutdown condition with preparations underway for initial criticality.

1.3.4.3	Reactor Coolant System overpressure during heatup due to de-energized vital AC inverter and subsequent loss of vital instrumentation.	9-10-74

Heatup of the Reactor Coolant System was in progress when an unusual sound was discovered coming from the internals of the SID inverter cabinet. Upon investigation, a loose inductor lug was found to be sparking to a grounding bar. To prevent electrical transients and further degradation of the inductor lug, it was decided that the SID inverter be de-energized and repair started immediately. Twelve minutes after the inverter was secured, the High Reactor Coolant Pressure

1.3.4.3 (Continued)

Alarm sounded. The operator inspected his pressure indicators and noted the wide and narrow range pressure recorders for "B" loop were reading 1950 psig and the narrow range pressure indicator for "A" loop was reading 2400 psig and rising sharply. The operator decided the latter reading was correct and shut down the high pressure injection pump. The pressure began to drop quickly and at 2100 psig the operator energized the pressurizer heaters to assure that the "A" loop pressure was responding correctly and that there was still a steam bubble in the pressurizer. The RCS pressure subsequently decreased to 1900 psig by natural decay and then was reduced to 1600 psig until a complete analysis of the situation could be made. One of the systems that the SID inverter supplies is the reactor non-nuclear instrumentation "X" power. This bus feeds numerous signal converters, transmitters, indicators, controllers, recorders, and selector stations. The Reactor Coolant Narrow and Wide Range Recorders for Loop "B" stopped at the pressure indicated at the time "D" inverter was de-energized (1950 psig). The Seal Injection Flow Transmitter and Valve Controller went to zero signal and 50% open. The makeup control valve and letdown control valve also went to 50% open (zero signal). As a result of this problem an alternate power supply has been assigned to the NNI X power with a temporary manual transfer switch, to be replaced by an automatic transfer system. All inverters were checked for loose inductor ground connections. A thorough analysis of the transient revealed no adverse effects to the Reactor Coolant System. The reactor was subcritical and stabilized at 355°F and 1950 psig at the time the inverter was de-energized.

1.3.5 CHANGES IN PLANT OPERATING ORGANIZATION - SEPTEMBER, 1974

There were no changes in the plant operating staff for those positions which are designated as key supervisory personnel on Figure 6.2-1 of the Technical Specifications.

1.4 Report for October

1.4.1 OPERATIONS SUMMARY

1.4.1.1 Changes in Design

The following change in design of Rancho Seco Unit 1 were made during October, 1974:

1. The upper level sensing line for CRD cooling water surge tank level transmitter was relocated to the surge tank nitrogen space. This modification was necessary to eliminate erroneous indications that occurred when the low pressure connection on the level transmitter was vented to the atmosphere.

1.4.1.2 Performance Characteristics

The primary effort this month was completion of the initial power operation and electrical synchronization tests.

1.4.1.3 Changes in Operating Methods

No significant safety releated changes were made to the Rancho Seco Unit 1 operating procedures in October, 1974.

1.4.1.4 Surveillance Tests

1. The Nuclear Service Cooling Water System A was found to have low flow during performance of Surveillance Procedure 203.07C on October 6, 1974. An Abnormal Occurrence Report 74-7 was filed with NRC.

2. Diesel Generator "B" tripped during performance of Surveillance Procedure 206.03B on October 23, 1974. An Abnormal Occurrence Report 74-8 was filed with NRC.

1.4.1.5 Periodic Containment Leak Rate Tests

There were no periodic containment leak rate tests performed in October, 1974.

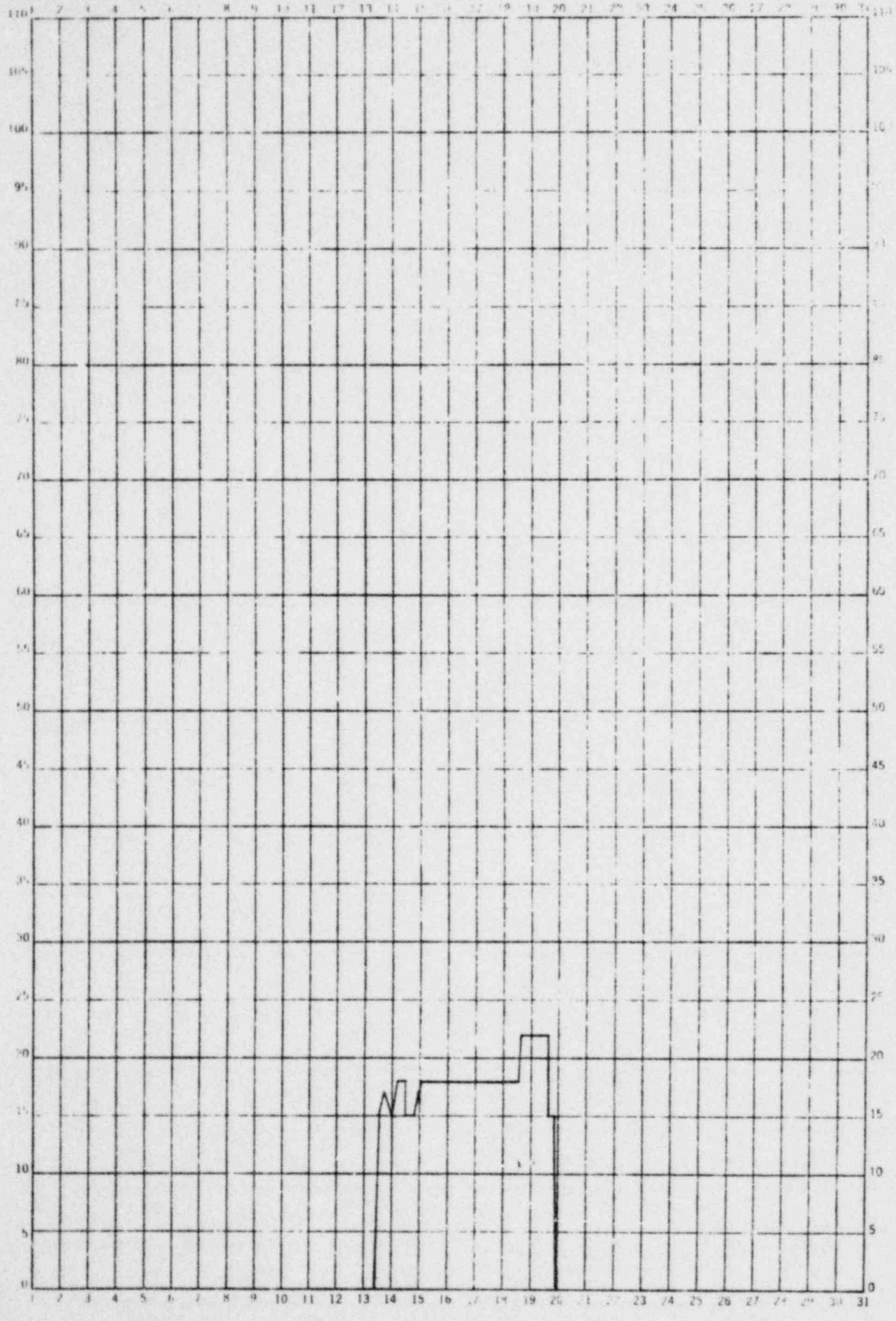
1.4.1.6 Changes, Tests, and Experiments Authorized by AEC

No changes, tests, or experiments requiring authorization from Nuclear Regulatory Commission, pursuant to 10 CFR 20 50.59a, were performed during October, 1974.

1.4.2 POWER GENERATION

Nuclear		Oct., 1974	Cumulative
1.	Number of hours the reactor was critical	326	326*
2.	Number of times the reactor was made critical	3	3*
3.	Gross thermal power generated (MWH)	123,006	123,006
4.	Effective full power	0.81	0.81
Electrical			
1.	Gross electrical power generated (MWH)	18,456	18,456
2.	Net electrical power generated (MWH)	-230	-230
3.	Number of hours the generator was on line	146	146

*Numbers from month of September, 1974 during Zero Power Physics Test not included.



Month OCTOBER 1974

1.4.3 UNIT 1 SHUTDOWNS - OCTOBER 1974

Date	Type	Status During Outage	Reason	Corrective Action	Duration
1	F	Hot Shutdown	Condenser Leak & Modif. of Poppet Values on the Turbine Throttle/Stops.	Plugged condenser tubes and staked pilot valve seats.	267

1.4.4 MAINTENANCE OF SAFETY RELATED EQUIPMENT

	Description:	Date
1.4.4.1	Diesel Generator "B" Electrical Breaker Trip	10-23-74

The Diesel Generator "B" Synchronization Surveillance Test is performed monthly as required by the Technical Specifications. During the test on October 23, 1974, the output breaker opened after operating the generator on line for 51 minutes. The first indication of trouble was both the green (stop) and white (run) lights for the diesel control panel in the Control Room came on. The diesel generator breaker was checked and found open with no faults and normal indication on the back lighted push buttons. Approximately 10 minutes later, the green (stop) light for the diesel started flashing. Normally this indicator is either on or off. Five minutes later the green light went out indicating proper operation of the controls. The diesel remained at 900 RPM the entire time with correct voltage and control. Later the diesel was re-paralleled and ran satisfactorily for two hours and fifteen minutes, at which time the generator was shut down using normal procedures. The problem was traced directly to the tachometer speed switch due to the dual indication of both "stop" and "run" lights in the Control Room. The relay tachometer was removed from the Diesel Generator "B" control panel. A new unit was installed and tested successfully on October 29, 1974. The failed relay tachometer was returned to the manufacturer for repair. The manufacturer reported that a dropping resistor was intermittently open and was the cause of the failure. The resistor was replaced at the factory and returned. The same component failed on August 29, 1974. (See Abnormal Occurrence Report 74-1.) At that time the contacts were resoldered inside the tachometer and a retest proved the component operable. It is believed that the failure experienced at that time was not corrected and can be traced to this occurrence. Replacement of the dropping resistor which was found to be intermittent at the factory should correct the problem and return the tachometer to its operable condition. The reactor had completed 15% power testing during the initial escalation program and was at cold shutdown conditions to perform maintenance.

1.4.4.2	Overheating of Auxiliary Feedwater Pump.	10-30-74

An Auxiliary Feedwater Pump overheated while attempting to transfer water from the Condensate Storage Tank to the steam generators during a feed and bleed operation to improve the water chemistry in the steam generators. The overheating occurred due to failure to open a discharge valve. The pump was inspected and the lead packing was found melted and leaking out of the glands. The coupling to the motor was removed and manual rotation of the pump shaft was unsuccessful. When dismantled in the plant shop, the casing wear rings were distored and frozen to the impellers, the seal rings were frozen to the bushings, and the bushings were frozen to the drive shaft. New wear rings, bushings, and a new shaft were fabricated at the shop, the seven impellers were inspected and reused and the completed pump was reassembled to factory specifications. The pump was installed and tested on November 11, 1974, and met all the Technical Specification requirements. The plant was at cold shutdown conditions and no transient was associated with this occurrence.

1.4.5 CHANGES IN PLANT OPERATING ORGANIZATION - OCTOBER, 1974

There were no changes in the plant operating staff for those positions which are designated as key supervisory personnel on Figure 6.2-1 of the Technical Specifications.

1.5 Report for November

1.5.1 OPERATIONS SUMMARY

1.5.1.1 Changes in Design

The following changes in design of Rancho Seco Unit 1 were made during November, 1974:

1. New Silicon Control Rectifiers were installed in Inverter SIC. This modification was necessary to make the inverter less vulnerable to noise spikes which had caused the inverter to trip.

2. The Bailey positioner on Turbine Bypass Valve PV-20564 was replaced with a Fisher positioner. The Bailey positioner had broken due to vibration and valve shock from fast opening. The change was made to determine which positioner works best for this type of valve and service.

3. Repeater relays were installed in the Seismic Monitoring System to isolate seismic sensor relays from the Annunciator System. This modification was necessary because 480 volt AC from an annunciator failure shorted out the relay in a seismic sensor, causing high voltage on the +12 volt DC supply to the seismic system. This resulted in a burnout of the electronics in the system.

1.5.1.2 Performance Characteristics

The primary effort this month was completion of the 15% power operation test plateau.

1.5.1.3 Changes in Operating Methods

No significant safety related changes were made to the Rancho Seco Unit 1 operating procedures in November, 1974.

1.5.1.4 Surveillance Tests

1. Nuclear Service Cooling Water System "B" was found to have low flow during performance of Surveillance Procedure 203.07D on November 1, 1974. An Abnormal Occurrence Report 74-9 was filed with NRC.

2. High Pressure Injection System Valve SFV-23645 failed to close during performance of Surveillance Procedure 203.02A on November 8, 1974. An Abnormal Occurrence Report 74-12 was filed with NRC.

1.5.1.5 Periodic Containment Leak Rate Tests

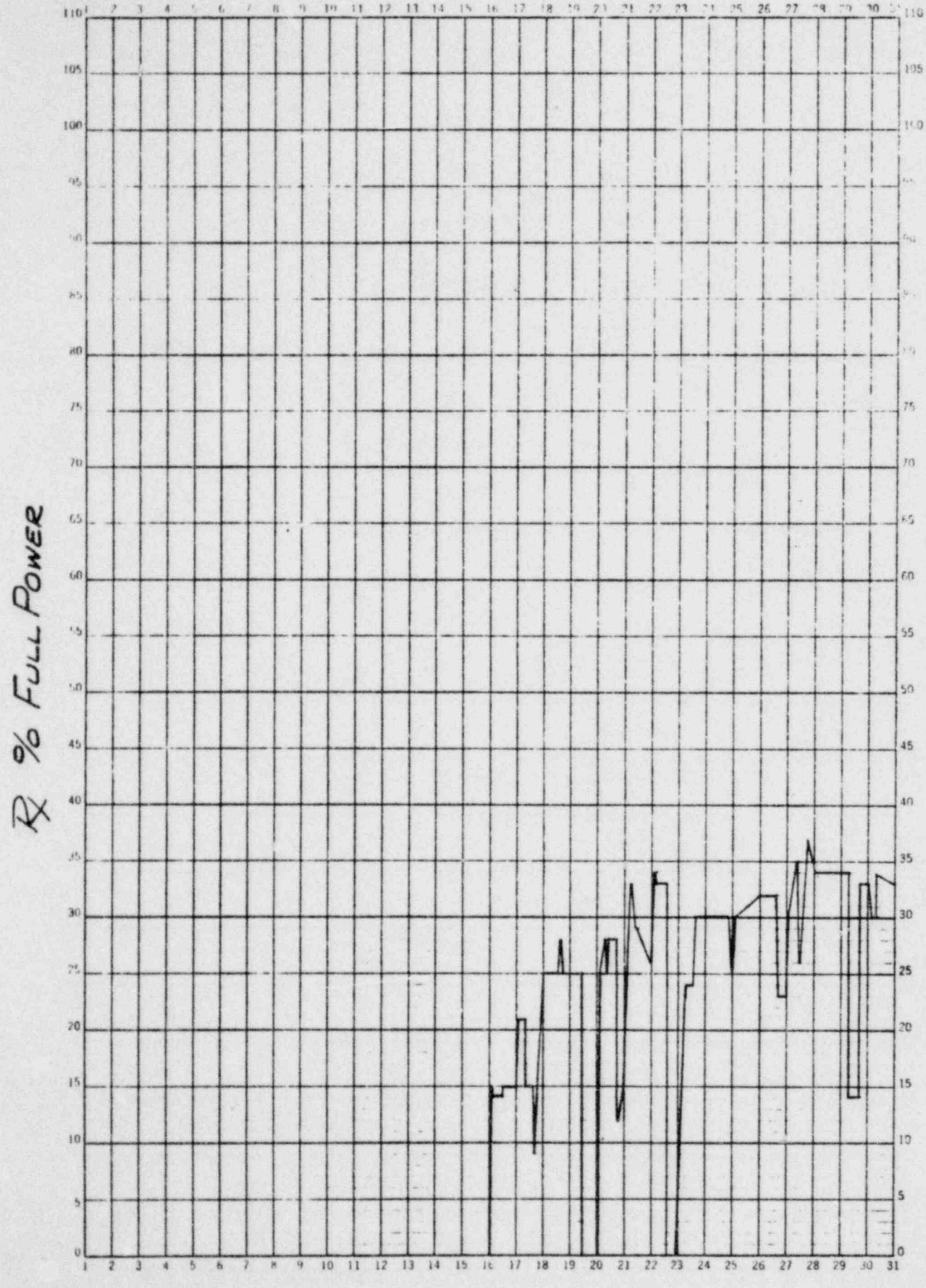
There were no periodic containment leak rate tests performed in November, 1974.

1.5.1.6 Changes, Tests, and Experiments Authorized by AEC

No changes, tests, or experiments requiring authorization from Nuclear Regulatory Commission, pursuant to 10 CFR 50.59a, were performed during November, 1974.

1.5.2 POWER GENERATION

Nuclear		Nov., 1974	Cumulative
1.	Number of hours the reactor was critical	333	659
2.	Number of times the reactor was made critical	3	6
3.	Gross thermal power generated (MWH)	227,728	350,734
4.	Effective full power days	3.56	4.37
Electrical			
1.	Gross electrical power generated (MWH)	68,568	37,024
2.	Net electrical power generated (MWH)	44,394	44,164
3.	Number of hours the generator was on line	289	435



Month NOVEMBER 19 74

1.5.3 UNIT 1 SHUTDOWNS - NOVEMBER 1974

Date	Type	Status During Outage	Reason	Corrective Action	Duration
11/19	Manual	Hot Shutdown	Feedwater Flow Oscillation during ICS tuning at power resulting in manual reactor trip simultaneous with high coolant system pressure trip.	The ICS feedwater dynamics was adjusted to decrease the response time to transients	14.5 hours
11/22	Trip	Hot Shutdown	Temporary Reduction of Loop A feedwater flow and subsequent reactor trip on high coolant pressure caused by momentary loss of "J" Inverter.	Backup Power Supply to "J" Inverter to be installed after design review.	16.5 hours

1.5.4 MAINTENANCE OF SAFETY RELATED EQUIPMENT

	Description	Date
1.5.4.1	Nuclear Service Cooling Water System Low Flow	11-1-74

Plant personnel performing routine surveillance testing of the nuclear service cooling water "B" system discovered the flow to be below the minimum flow requirements of the Technical Specifications. Valve positions of all components cooled by the NSCW system were inspected. A Nuclear Service Cooling Water Supply Valve for Reactor Building Emergency Cooling Unit "B" was found in a more closed position than when it was initially throttled during the initial flow balance test. A careful inspection revealed that the worm gear on the position adjustment handle had worn due to flow induced vibration. A new worm gear was installed on the operator and an inspection of the other throttle valves showed them to be satisfactory with no apparent wear. In addition, positive locking pins have been installed on all throttle valves for the emergency cooling units. The plant was at cold shutdown conditions and all components in the nuclear service cooling water "A" system were operable.

1.5.4.2	Failure of Decay Heat Exchanger Discharge Valve (SFV-23039).	11-2-74

The Decay Heat System was being filled and vented following the replacement of a decay heat exchanger bypass vent valve. During the fill and vent procedure, the decay heat exchanger discharge valve (SFV-26039) was throttled from 3200 gpm to 2800 gpm. Later attempts to throttle the discharge valve were unsuccessful. Inspection of the valve operator revealed that a tooth had broken from the main drive gear and the object jammed between two adjacent drive gears. The object was removed and the main gear drive was replaced. The valve was retested successfully and returned to service. The reactor was at cold shutdown conditions and no transient was associated with this occurrence. The redundant decay heat system was fully operational and in service during the repair of this valve.

1.5.4.3	Failure of High Pressure Injection System Recirculation Isolation Valve to fully close.	11-8-74

During a routine surveillance test, recirculation flow of the high pressure injection system did not stop as required. The recirculation of the HPI System is stopped by one of two valves in series. Each valve is tested individually and during this test SFV-23645 did not completely close. This permitted a small amount of water to recirculate back to the makeup tank, rather than flow to the reactor coolant system. The other series valve was tested and operated correctly. Both valves are designed to operate at a maximum differential pressure of 2500 psi. However, the maximum differential pressure across the valve when it failed to close was approximately 2900 psi. Therefore, the torque switch setting had to be increased to allow the valve to close at a higher differential pressure than the initial design condition. After the torque switch setting was increased on SFV-23645, the valve was stroked five times and operated correctly each time. The reactor was at cold shutdown condition and there was no transient associated with this occurrence.

1.5.5 CHANGES IN PLANT OPERATING ORGANIZATION - NOVEMBER, 1974

There were no changes in the plant operating staff for those positions which are designated as key supervisory personnel on Figure 6.2-1 of the Technical Specifications.

1.6 Report for December

1.6.1 OPERATIONS SUMMARY

1.6.1.1 Changes in Design

The following changes in design of Rancho Seco Unit 1 were made during December, 1974:

1. The Bailey positioners on Turbine Bypass Valves PV-20561, PV-20563 and PV-20566 were replaced with Fisher positioners. The Bailey positioners had previously broken due to vibration and valve shock from opening too fast. The Fisher positioners seem to be less susceptible to vibration for this type of valve than the Bailey positioners.

1.6.1.2 Performance Characteristics

The primary effort this month was completion of the 40% power operation test plateau.

1.6.1.3 Changes in Operating Methods

The following significant safety related changes were made to Rancho Seco Unit 1 operating procedures in December, 1974:

1. Procedure A.66, "Radiation Detection for Liquid System".

   Revision 1 - Added additional system limits and precautions and rewrote abnormal operation section on radiation monitor system failure alarm to clarify system design functions.

2. Procedure A.67, "Area Radiation Monitoring System".

   Revision 1 - Revised abnormal operation section to provide operator response to a radiation monitor alarm and to provide operator response to a failure alarm.

3. Procedure B-2, Plant Heatup and Startup".

   Revision 2 - Changed recommended control rod configurations for criticality and added B&W recommended maneuvering restrictions.

1.6.1.4 Surveillance Tests

1. Diesel Generator System "A" failed to start on December 3, 1974 during performance of Surveillance Procedure 206.03A. An Abnormal Occurrence Report 74-13 was filed with NRC.

1.6.1.5 Periodic Containment Leak Rate Tests.

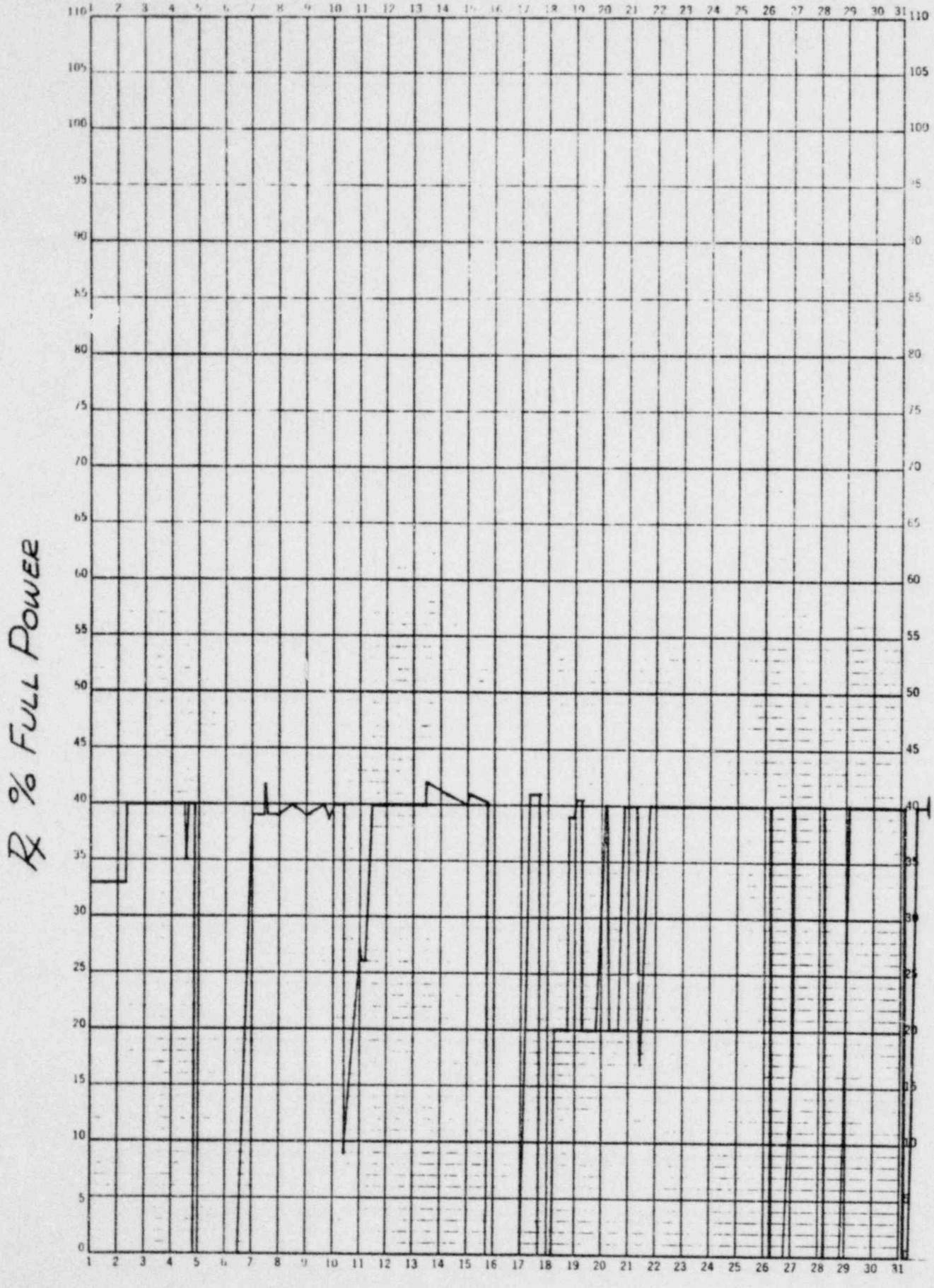
There were no periodic containment leak rate tests performed in December, 1974.

1.6.1.6 Changes, Tests, and Experiments Authorized by AEC

No changes, tests, or experiments requiring authorization from Nuclear Regulatory Commission, pursuant to 10 CFR 50.59a, were performed during December, 1974.

1.6.2 POWER GENERATION

Nuclear		Dec., 1974	Cumulative
1.	Number of hours the reactor was critical	626	1,285
2.	Number of times the reactor was made critical	6	12
3.	Gross thermal power generated (MWH)	595,528	946,262
4.	Effective full power days	8.95	13.32
Electrical			
1.	Gross electrical power generated (MWH)	184,536	271,560
2.	Net electrical power generated (MWH)	152,968	197,132
3.	Number of hours the generator was on line	582	1,017


Rx % FULL POWER
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
K&E 1 MONTH BY DAYS 46 2290
X 110 DIVISIONS
KEUFFEL & ESSER CO.
Month DECEMBER 1974

1.6.3 UNIT 1 SHUTDOWNS - DECEMBER 1974

Date	Type	Status During Outage	Reason	Corrective Action	Duration
12/4	Trip	Hot Shutdown	Instrument technician tripped turbine during instrument check	OPC transducer and feedwater pressure switches recalibrated	42 hours
12/10	Manual	Hot Shutdown	Leaking weld on "L" fitting for EH fluid supply line to intercept valve hydraulic operator	Fitting rewelded	7.75 hours
12/15	Trip	Hot Shutdown	Power failure in Control Rod Drive System	Added cooling fans to CRD panel	34 hours
12/17	Trip	Hot Shutdown	Power failure in Control Rod Drive System	Control Rod Group 6/7 programer assembly readjusted	17 hours
12/19	Manual	Hot Shutdown	Main Turbine OPC Controller not functioning due to contaminants in pressure sensing line.	Pressure sensing line blown down	4 hours
12/26	Trip	Hot Shutdown	Failure of Vital Power Bus Inverter "C"	Replaced two Silicon Control Rectifiers in "C" inverter	16 hours
12/28	Trip	Hot Shutdown	Failure of Vital Power Bus Inverter "C"	Failed components replaced. Load Transfer Switch to "J" Inverter installed	20 hours

1.6.3 UNIT 1 SHUTDOWNS - DECEMBER 1974 (continued)

Date	Type	Status During Outage	Reason	Corrective Action	Duration
12/31	Trip	Hot Shutdown	Operator tripped electrical bus during transfer to alternate power supply	blown fuses replaced	12 hours

1.6.4 MAINTENANCE OF SAFETY RELATED EQUIPMENT

	Description:	Date
1.6.4.1	Failure of "A" Diesel Generator to Start.	12-3-74

Starting of Diesel Generator "A" was attempted unsuccessfully from the Control Room. The Diesel Room fans and engine fuel oil pumps started, the engine run light on the local control panel came on, went off and stayed off. The starting air motors did not run and therefore the diesel did not start. The manual air valves were checked open and starting air pressure was at 250 psig. The "A" diesel "stop" button in the Control Room was pushed and the engine auxiliaries went through their shutdown sequences as if the engine had been running. An inspection of the diesel generator control circuit revealed the Dynalco Relay Tachometer had malfunctioned in such a manner that it blocked the energizing of the diesel air start solenoid which prevented the diesel from starting. The defective relay was removed and a new one was calibrated, installed, and tested successfully. An inspection of the original relay tachometer indicated that three Zener diodes had overheated and failed. This in turn caused the relay tachometer to malfunction. Based on extensive testing by Dynalco, it has been determined that the Zener diodes had overheated, which caused them to fail, due to the close proximity of the Zeners to each other, the fact that the Zeners were not connected to a heat sink and the lack of air circulation through the relay tachometer. To correct this problem, the manufacturer made the following modifications:

(1) The Zener diodes that are overheating are three 5-watt 7.5 volt connected in series to give a control voltage of approximately 22.5 volts. They have been replaced with one 50-watt 24 volt Zener mounted to a heat sink to dissipate the heat more efficiently.

(2) Air vents have been cut in the side of the relay tachometer to allow air circulation through the tachometer.

To ensure that the new relays will operate as required, the relays were electrically tested daily for a month. The reactor was operating at 40% full power. No transient occurred as a result of this problem.

1.6.5 CHANGES IN PLANT OPERATING ORGANIZATION - DECEMBER, 1974

There were no changes in the plant operating staff for those positions which are designated as key supervisory personnel on Figure 6.2-1 of the Technical Specifications.

1.7 TABULATION OF PERSONNEL EXPOSURES

Work & Job Function	Number of Personnel (>100 mrem)			Total Man-Rem		
	Station Employees	Utility Employees	Contract Workers	Station Employees	Utility Employees	Contract Workers
REACTOR OPS & SURV.						
Maintenance Personnel	2	0	0	0.246	0	0
Operating Personnel	0	0	0	0	0	0
Health Physics Personnel	2	0	0	0.554	0	0
Supervisory Personnel	0	0	0	0	0	0
Engineering Personnel	1	0	0	0.141	0	0
ROUTINE MAINT./INSERV. INSP.						
Maintenance Personnel	0	0	0	0	0	0
Operating Personnel	0	0	0	0	0	0
Health Physics Personnel	0	0	0	0	0	0
Supervisory Personnel	0	0	0	0	0	0
Engineering Personnel	0	0	0	0	0	0
SPECIAL MAINTENANCE						
Maintenance Personnel	0	0	0	0	0	0
Operating Personnel	0	0	0	0	0	0
Health Physics Personnel	0	0	0	0	0	0
Supervisory Personnel	0	0	0	0	0	0
Engineering Personnel	0	0	0	0	0	0
WASTE PROCESSING						
Maintenance Personnel	0	0	0	0	0	0
Operating Personnel	0	0	0	0	0	0
Health Physics Personnel	0	0	0	0	0	0
Supervisory Personnel	0	0	0	0	0	0
Engineering Personnel	0	0	0	0	0	0
REFUELING						
Maintenance Personnel	0	0	0	0	0	0
Operating Personnel	0	0	0	0	0	0
Health Physics Personnel	0	0	0	0	0	0
Supervisory Personnel	0	0	0	0	0	0
Engineering Personnel	0	0	0	0	0	0
TOTAL						
Maintenance Personnel	2	0	0	0.246	0	0
Operating Personnel	0	0	0	0	0	0
Health Physics Personnel	2	0	0	0.554	0	0
Supervisory Personnel	0	0	0	0	0	0
Engineering Personnel	1	0	0	0.141	0	0
GRAND TOTAL	5	0	0	0.941	0	0

PERSONNEL WHOLE BODY EXPOSURES FOR CALENDAR YEAR 1974

Licensee Reporting (Name & Address)	License No.
Rancho Seco, Unit 1 Clay Station, California	DPR-54

Annual Dose Ranges (rem)	Number of Individuals in Each Range
No Measurable Exposure	1405
Measurable Exposure Less Than 0.10	121
0.10 -- 0.25	5
0.25 -- 0.50	1
0.50 -- 0.75	0
0.75 -- 1	0
1 -- 2	0
2 -- 3	0
3 -- 4	0
4 -- 5	0
5 -- 6	0
6 -- 7	0
7 -- 8	0
8 -- 9	0
9 --10	0
10 --11	0
11 --12	0
12 +	0
Total number of individuals reported	1532

The above information is submitted for the total number of individuals for whom personnel monitoring was (check one)

[ ] required under 10CFR20.202(a) or 10CFR34.33(a) during the calendar year.

[✓] provided during the calendar year.

1.8 FUEL EXAMINATIONS

There were no irradiated fuel examinations by eddy current tests, ultrasonic tests, or visual examinations performed during 1974.

During the power escalation sequence the following data was accumulated:

Month	$\bar{E}$	Gross B Activity	I-131	I-133
October	1.74	2.18 x 10-2	< MDA	< MDA
November	0.45	2.97 x 10-2	< MDA	< MDA
December	0.245	4.14 x 10-2	< MDA	4.09 x 10-5

Note: MDA is Minimum Detectable Activity

The activity increase was expected due to the power escalation during the report period. These activities indicate that there are no fuel cladding failures during October, November, and December, when the power escalation and startup testing were in process.

SECTION II

ANNUAL OPERATING REPORT

TABLE OF CONTENTS (Cont.)

2.0.1

LIST OF TABLES

2.1 INTRODUCTION AND SUMMARY

This report has been prepared for submittal to the U. S. Nuclear Regulatory Commission in accordance with Appendix B to the Operating License for Rancho Seco Unit 1. This report is intended to summarize the significant environmental aspects during the period from initial criticality to the end of 1974. The report period was from September 16, 1974 through December 31, 1974.

Initial criticality was achieved on this pressurized water reactor on September 16, 1974. The highest power level attained through December 31, 1974 was 42% (384MWe-net); the power levels were varied to perform startup tests.

The effects of the plant upon the environment were minimal. Several short periods of higher than desirable chlorine levels in plant effluent were experienced without any appreciable effect on the receiving waters. There was one occurrence of discharge of effluent water containing 853 mg/l dissolved solid (850 mg/l limit). Very minor amounts of plant related radioactivity were realeased to the environs.

The environmental surveillance programs were effective in evaluating the effect of the plant on the environs. There was no evidence of deleterious effects due to effluents from the facility. Measurements of radioactivity in the air, water, soil, vegetation and animal life indicated that there was no significant contribution from the operation of Rancho Seco.

An estimate of the errors associated with the determination of airborne and liquid radioactive releases is included in Section 2.5.

2.2 ENVIRONMENTAL PROTECTION

2.2.1 PLANT WATER DISCHARGE TEMPERATURE

Technical Specification Appendix B limit - 90°F. The plant water discharge temperature during the report period of September 16 through December 31 varied from 55° to 82°F., well under the specification requirement of 90°F. Since seasonal temperatures were low enough, addition of dilution water for reducing water effluent temperatures was not required.

2.2.2 CHLORINE

Technical Specification Appendix B limit - 0.2mg/l.- Three brief periods exceeding the specified limit occurred during the reporting period. Chlorine concentrations to 0.35 mg/l. were experienced due to control problems in the sewage plant. (1) Chlorination injection rates were adjusted to bring the concentrations down to acceptable values. Work is in progress to prevent reoccurrence of overchlorination.

2.2.3 DISSOLVED SOLIDS

Technical Specification Appendix B limit - 850 mg/l. or 34,000 lbs. for a single day - The total dissolved solids, TDS, were kept below the specification requirement with the exception of one occurrence in which the concentration exceeded the specification for 2 hours.(2) Inaccurate measurement of effluent flow was encountered due to obstruction of the flow path at the outfall; high flow was indicated with consequent high TDS calculated discharges; the flow measurement error was diagnosed and corrected.

(1) Unusual Occurrence Reports, September 21, 1974 and November 26, 1974.
(2) Unusual Occurrence Report, November 22, 1974.

2.2.4 pH

Technical Specification Appendix B limit - 6.5 to 8.5 - The pH of the site effluent during the report period was within the range of 6.5 to 8.5. It should be noted that the Folsom Canal had high pH values (9.0 to 9.2) in the months of September, October, and November, indicating leaching of the Canal surfaces. The pH of the Canal dropped below 8.5 in the month of December. These pH changes of the Folsom Canal were not connected to the operation of Rancho Seco.

2.2.5 OTHER CHEMICALS

Technical Specification Appendix B Limit - Dissolved Oxygen 5.0 mg/l; B, 1.2 mg/l; Zn 1.0 mg/l. The dissolved Oxygen concentration measured 100 yards downstream of the discharge point was maintained above the limit of 5.0 mg/l. During the months of September, October, and November the dissolved Oxygen in Hadselville Creek was below 5.0 mg/l primarily due to local damming of the creek and seasonal related heavy growtns of water flora. The dissolved Oxygen content of Rancho Seco Effluent was always above the 5.0 mg/l level.

Composite samples analyzed during the report period indicated that the average Boron content of the effluent was less than 0.1 mg/l. and the average Zinc content was 0.3 mg/l. These values were well under the technical specification limits.

2.2.6 RADIOACTIVE DISCHARGES AND SHIPMENTS

2.2.6.1 LIQUID RELEASES

A small quantity of radioactive tritiated water was

released in October. An improperly routed drain sump in a controlled area caused some floor drains to be processed through the ion exchange regeneration system. The radioactivity was heldup, sampled and measured in retention basins. Since the concentration amounted to only 0.01% of the applicable 7-day average limit for discharge, the liquid was released. The pathway by which this discharge occurred has been physically removed. The total activity released contained 0.002 Ci of fission and activation products and 0.0197 Ci of Tritium. The low level of activity precluded identification of specific isotopes. The summary of the liquid released is given in Tables 1 and 2.

2.2.6.2 GASEOUS RELEASES

Since Rancho Seco is a pressurized water reactor the gaseous releases are composed of batch releases from the waste gas decay tanks, batch releases from the containment building purges, and continuous releases from the auxiliary building stacks and the gland steam exhaust. The total gaseous releases for this reporting period were 0.00298 Ci of fission gases, primarily Xenons 133 and 135 and Krypton 85; 0.00606 Ci of Tritium, 0.00000956 Ci of particulates and 0.000000809 Ci gross alpha activity. The low levels of the gaseous releases is presented in Tables 3, 4, and 5.

2.2.6.3 SOLID WASTES

There were no solid wastes shipped from the Rancho Seco reactor facility during the report period.

2.2.6.4 OFFSITE LIQUID SHIPMENTS

Four shipments of radioactive liquid wastes were trucked to Nuclear Engineering Co., Beatty, Nevada. A total of 0.1523 Ci, primarily H-3, with some Co-58 were shipped for disposal. The details of each shipment are included in Table 6.

TABLE 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

FACILITY: RANCHO SECO (UNIT 1) DOCKET NO. 50-312

REPORTING PERIOD: 3RD AND 4TH QUARTER, 1974

RADIOACTIVE LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES*

		UNITS	3RD QTR.* SUMMARY	4TH QTR.* SUMMARY	EST. TOTAL ERROR, %
A.	FISSION & ACTIVATION PRODUCTS				
	1. Total Release (not including tritium, gases, alpha)	Ci	0.00E0	2.28E-03	±2.6E+01
	2. Average diluted concentration during period	µCi/ml	0.00E0	1.00E-06	
	3. Percent of applicable limit	%	0.00E0	9.12E-02	
B	TRITIUM				
	1. Total Release	Ci	0.00E0	1.97-02	±5.5E+01
	2. Average diluted concentration during period	µCi/ml	0.00E0	8.68E-06	
	3. Percent of applicable limit	%	0.00E0	2.89E-01	
C.	DISSOLVED & ENTRAINED GASES				
	1. Total Release	Ci	0.00E0	0.00E0	
	2. Average diluted concentration during period	µCi/ml	0.00E0	0.00E0	
	3. Percent of applicable limit	%	0.00E0	0.00E0	
D.	GROSS ALPHA RADIOACTIVITY				
	1. Total Release	Ci	0.00E0	0.00E0	
E.	VOLUME OF WASTE RELEASED	liters	0.00E0	2.27E+06	±1.0E+01
F.	VOLUME OF DILUTION WATER USED DURING PERIOD OF RADIOACTIVE LIQUID RELEASES	liters	0.00E0	1.47E+07	±0.2E+01

* Monthly summaries not included since only two releases occurred during the reporting period; both during the period of October 14 through October 18, 1974.

TABLE 2

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

FACILITY: RANCHO SECO (UNIT 1) DOCKET NO. 50-312

AVERAGE QUARTERLY RESULTS REPORTING PERIOD: 3RD AND 4TH QUARTER, 1974

LIQUID EFFLUENTS BATCH MODE

NUCLIDES RELEASED	UNIT	QUARTER 3	QUARTER 4
Strontium-89	Ci	0.00E0	0.00E0
Strontium-90	Ci	0.00E0	0.00E0
Cesium-134	Ci	0.00E0	0.00E0
Cesium-137	Ci	0.00E0	0.00E0
Iodine-131	Ci	0.00E0	0.00E0
Cobalt-58	Ci	0.00E0	0.00E0
Cobalt-60	Ci	0.00E0	0.00E0
Iron-59	Ci	0.00E0	0.00E0
Zinc-65	Ci	0.00E0	0.00E0
Manganese-54	Ci	0.00E0	0.00E0
Chromium-51	Ci	0.00E0	0.00E0
Zirconium-Niobium-95	Ci	0.00E0	0.00E0
Molybdenum-99	Ci	0.00E0	0.00E0
Technetium-99m	Ci	0.00E0	0.00E0
Barium-Lanthanum-140	Ci	0.00E0	0.00E0
Cerium-141	Ci	0.00E0	0.00E0
Other (specify)			
1. Tritium (H-3)	Ci	0.00E0	1.97E-02
2. Xenon-133	Ci	0.00E0	0.00E0
3. Xenon-135	Ci	0.00E0	0.00E0
Unidentified	Ci	0.00E0	2.00E-03
Total for period(above)	Ci	0.00E0	2.17E-02

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

FACILITY: RANCHO SECO (UNIT 1) DOCKET NO. 50-312

AIRBORNE EFFLUENTS SUMMATION OF ALL RELEASES REPORTING PERIOD: 3RD and 4TH QUARTER, 1974

		UNITS	3RD. QTR. SUMMARY (1)	MONTHLY SUMMARY 4TH QTR. OCTOBER	NOVEMBER	DECEMBER	4TH QTR. SUMMARY	EST. TOTAL % ERROR
A.	FISSION & ACTIVATION GASES							
	1. Total Release	Ci	0.00E0 (2)	0.00E0 (2)	1.66E-03	1.32E-03	2.98E-03	±3.4E+01
	2. Average Release Rate	µCi/sec	0.00E0 (2)	0.00E0 (2)	6.40E-04	4.93E-04	3.75E-04	
	3. % of Technical Specification Limit	%	0.00E0 (2)	(3)	(3)	(3)	1.17E-05	
B.	IODINES							
	1. Total I-131	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	
	2. Average Release Rate	µCi/sec	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	
	3. % of Technical Specification Limit	%	0.00E0 (2)	(3)	(3)	(3)	0.00E0 (2)	
C.	PARTICULATES							
	1. Particulates (τ > 8 days) (5)	Ci	0.00E0 (2)	4.68-06	4.35E-06	5.26E-07	9.56E-06	+1.00E+02 -1.3E+02
	2. Average Release Rate	µCi/sec	0.00E0 (2)	1.75E-06	1.68E-06	1.96E-07	1.20E-06	
	3. % of Technical Specification Limit	%	0.00E0 (2)	(3)	(3)	(3)	8.09E-07	
	4. Gross alpha radioactivity	Ci	0.00E0 (2)	1.40E-08	6.59E-07	1.36E-07	8.09E-07	
D.	TRITIUM							
	1. Total Release	Ci	0.00E0	2.04E-03	2.19E-03	1.83E-03	6.06E-03	+1.5E+01 -2.8E+01
	2. Average Release Rate	µCi/sec	0.00E0	7.64E-04	8.47E-04	6.81E-04	7.62E-04	
	3. % of Technical Specification Limit	%	(4)	(4)	(4)	(4)	(4)	

TABLE 4

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

FACILITY: RANCHO SECO (UNIT 1) DOCKET NO. 50-312

REPORTING PERIOD: 3RD AND 4TH QUARTER, 1974

GASEOUS EFFLUENTS- GROUND-LEVEL RELEASES

BATCH MODE

	UNITS	3RD. QUARTER SUMMARY	MONTHLY SUMMARY, 4TH QTR OCTOBER	NOVEMBER	DECEMBER	4TH QUARTER SUMMARY
1. FISSION GASES						
Krypton-85	Ci	0.00E0	0.00E0 (2)	8.72E-04	0.00E0 (2)	8.72E-04
Krypton-85m	Ci	0.00E0	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Krypton-87	Ci	0.00E0	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Krypton-88	Ci	0.00E0	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Xenon-133	Ci	0.00E0	0.00E0 (2)	7.90E-04	1.24E-03	2.03E-03
Xenon-135	Ci	0.00E0	0.00E0 (2)	3.05E-05	7.90E-05	1.10E-04
Xenon-135m	Ci	0.00E0	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Xenon-138	Ci	0.00E0	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Others	Ci	0.00E0	0.00E0	0.00E0	0.00E0	0.00E0
Unidentified	Ci	0.00E0	0.00E0	0.00E0	0.00E0	0.00E0
Total for Period	Ci	0.00E0	0.00E0 (2)	1.66E-03	1.32E-03	2.98E-03
2. IODINE						
Iodine-131	Ci	0.00E0	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Iodine-133	Ci	0.00E0	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Iodine-135	Ci	0.00E0	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Total for Period	Ci	0.00E0	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
3. PARTICULATES						
Strontium-89	Ci	0.00E0	(5)	(5)	(5)	(5)
Strontium-90	Ci	0.00E0	(5)	(5)	(5)	(5)
Cesium-134	Ci	0.00E0	(5)	(5)	(5)	(5)
Cesium-137	Ci	0.00E0	(5)	(5)	(5)	(5)
Barium-Lanthium-140	Ci	0.00E0	(5)	(5)	(5)	(5)
Others	Ci	0.00E0	(5)	(5)	(5)	(5)
Unidentified	Ci	0.00E0	2.35E-07	9.53E-07	3.22E-10	1.19E-06

TABLE 5

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

FACILITY: RANCHO SECO (UNIT 1) DOCKET NO. 50-312

REPORTING PERIOD: 3RD AND 4TH QUARTER, 1974

GASEOUS EFFLUENTS- GROUND-LEVEL RELEASES

CONTINUOUS MODE

	UNITS	3RD. QUARTER SUMMARY	MONTHLY SUMMARY, 4TH QTR OCTOBER	NOVEMBER	DECEMBER	4TH QUARTER SUMMARY
1. FISSION GASES						
Krypton-85	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Krypton-85m	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Krypton-87	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Krypton-88	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Xenon-133	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Xenon-135	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Xenon-135m	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Xenon-138	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Others	Ci					
Unidentified	Ci					
Total for Period	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
2. IODINE						
Iodine-131	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Iodine-133	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Iodine-135	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
Total for Period	Ci	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)	0.00E0 (2)
3. PARTICULATES						
Strontium-89	Ci	(5)	(5)	(5)	(5)	(5)
Strontium-90	Ci	(5)	(5)	(5)	(5)	(5)
Cesium-134	Ci	(5)	(5)	(5)	(5)	(5)
Cesium-137	Ci	(5)	(5)	(5)	(5)	(5)
Barium-Lanthium-140	Ci	(5)	(5)	(5)	(5)	(5)
Others	Ci	(5)	(5)	(5)	(5)	(5)
Unidentified	Ci	0.00E0 (2)	4.44E-06	3.40E-06	5.26E-07	8.37E-06

TABLE 6

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

FACILITY: RANCHO SECO (UNIT 1) DOCKET NO. 50-312

REPORTING PERIOD: 3RD AND 4TH QUARTER, 1974

LIQUID WASTE TRUCKED OFFSITE FOR DISPOSAL

DATE	VOLUME (gal)	TOTAL ACTIVITY (Ci)	MAJOR NUCLIDES AND % COMPOSITION		DESTINATION
Nov. 14, 1974	2785	2.25E-02	H-3 Co-58	62% 34%	Nuclear Engineering Co. Beatty, Nevada
Dec. 12, 1974	2300	2.28E-02	H-3 Co-58	75% 24%	(Same)
Dec. 19, 1974	2420	5.00E-02	H-3	98%	(Same)
Dec. 23, 1974	2740	5.70E-02	H-3 Co-58	94% 2.6%	(Same)

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

FACILITY: RANCHO SECO (UNIT 1) DOCKET NO. 50-312

REPORTING PERIOD: 3RD AND 4TH QUARTER, 1974

NOTES

(1) Third quarter monthly summary not included since all operation during the third quarter occurred in September.

(2) No measurable activity in samples collected during this period. Measurement sensitivity and volumes of air released during the reporting period are as follows:

ISOTOPE	MINIMUM DETECTABLE ACTIVITY (μCi/ml)	BATCH RELEASE VOLUME	CONTINUOUS RELEASE VOLUME
Kr-85	4.65E-06	1.13E+11 cc	1.81E+14 cc
Kr-85m	1.48E-08		
Kr-87	3.08E-08		
Kr-88	1.16E-07		
Xe-135	1.10E-08		
Xe-135m	4.46E-08		
Xe-138	3.94E-08		
Xe-133	1.00E-07		
I-131	≈5.0E-14		
I-133	≈2.5E-13		
	≈1.0E-10		
H-3	≈4.0E-12		

(3) Technical Specification release limits are given in terms of quarterly average release rates.

(4) No Technical Specification limit for release of Tritium in gaseous effluents.

(5) Particulates identified by gross beta activity. Insufficient activity for identification of specific isotopes present. All particulate activity released is assumed to have a half-life > 8 days.

2.3 NON-RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE PROGRAMS

2.3.1 EROSION

Each quarter a visual inspection of the waste water effluent course was made and channel dimensions were compared to the baseline channel. Photographs were taken to document the characteristics of the effluent stream bed and banks. Examination and comparison with the reference photographs indicated no erosion of the stream bed or degradation of the soil banks due to plant effluent discharges at Rancho Seco.

2.3.2 DRIFT CONTAMINANTS

Soil samples were taken each quarter from three locations approximately 0.25 miles from the base of the cooling towers. These sample points were about 120^{o} apart to provide adequate coverage. The samples were analyzed for leachable sulfates. The leachable sulfates concentration indicated by analyses of the soil samples remained at preoperational levels and well under the 1500 ppm allowable level. This was substantiated by no evident degradation of agricultural land around the cooling towers.

2.3.3 LIQUID EFFLUENT CONTAMINANTS

Three downstream locations were sampled to monitor the possible effects of effluent streams from the plant on irrigated lands. The effect on the agricultural land was assessed by monitoring leachable sulfates.

Again the analyses of the samples showed no evidence of degradation of the agricultural land.

The samples of effluent water analyzed for oxygen, boron, and zinc also showed that the effluent water from Rancho Seco was maintained at a satisfactory environmental quality.

A check was made to determine the quantities of chemical used or released by the plant. The quantities were compared to the Technical Specification requirements, Table 5.1, Appendix B. Quantities of chemicals released were within the stated limits with the following exceptions:

CHEMICAL	ACTUAL USE		ESTIMATED USE	
	lbs.	conc. mg/l	lbs.	conc. mg/l
Sodium (Na)	2.86×10^5	33	1.45×10^5	39
Alum	5.0×10^4	0.90	4.0×10^4	1.7 Al

The use of NaOH has exceeded the design limit by approximately a factor of two due primarily to a very high frequency of regeneration of ion exchange beds for the steam generator feedwater cycle. The ultimate cause of this high rate of regeneration reflects back to corrosion and scaling problems with the feedwater heaters and the inability to properly protect these units during construction and testing. The frequency of regeneration is still greater than design as the system continues to be cleaned up during power ascension, but should come down to design levels after reaching steady state operation in April, 1975. It should be noted that although the total quantity of consumed caustic exceeded the limit, the effluent concentration of Na ion was within the limit.

The use of alum exceeded the design level because it was found necessary to operate the makeup water clarification system continuously,

whereas design use was only during a portion of the year when high solids were occurring. The clarifier is still being operated continuously, but alternative techniques for removal of problem solids are under study; these may permit removing the clarifier from service. It should be noted that although the total amount of alum released slightly exceeded the limit, the concentration of Al ion in effluent was below the projected limit.

2.3.4 NOISE

Noise measurements within the site boundary taken during the initial startup indicated higher than desirable levels near the parking lot area of the plant. Another set of noise measurements will be made with the plant at full power. An evaluation will be made at that time.

2.3.5 FOGGING

No evidence of ground level fogging due to operation of Rancho Seco was observed during the reporting period.

2.3.6 RESERVOIR DRAWDOWN

The reservoir was maintained at required levels (237-240 feet) during the reporting period. The County Parks Department in consonance with the State requested that water level be lowered from 240 to 237 feet during the period of November and early December to aid in weed control. The reservoir was then returned to its normal operating level of 240 feet.

2.4 RADIOLOGICAL ENVIRONMENTAL MONITORING

2.4.1 FISH

Samples of fish were collected from the Rancho Seco Reservoir and the Comanche Reservoir during the reporting period. The samples were analyzed for Gross Beta minus K-40, K-40 and Sr-90 activities. The activities are low and correspond with preoperationally determined analyses. The data s shown in Tables 7 and 10. There was no indication of any effect due to the operation of Rancho Seco.

2.4.2 ALGAE AND OTHER AQUATIC PLANTS

An algae sample was collected from the mixed effluent stream at the site boundary on November 16, 1974. The sample was analyzed for Gross Beta minus K-40, K-40 and Sr-90. A Gamma spectrometric analysis was also performed. The data are shown in Tables 7 and 10. The analyses showed that the activity was within previous base data and that there has been no indication of contribution by the effluents of the plant.

2.4.3 SURFACE AND RUNOFF WATER

Surface and runoff water samples were taken in both reportable quarters. The samples were analyzed for Tritium and Gross Beta and Gamma spectra were obtained. The data are shown in Tables 7 and 10. The Gross Beta data in general showed no significant variations when compared with preoperational levels. The Tritium values in all cases were below the detection limit

(0 ± 160 pCi/l). In the analyses of the Gammas spectra only Cs-137 was detected (in the suspended solids), but the activity (9.0 pCi/l) was just above the detectable limit of 8 pCi/l. This could be attributed to fall-out. There was no indication that the activity was attributable to the station.

2.4.4 MUD AND SILT

Samples were collected from the Site Reservoir and the Mixed Runoff Effluent at the Site Boundary. Although the 4th quarter samples were slightly higher in Gross Beta than the 3rd quarter samples, all samples were nonetheless within preoperational measured values. The data is given in Tables 7 and 10. These changes in concentrations do not appear to be a result of the startup of the reactor or any effluents from the plant.

2.4.5 FRESH MILK SAMPLING

Fresh milk samples were collected on a weekly basis from four dairies during the report period. The I-131 levels were below the detection limit of 0.5 pCi/l. The average Sr-90 levels which ranged from 1.4 to 2.8 pCi/l were consistent with preoperational baseline data. The data are presented in Tables 7 and 10. A review of the data indicated no specific correlation of activity in the milk with animal vegetation samples collected during this period. There was no indication of contribution of the activity by the reactor facility.

2.4.6 RABBITS

Four rabbit samples were collected. The flesh was analyzed for Gross Beta minus K-40 and K-40; the femurs for Sr-90 and stable Calcium, and the thyroids for I-131. The Gross Beta minus K-40 and K-40 levels compared well with preoperational data. The Sr-90 activity fluctuated between the two reportable quarters but was well within acceptable levels. The Calcium data also varied but were within previously measured values. There was evidence of low I-131 activity (0.24 ± 0.16 p Ci/g). The data are included in Tables 7 and 10. In summary the measured values were within normal variations.

2.4.7 EDIBLE VEGETATION

Four human vegetation samples (tomatoes and hops) were collected and analyzed. Naturally occurring K-40 activity appeared to be slightly higher than previous samples for no apparent reason. The Gross Beta minus K-40 activity continued to be at levels measured during preoperational monitoring. See Tables 7 and 10 for the specific data.

Twenty-four anaimal vegetation samples were obtained and analyzed for Gross Beta minus K-40, K-40 and Sr-90. No significant variations were observed although one sample indicated a Sr-90 activity of 0.75 pCi/g. There is no apparent correlation of the Sr-90 activity with the power plant operation. Further, these values were similiar to others measured throughout the country. The data is summarized in Tables 7 and 10.

2.4.8 WELL WATER

Well water samples, collected each quarter, were analyzed for Gross Beta and Tritium. The activities were consistent with preoperational levels. See Tables 7 and 10 for specific details.

2.4.9 AIRBORNE PARTICULATES AND IODINE

Weekly samples from eight stations were collected and analyzed for Gross Beta and Iodine. Gamma spectrometry and Gross Alpha analyses were performed on quarterly composites from each station. The data are presented in Tables 8 and 11. The data are consistent with preoperational values and reflect nominal fluctuations. A slight amount of Ce-144 was measured but was not significant. Four charcoal samples indicated above detection limits of I-131, 0.005 to 0.010 pCi/m^3. However, there did not appear to be any correlation to the operation of the plant.

2.4.10 DIRECT RADIATION

Thermoluminescent Dosimetry samples from 19 stations were measured quarterly. The 3rd and 4th quarter values were 20.4 $\pm$ 3.7 mrem and 19.9 $\pm$ 3.0 mrem respectively. These are well within preoperationally measured data. The data are given in Tables 9 and 12.

TABLE 7

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 3RD QUARTER, 1974

AVERAGE QUARTERLY RESULTS

FISH - pCi/g (DRY) Q/G

Location	Beta less K-40 0.02*	K-40 .001*	Sr-90 0.03*
Site Reservoir	0.00	10.84	0.42
Comanche Reservoir	0.00	9.57	0.26

ALGAE

No Samples Available This Quarter.

SURFACE WATER - pCi/l - M/G

Location	H-3 160*	Beta (Sus.) 0.5*	Beta (Dis.) 0.5*
Comanche Reservoir	0	0.5	3.3
Folsom Canal	0	1.4	11.0
Site Reservoir	0	0.9	5.3
Site Drinking Fountain	0	1.5	4.2
Folsom South Canal	0	2.0	2.0
Natoma Lake	0	0.0	2.5

* Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 7 (Cont)

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 3RD QUARTER, 1974

AVERAGE QUARTERLY RESULTS

RUNOFF WATER - pCi/l - F/G

Location	H-3 160*	Beta (Sus.) 0.5*	Beta (Dis.) 0.5*
Mixed Effluent (Site Boundary)	0	6.48	9.07

Gamma Spectrometry

Ba-140 33*	Co-60 17*	Cs-137 8*	I-131 5*	Mn-54 10*	Ru-106 5*	Zn-65 23*	Zr-95 13*

All six samples (suspended and dissolved) collected this quarter were analyzed for the isotopes listed above. All were below the detection limits listed.

MUD AND SILT - pCi/g (DRY) - Q/G

Location	Gross Beta 0.05*
Site Reservoir	0.41 ± 0.02
Mixed Runoff Effluent (Site Boundary)	1.37 ± 0.31

* Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 7 (Cont)

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 3RD QUARTER, 1974

AVERAGE QUARTERLY RESULTS

FRESH MILK - pCi/l - W/G

Location	I-131 0.5*
Sturmer Dairy	0.0
Borges Dairy	0.0
Marciel Ranch	0.0
Warmerdam Dairy	0.0

* Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 7 (Cont)

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 3RD QUARTER, 1974

AVERAGE QUARTERLY RESULTS

RABBIT FLESH - pCi/g (DRY) - Q/G

Location	Beta less K-40 0.02*	K-40 .001*
Rancho Seco Site	0.00	9.960
North of Site	0.00	9.960

RABBIT FEMUR - pCi/g (WET)- Q/G

Location	Sr-90 0.03*	Ca .001*
Rancho Seco Site	0.56 ± 0.05	37.0
North of Site	3.63 ± 0.15	6.1

RABBIT THYROID - pCi/g (WET) - Q/G

Location	I-131 0.05*
Rancho Seco Site	0.00
North of Site	0.00

* Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 7 (Cont)

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 3RD QUARTER, 1974

AVERAGE QUARTERLY RESULTS

ANIMAL VEGETATION - pCi/g (DRY) - M/G

Location	Beta less K-40 0.02*	K-40 .001*	Sr-90 0.03*
Sturmer Dairy	0.00	26.93	0.08
Broges Dairy	0.00	17.87	0.04
Marciel Ranch	0.00	7.15	0.09
Warmerdam Dairy	0.00	39.06	0.15

HUMAN VEGETATION - pCi/g (DRY) - S/G

Location	Type of Vegetation	Beta less K-40 0.02*	K-40 .001*
Sloughhouse Area	Hops	0.00	23.24
Clay Station Area	Tomatoes	0.00	58.10
Ione Area	Tomatoes	0.00	49.80
Clements Area	Tomatoes	0.00	44.82

* Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 7 (Cont)

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 3RD QUARTER, 1974

AVERAGE QUARTERLY RESULTS

WELL WATER - pCi/l - Q/G

Location	H-3 160*	Beta 0.5*
Site Well	0	3.4 ± 1.4
Clay Station Well	0	2.7 ± 1.4
Reservoir Area Well	0	2.8 ± 1.4
Clay Cattle Co. Well	0	1.9 ± 1.3

* Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 8

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 3RD QUARTER, 1974

AVERAGE QUARTERLY RESULTS

AIRBORNE - pCi/m^3

Location	Air Particulates(W/C) Gross Beta .002*	Air Particulates(Q/C') Alpha .005*	Charcoal Filters(W/C) I-131 .004*
Site A	.053	.000	.000
Site B	.042	.000	.000
Site C	.046	.000	.000
Site D	.042	.000	.000
Site E	.049	.000	.000
Site F	.068	.000	.001
Site G	.068	.000	.000
Site H	.047	.000	.000

Air Particulate Gamma Spectrometry (Q/C')

Location	Ba-140 .001*	Co-60 .004*	Ce-144 .001*	Cs-137 .002*	I-131 .001*	Mn-54 .002*	Ru-106 .001*	Fe-59 .001*	Zn-65 .004*	Zr-95 .002*
Site A	**	**	.004	**	**	**	**	**	**	**
Site B	**	**	.004	**	**	**	.005	**	**	**
Site C	**	**	.006	**	**	**	**	**	**	**
Site D	**	**	.005	**	**	**	**	**	**	**
Site E	**	**	.008	**	**	**	**	**	**	**
Site F	**	**	.010	**	**	**	**	**	**	**
Site G	**	**	**	**	**	**	**	.003	**	**
Site H	**	**	.002	**	**	**	**	**	**	**

* Detection Limit
** Below Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 9

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 3RD QUARTER, 1974

AVERAGE QUARTERLY RESULTS

DIRECT RADIATION - mrem/QUARTER - Q/I

Location	TLD Reading
N. Perimeter Fence	16.1± 1.2
E. Perimeter Fence	13.8± 0.5
W. Perimeter Fence	15.4± 1.5
S. W. Perimeter Fence	14.9± 0.8
S. E. Perimeter Fence	17.5± 1.4
Visitors' Center	17.5± 0.5
Rt. 104 Entrance	20.6± 0.8
N. W. of Site (6 miles)	23.8± 7.2
N. W. of Site, Sacramento (22 miles)	18.7± 1.5
S. W. of Site, Lodi (17 miles)	20.5± 0.7
S. of Site (0.25) miles	19.0± 0.6
E. of Site, Ione (11 miles)	22.0± 4.4
W. Milk Station (10 miles)	21.8± 1.2
S. W. of Site, Galt (11 miles)	23.7± 0.8
S. E. of Site, Comanche Res. (11 miles)	23.2± 0.6
W. of Site, Clay (1.5 miles)	22.9± 2.1
S. W. Milk Station (9 miles)	25.7± 2.9
N. E. of Site (8 miles)	24.9± 0.2
S. E. of Site (1 mile)	25.5± 1.1

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite, I-Integrating

TABLE 10

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 4TH QUARTER, 1974

AVERAGE QUARTERLY RESULTS

FISH - pCi/g (DRY) - Q/G

Location	Beta less K-40 0.02*	K-40 .001*	Sr-90 0.03*
Site Reservoir	0.00	12.282	0.00

ALGAE - pCi/g (DRY)- Q/G

Location	Beta less K-40 0.02*	K-40 .001*	Sr-90 0.03*
Mixed Effluent (Site Boundary)	0.35 ± 0.07	1.33	0.00

Gamma Spectrometry

Ba-140 .010*	Co-60 .033*	I-131 .010*	Mn-54 .020*	Ru-106 .010*	Zn-65 .047*	Zr-95 .025*	Cs-137 .016*
**	**	**	**	.124	**	**	.081

* Detection Limit

** Below Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 10 (Cont)

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 4TH QUARTER, 1974

AVERAGE QUARTERLY RESULTS

SURFACE WATER - pCi/l - M/G

Location	H-3 160*	Beta (Sus.) 0.5*	Beta (Dis.) 0.5*
Comanche Reservoir	0	1.6	0.7
Folsom Canal	0	0.7	1.2
Site Reservoir	0	0.4	2.3
Site Drinking Fountain	0	0.5	0.9

RUNOFF WATER - pCi/l - F/G

Location	H-3 160*	Beta (Sus.) 0.5*	Beta (Dis.) 0.5*
Mixed Effluent (Site Boundary)	0	1.1	3.2

Gamma Spectrometry

Ba-140 33*	Co-60 17*	Cs-137 8*	I-131 5*	Mn-54 10*	Ru-106 5*	Zn-65 23*	Zr-95 13*

All seven samples (suspended and dissolved) collected this quarter were analyzed for the isotopes listed above. All were below the detection limits listed except the sample collected on 12/31/74. This sample's suspended fraction had an Cs-137 value of 9.

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

* Detection Limit

TABLE 10 (Cont)

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 4TH QUARTER, 1974

AVERAGE QUARTERLY RESULTS

MUD AND SILT - pCi/g (DRY) - Q/G

Location	Gross Beta 0.05*
Site Reservoir	2.96 ± 0.45
Mixed Runoff Effluent (Site Boundary)	3.91 ± 0.50

FRESH MILK - pCi/l - W/G

Location	I-131 0.5*	Sr-90 1.0*
Sturmer Dairy	0.0	1.4
Borges Dairy	0.0	2.8
Marciel Ranch	0.0	2.4**
Warmerdam Dair	0.0	1.4

* Detection Limit
** Includes one sample with 3.3 ± 1.1 pCi/l

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 10 (Cont)

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 4TH QUARTER, 1974

AVERAGE QUARTERLY RESULTS

RABBIT FLESH - pCi/G (DRY) - Q/G

Location	Beta less K-40 0.02*	K-40 .001*
Rancho Seco Site	0.04	4.192

RABBIT FEMUR - pCi/g (WET) - Q/G

Location	Sr-90 0.03*	Ca .001*
Rancho Seco Site	1.11	30.05

RABBIT THYROID - pCi/g (WET) - Q/G

Location	I-131 0.05*
Rancho Seco Site	0.12**

* Detection Limit
** Includes one sample with 0.24 ± 0.16 p Ci/g

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 10 (Cont)

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 4TH QUARTER, 1974

AVERAGE QUARTERLY RESULTS

ANIMAL VEGETATION - pCi/g (DRY) - M/G

Location	Beta less K-40 0.02*	K-40 .001*	Sr-90 0.03*
Sturmer Dairy	0.00	26.25	0.23
Borges Dairy	0.00	17.01	0.17
Marciel Ranch	1.58	6.70	0.40
Warmerdam Dairy	0.00	21.03	0.26

HUMAN VEGETATION

No samples collected this quarter.

WELL WATER - pCi/l - Q/G

Location	H-3 160*	Beta 0.5*
Site Well	0	3.8 ± 1.6
Clay Station Well	0	2.3 ± 0.4
Reservoir Area Well	0	2.1 ± 0.4
Clay Cattle Co. Well	0	2.9 ± 0.5

* Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 11

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 4TH QUARTER, 1974

AVERAGE QUARTERLY RESULTS

AIRBORNE - pCi/m^3

Location	Air Particulates(W/C) Gross Beta .002*	Air Particulates(Q/C') Alpha .005*	Charcoal Filters(W/C) I-131 .004*
Site A	.034	.000	.000
Site B	.162	.000	.001
Site C	.038	.000	.000
Site D	.031	.000	.001
Site E	.040	.000	.000
Site F	.046	.000	.000
Site G	.019	.000	.001
Site H	.036	.000	.000

Air Particulate Gamma Spectrometry (Q/C')

Ba-140 .001*	Co-60 .004*	Ce-144 .001*	Cs-137 .002*	I-131 .001*	Mn-54 .002*	Ru-106 .001*	Fe-59 .001*	Zn-65 .004*	Zr-95 .002*

All samples, composited by sampling location, were analyzed for the isotopes listed above. All were below the detection limits listed except the sample from Site H. This composite had a Ce-144 value of .004.

* Detection Limit

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite

TABLE 12

REPORTING OF RADIOACTIVITY IN THE ENVIRONS

DOCKET NO. 50-312

FACILITY: RANCHO SECO (UNIT 1) REPORTING PERIOD: 4TH QUARTER, 1974

AVERAGE QUARTERLY RESULTS

DIRECT RADIATION - mrem/QUARTER - Q/I

Location	TLD Reading
N. Perimeter Fence	18.9 ± 1.7
E. Perimeter Fence	18.5 ± 1.1
W. Perimeter Fence	18.6 ± 0.33
S. W. Perimeter Fence	17.1 ± 0.84
S. E. Perimeter Fence	Dosimeter Lost
Visitors' Center	16.5 ± 0.63
Rt. 104 Entrance	20.7 ± 7.5
N. W. of Site (6 miles)	28.4 ± 1.3
N. W. of Site, Sacramento (22 miles)	20.1 ± 0.28
S. W. of Site, Lodi (17 miles)	22.1 ± 0.51
S. of Site (0.25 miles)	20.1 ± 1.25
E. of Site, Ione (11 miles)	21.4 ± 1.2
W. Milk Station (10 miles)	14.2 ± 4.4
S. W. of Site, Galt (11 miles)	22.9 ± 0.78
S. E. of Site, Comanche Res. (11 miles)	22.1 ± 0.6
W. of Site, Clay (1.5 miles)	16.9 ± 0.92
S. W. Milk Station (9 miles)	20.0 ± 0.15
N. E. of Site (8 miles)	18.8 ± 0.33
S. E. of Site (1 mile)	21.1 ± 3.2

FREQUENCY: W-Weekly, F-Fortnightly, M-Monthly, Q-Quarterly, S-Semi-Annually

TYPE: G-Grab, C-Continuous, C'-Composite, I-Integrating

2.5 ESTIMATION OF ERRORS

An estimate of the errors associated with determining the airborne and liquid radioactive releases was made for the Rancho Seco Unit 1 Plant. The airborne releases included the continuous releases and decay tank releases from the Auxiliary Building Stack, the Reactor Building Purges, and the Gland Steam Exhaust. The liquids consisted of Radwaste Shipments and controlled liquid effluents from the plant.

The considerations used in estimating the errors of the airborne releases included the following items: (1) anisokinetic sampling, (2) desposition of sample in lines, (3) losses on particulate filters, (4) inefficiencies of the charcoal cartridge, (5) losses due to handling, (6) flow rate uncertainties, (7) decay tank pressure changes, and (8) counting statistics. The items included in the liquid release error analysis were: (1) sampling, (2) volume measurements, and (3) counting statistics.

A compilation of the error analysis is given in the subsequent summary.

SUMMARY OF ERRORS IN THE DETERMINATION OF AIRBORNE AND LIQUID RADIOACTIVE RELEASES AT RANCHO SECO

(All Errors in Percent)

I. Airborne Releases

A. Auxiliary Building Stack

1. Continuous Releases

Fission and Activation Gases = $\pm(\sigma^2+7^2)^{1/2}$

Iodines = $+(\sigma^2+9^2)^{1/2}$ or $-[6+(\sigma^2+9^2)^{1/2}]$

Particulates = $+(\sigma^2+9^2)^{1/2}$ or $-[5+(\sigma^2+9^2)^{1/2}]$

Tritium = $+(\sigma^2+9^2)^{1/2}$ or $-[10+(\sigma^2+9^2)^{1/2}]$

2. Decay Tank Releases

Fission and Activation Gases = $\pm[\sigma^2+4^2]^{1/2}$

Iodines = $+(\sigma^2+9^2)^{1/2}$ or $-[6+(\sigma^2+9^2)^{1/2}]$

Particulates = $+(\sigma^2+9^2)^{1/2}$ or $-[5+(\sigma^2+9^2)^{1/2}]$

Tritium = $+[\sigma^2+5^2+4^2]^{1/2}$ or

$-(10+[\sigma^2+5^2+4^2]^{1/2})$

B. Reactor Building Purges

Fission and Activation Gases = $+(\sigma^2+5^2)^{1/2}$ or $-[5+(\sigma^2+5^2)^{1/2}]$

Iodines = $+(\sigma^2+9^2)^{1/2}$ or $-[6+(\sigma^2+9^2)^{1/2}]$

Particulate = $+(\sigma^2+9^2)^{1/2}$ or $-[5+(\sigma^2+9^2)^{1/2}]$

Tritium = $+(\sigma^2+5^2)^{1/2}$ or $-[15+(\sigma^2+5^2)^{1/2}]$

C. Gland Seal Exhaust

Fission and Activation Gases = $\pm(\sigma^2+10^2)^{1/2}$

Iodines = $\pm(\sigma^2+10^2)^{1/2}$

Particulates = $+(\sigma^2+10^2)^{1/2}$ or $-[5+(\sigma^2+10^2)^{1/2}]$

Tritium = $+(\sigma^2+10^2)^{1/2}$ or $-[10+(\sigma^2+10^2)^{1/2}]$

II. Liquid Releases

A. Radwaste Shipments

Error in activity = $\pm(\sigma^2+1)^{1/2}$

B. Liquid Effluents

Fission and Activation Products = $\pm(\sigma^2+10^2)^{1/2}$

Tritium = $\pm(\sigma^2+10^2)^{1/2}$

Dissolved and Entrained Gases = $\pm(\sigma^2+10^2)^{1/2}$

Gross Alpha Activity = $\pm(\sigma^2+10^2)^{1/2}$

Volume of Water = ± 10

Volume of Dilution Water = ± 2