SAN ONOFRE NUCLEAR GENERATING STATION

SEMI-ANNUAL OPERATING REPORT NO. 14

FOR THE PERIOD INCLUDING

JANUARY 1, 1974, TO JUNE 30, 1974

Submitted in Accordance With:

Operating License No. DPR-13

Submitted by:

Southern California Edison Company

San Diego Gas & Electric Company

SAN ONOFRE NUCLEAR GENERATING STATION

SEMI-ANNUAL OPERATING REPORT

UNIT 1

The following report is submitted in compliance with Section 6.5 of the Technical Specifications for the San Onofre Nuclear Generating Station, Unit 1.

A. OPERATIONS SUMMARY

At the start of the reporting period, the unit was shutdown to affect repairs to the No. 1 Low Pressure turbine blading and the Loop B safety injection piping. The unit returned to service on January 22, 1974, and reached full power operation (450 MWe) the following day.

The unit was removed from service on April 27, 1974, to affect repairs to the east reheaters, generator hydrogen blower and two leaking steam generator tubes. The unit returned to service on May 20, 1974, reaching full power operation that day.

1. Changes in Facility Design

No.	Title	Description
73-6	Boron Concentration Measuring System Recorder	The modification provides a 2-pen recorder for reactor coolant boron concentration
73-13	Installation of Drag Valves to Replace Existing Feed Pump Miniflow Valves	The two existing feed pump miniflow valves were replaced with two pressure breakdown (drag) valves to improve the operating characteristics of the system.
73-21	Replace Line Trap Tuners and Arrestors	The existing Westinghouse line trap tuners and arrestors were replaced with improved units.
73-22	Replace Overcurrent Trip Relay Devices	Improved overcurrent trip devices were installed on safety related breakers to avoid cracking of the bottom molded end cap.
73-33	Install Larger Diameter Bolts on Motor Operators of MOV-850 A, B and C	Larger motor mounting bolts were installed to minimize the possibility of bolt failure.

No.	Title	Description
73-34	Modify Safety Injection Vent Line System	Additional lines and valves were installed to facilitate on-line venting of the safety injection system piping.
73-35	Modify Chemical Feed System Phosphate Addition Train	Three remote control valves were installed in the phosphate addition train to permit a more rapid response to a steam generator pH depression.
74-01	Relocation of PRA-100 Peak Acceleration Recording Instrument	The peak acceleration recording instrument was relocated to a more optimum position on the reactor coolant piping.
74-02	Replacement of Loop "B" Cold Leg Shielding	Concrete aggregate was provided as shielding around the SIS inlet nozzle on the Loop B cold leg.
74-03	Main Steam and Feedwater Piping Support Modifications	Additional static supports and dynamic constraints were provided for the main steam and feedwater piping.
74-05	Replacement of the Loop "B" Safety Injection System Solid Hanger	A modified and heavier bracket was provided to prevent overstress and possible failure of the hanger attachment.
74-07	Vital Bus Static Inverters	The existing three inverters were replaced to inprove the reliability of instrumentation power supplies.
74-08	Use Spare Power Range Nuclear Instrumentation Channel in Place of Channel 1206	One of the spare detectors was used to supply the flux signal to power range channel 1206 in place of the normal detector which failed.
74-12	Modify Boron Concentration Measurement System	Correct design problems inherent in the boron concentration measurement system.
74-13	Install Alarm to Alert When Feedwater Regulating Valves Should be Changed From Auto to Manual	The new alarm alerts the control operator to shift feedwater control to manual during a unit shutdown.

No.	Title	Description
74-16	Add Heater Elements to CV-334 Support Column	Two 250 watt, 120 volt strip heaters were installed on the support column for control valve CV-334 to improve heat tracing on the valve.
74-21	Use of Thimble #7 "A" Delta Flux Detector Signal in Place of Power Range Channel 1207 "A" Detector Signal	The thimble #7 "A" delta flux detector was used to supply the flux signal to power range channel 1207 A.

2. Performance Characteristics

At the start of the reporting period, the unit was shutdown to affect repairs to the No. 1 Low Pressure turbine blading and loop B safety injection piping. The unit returned to service on January 22, 1974.

The reactor and turbine plants were routinely monitored during the six month reporting period. No significant deviations in performance from expected values were noted with the exception of degraded performance of the east reheaters. Average burnup of the core for Cycle 4 for the reporting period was 3042.75 MWD/MTM.

3. Changes in Operating Methods

The following is a summary of those operating methods that were required due to changes in facility design or performance characteristics.

Design Change		Affected Procedure	
73-13	Installation of Drag Valves	S-2-1	Main Feed Pump Operation
73-34	Safety Injection Vent Line Modification	a) S-3-3.10	Safety Injection System Venting
		b) S-3-3.3	Hot Operational Test of the Safety Injection System and Containment Sphere Spray System
		c) S-3-3.4	Cold Operational Test of the Safety Injection System and Containment Sphere Spray System
		d) Check-off List PSSO-137, Reactor Pre-critical Check-Off List	
74-01	PRA-100 Peak Acceleration Recording Instrument Relocation	Check-off List PSSO-137, Reactor Pre-critical Check-Off List	

Design Change	Affected Procedure
74-13 Feedwater Regulating Valves Alert Alarm	a) S-3-1.4 Unit I Shutdown to Hot Standby Conditions
	b) S-3-5.1 Emergency Shutdown

4. Surveillance Tests and Inspections

All surveillance tests, checks and calibrations required by the Technical Specifications were performed at the frequency stipulated. All results are within required limits. Minor difficulities encountered are noted in Attachment I.

5. Periodic Containment Leak Rate Tests

1/23/74 Tests following a shutdown

Location	Leakage (% of Allowable)
Equipment Door	0.025
South Air Lock	0.00
North Air Lock	0.00
POV-9, POV-9A	0.019
POV-10, POV-10A	0.039

5/2/74 Tests following a shutdown

Location	Leakage (% of Allowable)
Equipment Door	0.074
POV-9, POV-9A	0.231
POV-10, POV-10A	0.035
CV-102, CV-103	0.166
CV-104, CV-105	1.046
CV-106, CV-107	0.113
Main Steam Chambers "A" and "B"	0.180
Main Steam Chamber "A" only	0.054

5/17/74 Regular Six Month Test

Location	Leakage (% of Allowable)
CV-10, CV-40, CV-116	0.847
CV-146, SV-1212-8	0.150
CV-147, SV-1212-9	0.119
CV-948, CV-949	6.217
South Air Lock	0.852
North Air Lock	0.000
Flg. to Flg. & W. 4 KV	0.103
East Elect. Penet.	4.052
West Elect. Penet.	0.954
SIS Loops "B" & "C" vent lines	0.000

All results were within Technical Specification requirements.

6. Changes, Tests and Experiments Requiring Commission Authorization

Technical Specification Change No. 14 was approved during the reporting period by the Commission pursuant to 10 CFR Part 50, Section 50.59 (a).

Technical Specification Changes

Change No. 14

This change revised Technical Specification 4.7 to clarify the inservice inspection as it currently exists.

A new Technical Specification, No. 4.9, was created to clarify the existing reactor vessel surveillance program. This change also revised Technical Specification 3.1.3, Combined Heat-Up, Cool-Down and Pressure Limitations of the reactor coolant system.

7. Plant Operating Staff Changes

There were no changes in the key supervisory or technical personnel in the plant operating staff during the reporting period.

8. Station Incidents

74-01

On January 14, 1974, during a unit outage, a main steam line knee support attached to the secondary shield was found displaced from its normal position. An inspection of all main steam and feedwater line supports and restraints within the containment was performed. The inspection revealed that three knee supports and one hydraulic restraint anchor (snubber) were damaged. Two of these knee braces support the "B" feedwater line and one supports the main steam line. The inspection also revealed that the phenolic pad from one other main steam line support was missing and the pad from an additional support was displaced. The phenolic pads provide a bearing surface between knee supports and the main steam piping.

The upper vertical anchor plates on the three damaged knee supports were found to have experienced movement which caused spalling of the adjacent concrete. The upper plate on the steam line knee brace was also pulled loose from the secondary shield structure. In addition, one of the knee supports for the "B" feedwater line exhibited one sheared and three missing bolts. These bolts mount the pipe support pedestal securely to the knee support providng a rigid restraint for the line.

The anchor plates are fastened to the wall (secondary shield structure) by J bolt anchors imbedded in the concrete. The anchor bolts are screwed into nuts which are in turn welded to the back side of each corner of the anchor plates. In the case of the plate on the main steam line knee support, the J bolts became disengaged from the nuts.

The resulting disengagement allowed the plate to be pulled loose from the wall. The damaged hydraulic restraint anchor exhibited spalled concrete and was pulled loose from the wall at the top. The upper J bolts were found to be missing.

A program was initiated to verify design calculations and determine the cause of the above failures. The following conclusions concerning these items are presented below.

a. Review of the original design calculations revealed that original design assumptions included lateral loadings which were neglected in the final design of the supports.

b. Failure of the anchor plates was due to improper installation. Investigation of the failures indicated that the J bolts had insufficient thread engagement in the nuts on the back of the anchor plates.

c. The phenolic pads were probably displaced from their original positions due to abnormal line movements caused by failure of the knee supports.

d. The sheared bolt was found to be 5/8" diameter. Design drawings indicated that the bolts should have been 3/4" diameter.

<u>Corrective Action:</u>

a. Anchor plates were returned to their original configuration and additional supports added to secure them to the secondary shield structure.

b. Additional lateral struts were added to anchor plates where appropriate. Design calculations were used to verify the adequacy of the modifications.

c. Sheared bolts in the pedestal to knee support interface on the "B" feedwater line were replaced with 3/4" diameter bolts.

d. The displaced phenolic pad was returned to its original position and the missing pad was replaced.

e. The integrity of the main steam and feedwater headers was verified by calculations.

f. All spalled concrete was repaired.

This incident is discussed in detail in a letter to R. H. Engelken dated February 8, 1974.

74-02

At 9:15 am, on February 26, 1974, it was noticed that reactor coolant loop "B" variable low pressure trip set point indicated higher than normal. The loop "B" ΔT current source output signal was found to be 4°F higher than the calculated signal level. This condition was corrected by servicing the zero adjustment device and recalibration.

74-03

At 12:05 pm, on April 3, 1974, the north and south boric acid transfer pumps were valved to take suction from the boric acid storage tank. The north transfer pump was started by the control operator, who then opened control valve CV-334 (Boric Acid Supply Valve). Although the valve position indicating lights in the control room verified CV-334 open, the boric acid flow meter FR-1102 did not indicate boric acid flow through CV-334. The operator started the south transfer pump. With both transfer pumps operating, the boric acid flow meter still did not indicate a flow. Both transfer pumps were allowed to run for approximately one minute. In this time span, about fifty gallons of boric acid solution should have been delivered to the system. The lack of boric acid flow indication was further substantiated by the unchanged level in the boric acid storage tank and no change in reactor power. Proper operability of both transfer pumps was proven by opening CV-333 (Boric Acid Recirculation Valve) and verifying flow back to the boric acid storage tank. The integrity of the boric acid flow meter and piping from CV-334 was proven by injection of primary water back through manual block valve 336 to the charging pump suction. Both flow meter indication and increasing reactor power verified this flow path existed. It became apparent a stoppage existed in either CV-334 and/or check valve C-42.

To verify a stoppage existed in CV-334 and/or the check valve C-42, primary water was valved to the transfer pump suction. The flow meter or reactor power did not evidence flow through the check valve and CV-334. An Instrument Technician was requested to verify the operability of CV-334. With an Instrument Technician observing CV-334, the control operator cycled the valve several times. Each time, CV-334 operated smoothly through a full stroke. The check valve C-42 was isolated and dissassembled. An inspection of the check valve did not reveal any malfunction or stoppage. Control valve CV-334 was also disassembled and inspected. No evidence of failure or stoppage was found. When CV-334 was reassembled, the boric acid system was valved to the normal configuration. The transfer pump was started, CV-334 was opened; boric acid flow indication was normal, the boric acid storage tank level and reactor power decreased, indicating the system was functioning in a normal manner.

After reviewing the circumstances of the incident, the information from the investigation, it can only be concluded a stoppage existed in CV-334. The stoppage was apparently solidified boric acid. The stoppage was apparently dislodged during disassembly of CV-334.

In order to learn the cause for the solidification of boric acid in the valve, four thermocouples were installed on the valve body and adjacent piping. The valve and piping were reinsulated and allowed to reach equilibrium temperature. Temperature data taken the following day revealed a somewhat lower temperature area at the base of CV-334. CV-334 is supported on a stand consisting of a large steel plate in contact with the valve body base. This support plate is in turn supported by a pipe extending up from the floor. It is apparent the support stand, acting as a heat sink, is responsible for the low temperature of the valve body, particularly at the base.

Insulating material has been provided between the support plate and the valve body. Additional heat tracing of the valve body and adjacent piping has been installed.

74-04

At 11:16 am, June 11, 1974, Unit 1 automatic load limit runback initiated which resulted in a load reduction of 160 MWe. After determining that the reactor core conditions were normal and no evidence of a dropped rod existed, the unit was returned to normal full load of 450 MWe gross at 1:00 pm the same day.

The runback was initiated by a momentary spike of nuclear power channel 1207. The position of the control rods was checked and the rods were found in their bank. An in-core thermocouple map was made and also indicated no abnormalities. The unit was subsequently returned to normal full load.

The spare channel drawer was installed as a replacement in NIS channel 1207 and operated overnight. Three occasions of instrument spiking were observed with the spare channel in service. Load runback was prevented during these occasions by operating with the turbine load limit D. C. supply de-energized and an operator in continuous attendance at the console to effect a runback if it was required.

On Wednesday, June 12, 1974, the original channel drawer was returned to service and the upper neutron detector input to the channel was switched to a spare detector in the same general core area.

74-05

At 3:05 am, June 14, 1974, Unit 1 automatic load limit runback was initiated with a resultant load reduction of 165 MWe. After determining that reactor core conditions were normal and no evidence of a dropped rod existed, the unit was returned to normal full load of 450 MWe gross at 6:40 am the same day.

No. 1 inverter, which normally supplies power to nuclear power range channel 1208, failed and its load transferred to the backup source. The resultant voltage transient caused a spike on channel 1208 initiating a "Nuclear Dropped Rod Rod Stop" which in turn initiated an automatic load limit device runback to 285 MWe gross. The position of the control rods were checked and the rods were found in their bank. An in-core thermocouple map was made and also indicated no abnormalities. The unit was subsequently returned to normal full load.

A shorted SCR in the inverter caused the inverter input fuse to open, shutting down the inverter and thereby initiating the automatic transfer to backup power. The SCR was replaced, the inverter tested for proper operation and returned to service at 12:45 pm on June 15, 1974.

It is concluded that the load limit runback was a result of the No. 1 inverter failure and load transfer. The shorted SCR appears to be an "infant mortality" type failure and no changes in present components are recommended at this time.

74-8

On January 16, 1974, routine chemical analysis of steam generator samples indicated a slight tritium concentration in "A" steam generator. The steam generators were bottled up at the time while waiting for turbine generator repairs to be completed. On January 18, 1974, a slight increase in tritium was noted in "C" steam generator.

The unit was returned to service on January 22, 1974. On January 24, 1974, the leak rate was measured to be 0.9 GPD. Sampling was conducted on a routine basis and leak rates were calculated and plotted through April 25, 1974, at which time the leak rate was approximately 40 GPD.

The unit was removed from service on April 27, 1974, to repair reheater tube leaks and steam generator tube leaks as well as conduct other maintenance.

A primary to secondary hydrostatic test revealed one leaking tube on the inlet side of "A" steam generator. Manual eddy current tests and plug gauging was conducted on selected tubes near the leaker. The leaking tube and three others were explosively plugged.

A second hydrostatic test was conducted and one leaking tube was found in "C" steam generator. Local plug gauging was conducted on selected tubes near the leaker and no restrictions were found. The leaking tube was explosively plugged. A final hydrostatic test was conducted and no leaks were found.

The unit was returned to service on May 20, 1974.

B. POWER GENERATION

1.	Gross Thermal Power Generated (MWH)	4,224,705,882
2.	Gross Electrical Power Generated (MWH)	1,436,400,000
3.	Net Electrical Power Generated (MWH)	1,362,702,000
4.	Hours Reactor Critical	3337.93
5.	Hours Generator On-Line	3279.87
6.	Histogram of Thermal Power vs Time (See Attachment II)	

C. SHUTDOWNS

74-01

1. Cause: On April 27, 1974, the unit was removed from service to repair steam generator and reheater tube leaks and to repair a leaking pressurizer safety valve. Just prior to the shutdown, there were indications of a partial loss of fan capacity in the generator hydrogen gas blower.

2. Shutdown method: Manual load reduction

3. Duration: 547.27 hours from 1:58 pm, April 27, 1974 to 8:14 am, May 20, 1974

4. Unit Status: Cold shutdown

5. Corrective Action:

   a) Reheater repairs were made which included plugging 23 and 38 leaking tubes in the southeast and northeast reheaters, respectively.

   b) Minor leakage on pressurizer safety valve RV-532 and main steam safety valve RV-2 was repaired by lapping the valve seating surfaces.

   c) Minor repairs were made on the epoxy coating of the condenser tube sheets and hydrostatic leak testing was accomplished.

   d) One leaking tube and three thinning tubes were plugged in "A" steam generator. One tube was plugged in "C" steam generator.

   e) The No. 1 and 3 inverters were replaced.

   f) The detectors in nuclear instrumentation channels 1205, 1206 and 1207 were replaced.

   g) An inspection and investigation of the generator problem revealed that some rotating and stationary blades had failed and passed through the hydrogen blower, This resulted in damage to all stages of the blower and required complete replacement of all stationary and rotating blades. During the course of the blower repairs, the generator casing was cleaned of debris and minor repairs completed on the stator winding.

D. CORRECTIVE MAINTENANCE ON SAFETY RELATED EQUIPMENT

EQUIPMENT	MALFUNCTION CAUSE	MALFUNCTION RESULT	EFFECT ON SAFE OPERATION	CORRECTIVE ACTION	SPECIAL PRECAUTIONS
No. 3 slave cycler	Failed motor bearing	Motor tripped on overload	None	Replaced motor bearings	None
Area radiation monitor for sampling room (R-1235)	Alarm failed	Annunciating	None	Replaced SCR	None
Refueling water tank recirc. pump	Hard packing	Leakage	None	Repacked pump	None
Off site area radiation monitor (Marine Base)	Failed motor	Loss of pumping capability	None	Replaced with spare unit	None
Pressurizer safety valve RV-532	Seat imperfection	Slight leakage	None	Polish valve seat	None
Boric acid system CV-334	Boric acid plating out	Restricted flow	None	Installed heat tracing on valve support	None
Main steam safety valve RV-2	Seat imperfection	Slight leakage	None	Polish valve seat	None
Control rod bank two position indicator	Clutch slipped	Low position indication	None	Adjusted and calibrated	None
Nuclear Instrumentation system differentiator comparator	Out of calibration	Alarm in continuously	None	Recalibrated	None

D. CORRECTIVE MAINTENANCE ON SAFETY RELATED EQUIPMENT

EQUIPMENT	MALFUNCTION CAUSE	MALFUNCTION RESULT	EFFECT ON SAFE OPERATION	CORRECTIVE ACTION	SPECIAL PRECAUTIONS
CVI area monitor	Failed GM tube	Would not respond	None	Replaced GM tube and calibrated	None
Refueling water storage tank low level alarm	Corrosion	Inoperable	None	Cleaned, lubricated and verified calibration	None
Steam Gen "A" steam flow meter	Zero shift	Higher than normal signal	None	Performed static alignment and calibrated	None
Steam Gen "C" wide range level transmitter	Existing transmitter failed	High level indicated	None	Replaced transmitter	None
Boric acid flow transmitter FM-1102	Boric acid leak at flange	Deterioration of meter body	None	Replaced meter and calibrated	None
Nuclear instrumentation system startup channel N-1202 console startup rate indicator	Unknown	Out of spec	None	Calibrated	None
Nuclear instrumentation system power channel N-1206 rod stop circuit	SCR failed	Prevented auto rod withdrawal	None	Replaced SCR and calibrated	None
Loop B feedwater flow-steam flow mismatch bistable	Capacitor in amplifier input circuit failed	Channel tripped	None	Replaced capacitor, calibrated	None

D. CORRECTIVE MAINTENANCE ON SAFETY RELATED EQUIPMENT

EQUIPMENT	MALFUNCTION CAUSE	MALFUNCTION RESULT	EFFECT ON SAFE OPERATION	CORRECTIVE ACTION	SPECIAL PRECAUTIONS
Nuclear instrumentation channel N-1208	Unknown	Nuclear dropped rod circuit inoperative	None	Replaced channel	None
Aeroball system	Unknown	Channels inoperative	None	Reloaded 27 channels this period	None
Switchyard Area monitor	Normal wear	Binding	None	Replaced unit with spare	None
Pressurizer CV-531 operator diaphram	Loose fastening	Slight air leak	None	Retorqued bolting	None
South waste gas compressor	Failed rupture disc	Loss of pumping capacity	None	Replaced rupture disc 4 times this period	None
North waste gas compressor	Fouled limit switch	Developed low pressure	None	Cleaned and adjusted limit switch	None
North waste gas compressor	Failed motor	Loss of pumping capability	None	Rewound motor	None
#1 inverter	Failed SCR	Inoperative	None	Replaced SCR	None
Steam generators A & C	Tube failure	Minor leakage	None	A-Steam generator plugged one leaking tube and three thinning tubes C-Steam generator plugged 1 leaking tube	None

D. CORRECTIVE MAINTENANCE ON SAFETY RELATED EQUIPMENT

EQUIPMENT	MALFUNCTION CAUSE	MALFUNCTION RESULT	EFFECT ON SAFE OPERATION	CORRECTIVE ACTION	SPECIAL PRECAUTIONS
Power range channel 1206 detectors	Unknown	Decreasing output	None	Use spare detectors in thimble "3" to supply flux signal to channel 1206	None
Power range channel 1207 "A" detector	Unknown	Random spurious spiking	None	Use thimble "7A" detector to supply flux signal to channel 1207 A	None

E. CHANGES IN FACILITY DESIGN CARRIED OUT WITHOUT PRIOR COMMISSION APPROVAL

NO.	TITLE	DESCRIPTION	SAFETY ANALYSIS SUMMARY
73-06	Boron Concentration Measuring System Recorder	The modification provides a 2-pen recorder for reactor coolant boron	The boron concentration measuring readout system is not connected to or associated with any control or engineering safeguard systems.
73-13	Installation of Drag Valves to Replace Existing Feed Pump Miniflow valves	The two existing feedpump miniflow valves were replaced with two pressure breakdown (drag) valves to improve the operating characteristics of the system.	This installation replaces existing valves with valves capable of being modulated over a predetermined feedwater flow rate. A system functional modification is not involved. Solenoid operation of the valves from safety injection and feedwater pump operation signals was not altered.
73-21	Replace 220 KV Line Trap Tuners and Arrestors	The existing Westinghouse line trap tuners and arrestors were replaced with improved units.	Replacing the carrier protection line trap tuners provides improved line protection reliability and does not effect plant safety.
73-22	Replace Overcurrent Trip Relay Devices	Improved overcurrent trip devices were installed on safety related breakers to avoid cracking of the bottom molded end cap.	Replacing the overcurrent trip delay devices on all breakers associated with engineering safety circuits will improve the reliability of these systems.
73-33	Install Larger Diameter Bolts on Motor Operators of MOV's 850 A, B, C	Larger motor mounting bolts were installed to minimize the possibility of bolt failure.	Larger diameter motor mounting bolts add to the integrity of an existing system. A system functional modification is not involved.
73-34	Modify Safety Injection Vent Line System	Additional lines and valves were installed to facilitate on-line venting of the safety injection system piping.	A system functional modification is not involved and the new vent system improves the overall operation of the safety injection system.

E. CHANGES IN FACILITY DESIGN CARRIED OUT WITHOUT PRIOR COMMISSION APPROVAL

NO.	TITLE	DESCRIPTION	SAFETY ANALYSIS SUMMARY
73-35	Modify Chemical Feed System Phosphate Addition Train	Three remote control valves were installed in the phosphate addition train to permit a more rapid response to a steam generator pH depression.	This modification affords more operating flexibility and provides greater system reliability. The system being modified is not connected to or associated with any control or engineering safeguard system.
74-01	Relocation of PRA-100 Peak Acceleration Recording Instrument	The peak acceleration recording instrument was relocated to a more optimum position on the reactor coolant piping.	This modification will have no material effect on the Reactor Coolant System or any other system considered important to safety.
74-02	Replacement of Loop "B" Cold Leg Shielding	Concrete aggregate was provided as shielding around the SIS inlet nozzle on the "B" cold leg.	The use of concrete aggregate shielding will reduce neutron streaming and provide a gamma shield to reduce the radiation level inside the secondary reactor shield.
74=03	Main Steam and Feedwater Piping Support Modifications	Additional static supports and dynamic constraints were provided for the main steam and feedwater piping.	This modification will result in a more sound support system for main steam and feedwater piping. The support structures are not connected to or associated with any control or engineering safeguard systems.
73-05	Replacement of the Loop "B" Safety Injection System Solid Hanger Mounting Bracket.	A modified and heavier bracket was provided to prevent overstress and possible failure of the hanger attachment.	The use of a stronger mounting bracket assures that the bracket will not be overstressed from combined normal and seismic loads.
74=07	Vital Bus Static Inverters	The existing three inverters were replaced to improve the reliability of instrumentation power supplies.	Replacing the Westinghouse inverters with Avtel Corporation inverters is not a functional change to the vital bus system and improved the reliability of the associated power supplies.

E. CHANGES IN FACILITY DESIGN CARRIED OUT WITHOUT PRIOR COMMISSION APPROVAL

NO.	TITLE	DESCRIPTION	SAFETY ANALYSIS SUMMARY
74-08	Use Spare Power Range Nuclear Instrumentation Channel in Place of Channel 1206.	One of the spare detectors was used to supply the flux signal to power range channel 1206 in place of the normal detector which failed.	The spare detectors are of the same manufacture and model. Since the existing circuits, amplifiers and other components of power range channel drawer 1206 are utilized, the control, protection and alarm functions are unaffected.
74-12	Modify Boron Concentration Measurement System	Correct design problems inherent in the boron concentration measurement system.	The boron concentration measuring readout system is not connected to or associated with any control or engineering safeguard systems.
74-13	Install Alarm to Alert When Feedwater Regulating Valves Should be Changed From Auto to Manual	The new alarm alerts control operator to shift feedwater control to manual during a unit shutdown.	A system functional modification is not involved.
74-16	Add Heater Elements to CV-334 Support Column	Two 250 Watt, 120 Volt Strip heaters were installed on the support column for control valve CV-334 to improve heat tracing on the valve.	Addition of the strip heaters does not change the function or operation of the boric acid system.
74-21	Use of Thimble #7 "A" Delta Flux Detector Signal in Place of Power Range Channel 1207 "A" Detector Signal	The thimble #7 "A" delta flux detector was used to supply the flux signal to power range channel 1207A.	The subject chambers are of the same manufacture and model as the originals. Since the existing circuits, amplifiers and other components of power range channel drawer 1207 are utilized, the control, protection and alarm functions are unaffected.

F. RADIOACTIVE EFFLUENT RELEASES

Attached are tables which summarize radioactive releases from the plant for the subject reporting period. An independent laboratory performs some of the these analyses on monthly liquid composite samples. As a consequence, the May and June data do not contain strontium 89 or 90 values. These data will be included in a future report as they become available.

1. Gaseous Effluents

   a) Gross Radioactivity Releases

      1) Total gross radioactivity releases were 7.41×10^{2} curies

      2) The maximum gross radioactivity release rate for a one hour period was 2.74×10^{7} $\mu Ci/hr$

      3) Total gross radioactivity data by nuclide released are shown in Table 1.

      4) The percent of technical specification limit for noble gases is 8.35×10^{-2} percent.

   b) Iodine Releases

      1) No radioactive iodine was detected.

      2) The percent of technical specification limit for iodine-131 is zero percent.

   c) Particulate Releases

      1) No beta/gamma activity was detected.

      2) No alpha activity was detected.

      3) The total gross radioactivity for nuclides with half lives greater than eight days was zero curies.

      4) The percent of technical specification limit for particulate radioactivity is zero percent.

2. Liquid Effluents

   a) Total gross radioactivity released, excluding tritium and noble gases, was 3.51 curies. The average concentration released to unrestricted areas was 1.46×10^{-8} μCi/ml.

   b) The maximum concentration of gross radioactivity released to the unrestricted area was 2.80×10^{-6} μCi/ml.

   c) The total tritium released to the unrestricted area was 1.47×10^{3} curies. The average tritium concentration released to the unrestricted area was 6.13×10^{-6} μCi/ml. Alpha radioactivity released to the unrestricted area was 5.0×10^{-4} curies through April, 1974. The average alpha concentration released to the unrestricted area was 2.1×10^{-12} μCi/ml (based on total dilution water volume for period).

   d) The total dissolved gas radioactivity released to the unrestricted area was 1.62 curies. This quantity yielded an average concentration of 6.75×10^{-9} μCi/ml released to the unrestricted area.

   e) The volume of liquid waste released was 2.32×10^{7} liters.

   f) The total volume of dilution water was 2.40×10^{11} liters.

   g) Total gross radioactivity by nuclide is shown in Table II.

   h) The percent of the technical specification limit for liquid releases is 2.30×10^{-1}.

G. <u>SOLID WASTE</u>

1. A total of 2.02×10^{3} cubic feet of solid waste was shipped off site.

2. A total of 2.3×10^{2} curies was estimated to have been shipped during the past six months.

3. Waste shipments were made on February 1, March 22, 26, May 21, 22, 23, 24, 29, 30 and June 26. All shipments were made under a burial contract with Nuclear Engineering Co., Inc. The burial site is in Beatty, Nevada.

4. A total of ten spent fuel assemblies were shipped off site during the reporting period. They were shipped to the General Electric Reprocessing Center, Morris, Ill.

H. ENVIRONMENTAL MONITORING

1. Media sampled, analyzed and reported to SCE during the fourth quarter of 1973 and first quarter of 1974 are shown below.

Radiation Levels

a) A diagram showing the location of twelve combination film badge/TLD packs is shown in Figure 1.

b) Twenty-four film badge/TLD packs were evaluated during the reporting period.

c) No locations were found to be above local background levels.

d) All sample points showed less than the detection limit for film badge/TLD packs.

Marine Specimens

a) Four locations were sampled during this reporting period.

b) Five fish, one abalone, two tunicates, two lobsters and one sea hare were analyzed and reported during this period.

c) All radioactivity levels were within the previously observed range.

d) A tunicate collected from the New Kelp Bed showed the highest radioactivity level. Data are shown below for flesh and are reported as nCi/Kg dry weight.

	$\beta^{-40}K$
Highest	17
Lowest	<1
Average	5.7

Kelp, Marine Grass and Algae

a) Three locations were sampled during this reporting period.

b) Four different samples were analyzed and reported during this period.

c) All radioactivity levels were within the previously observed range.

d) A sample of marine grass collected from the intertidal station showed the highest radioactivity level. Data are shown below and are reported as nCi/Kg dry weight.

	β ^{40}K
Highest	15
Lowest	<7
Average	9.8

Vegetable Samples

a) There is one sampling location for vegetable samples.

b) Four different vegetable samples were collected and analyzed.

c) Levels of radioactivity were within the previously observed range.

d) Celery collected during the fourth quarter of 1973 showed the highest radioactivity content of the vegetables analyzed. Data are shown below and are reported as nCi/Kg dry weight.

	β ^{40}K
Highest	29
Lowest	<4
Average	12

Air Samples

a) Samples are collected from two stations.

b) A total of 48 samples were counted during this period.

c) No sample showed radioactivity levels above normal background. Some airborne radioactivity due to atmospheric weapons testing is believed present.

d) A sample collected from the San Clemente site showed the highest activity level for this period. Data are shown below and are reported in pCi/m^3 for total β and in fCi/m^3 for gross α.

	Total β	Gross α
Highest	0.287	6.8
Lowest	0.023	<0.1
Average	0.099	2.3

Drinking Water Samples

a) Samples were collected from two sites.

b) Four samples were collected during this period.

c) No sampling location showed activity levels above normal background.

d) A sample collected from the San Clemente reservoir showed the highest activity level for this period. Data are shown below and are reported in pCi/l.

	Filtrate plus Suspended Solids	
	Gross β	Gross α
Highest	27.0	<7.1
Lowest	18.9	<3.1
Average	23.4	<4.9

Beach Sand Samples

a) Samples are collected from one location about 0.2 miles south of the plant.

b) Two samples were collected during this period.

c) Activity levels were within those previously observed.

d) Data are shown below and are reported in nCi/Kg.

	Gross γ
Highest	13
Lowest	6
Average	9.5

Ocean Bottom Sediment Samples

a) Samples are collected from two locations.

b) Four samples were collected during this period.

c) Activity levels were within those previously observed.

d) A sample collected at the intake tunnel showed the highest activity level. Data are shown below and are reported in nCi/Kg.

	Gross β
Highest	56
Lowest	45
Average	50

Secondary Coolant Water Samples

a) Samples were collected from one location.

b) Two samples were collected during this period.

c) The activity level was within the previously observed range.

d) Data are shown below and are reported in fCi/cc.

	$\beta^{-40}K$
Highest	18
Lowest	7
Average	13

2. Levels of radioactive materials in the environmental media as determined by our environmental monitoring program did not indicate the likelihood of public intakes in excess of 1% of those that could result from continuous exposure to the concentration values listed in Appendix B, Table II of Part 20.

3. No statistically significant variations of offsite environmental concentrations were observed.

I. OPERATIONAL PERSONNEL RADIATION EXPOSURE

All persons required to wear film badges while on site during the reporting period are included in this report. Exposures are grouped according to the following levels:

<100 mrem
100-500 mrem
501-1250 mrem
1251-2500 mrem
>2500 mrem

Individuals with exposures greater than 500 mrem for the reporting period are classified according to the following six job categories:

Administrative and Engineering - This category includes Station and general office administrative and engineering personnel.

Chemical-Radiation Technicians - These individuals perform all radiation monitoring and other health physics functions.

Contractors - The major portion of exposure accumulated by these persons occurs while working on steam generators and/or performing the required in-service inspections during refuelings.

Maintenance - Major exposures to these persons occur during refuelings while working on steam generators, reactor coolant pumps and other equipment within the containment. Routine jobs which result in above average exposures include baling of radioactive trash and changing of reactor coolant or radioactive waste system filters and ion exchange resin beds.

Nuclear Instrument Technicians - These persons perform all instrument calibrations, repairs and tests.

Operations - These individuals are responsible for performing all plant equipment and reactor operational functions.

Personnel occupational radiation exposures for January through June, 1974, are shown below.

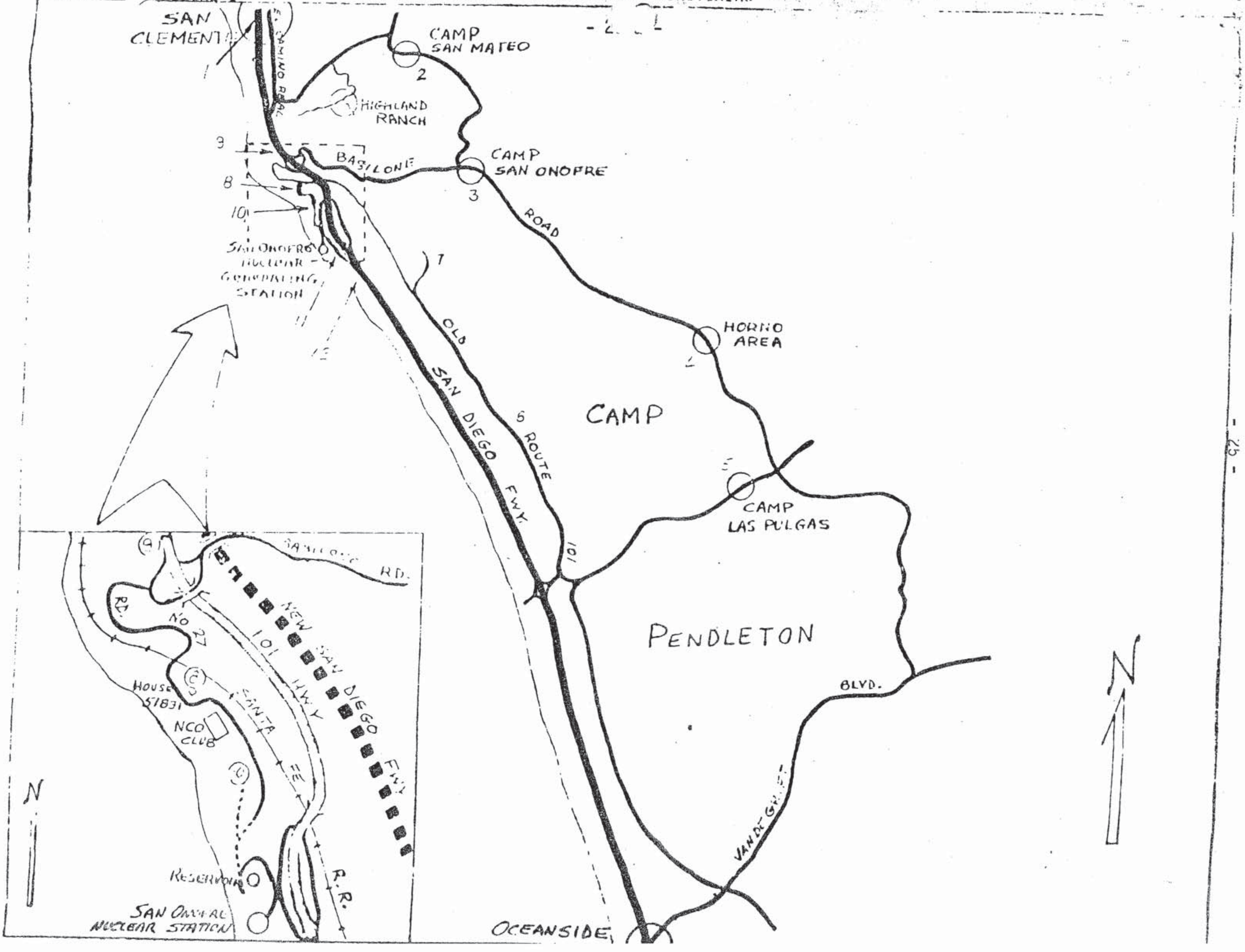
Exposure (mrem)	No. Persons
<100	156
100-500	87
501-1250	15
1251-2500	3
>2500	1

A total of 19 individuals received exposures greater than 500 mrem during this reporting period. These exposures are shown below as a function of the job category.

Category	No. Persons
Administrative and Engineering	1
Chemical Radiation Technicians	1
Contractors	4
Maintenance	10
Nuclear Instrument Technicians	3
Operations	0

:dkm

FIGURE I SAMPLE LOCATIONS FOR RADIATION MONITORING



CORRECTIONS AND ADDITIONS

The previous report for July 1, 1973, to December 31, 1973, should be corrected to show 13 persons with exposures from 1251-2500 mrem and 1 person with >2500 mrem (Section I). It was previously reported that 14 persons received exposures of 1251-2500 mrem and no persons received >2500 mrem. Categorization of the exposures should be changed from 52 Contractors and 2 Nuclear Instrument Technicians to 51 Contractors and 3 Nuclear Instrument Technicians with exposures >500 mrem.

Table II - Liquid Radioactive Releases should be updated to show the following.

Isotope	Curies Released During November	Total
gross α	1.3 (-4)	9.0 (-4)
average α concentration released	5.9 (-12)	4.7 (-12)
Sr-89	8 (-6)	1.9 (-4)
Mn-54	6.87 (-4)	1.42 (-2)
Zn-65	NDA	no change
Sr-90	3.5 (-5)	1.37 (-3)
C-14	2 (-4)	1.7 (-3)
Fe-59	3.90 (-3)	3.90 (-3)
Ag-110m	3.7 (-3)	3.7 (-3)
Cs-136	NDA	no change
Ce-141	NDA	no change
Ce-144	NDA	no change

REPORT OF RADIOACTIVE EFFLUENTS

Year: 1974

TABLE 2

I. LIQUID RELEASES

	UNITS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
1. Gross Radioactivity (β,γ)														
a) Total Release	Curies	5.49(-1)	1.32	4.23(-1)	8.27(-2)	7.71(-1)	3.56(-1)							3.51
b) Avg. Concentration Released	μCi/ml	1.89(-8)	2.88(-8)	8.39(-9)	1.83(-9)	2.31(-8)	7.36(-9)							1.46(-8)
c) Max. Concentration Released	μCi/ml	2.80(-6)	3.93(-7)	1.30(-8)	5.64(-7)	1.21(-6)	4.86(-7)							2.80(-6)
2. Tritium														
a) Total Release	Curies	9.00(1)	1.10(2)	2.74(2)	2.53(2)	5.94(2)	1.44(2)							1.47(3)
b) Avg. Concentration Released	μCi/ml	3.09(-6)	2.40(-6)	5.51(-6)	5.74(-6)	1.78(-5)	2.98(-6)							6.13(-6)
3. Dissolved Noble Gases														
a) Total Release	Curies	NDA	NDA	5.91(-1)	2.16(-1)	4.08(-1)	4.03(-1)							1.62
b) Avg. Concentration Released	μCi/ml	-	-	1.19(-8)	4.90(-9)	1.23(-8)	8.33(-9)							6.75(-9)
4. Gross Alpha Radioactivity														
a) Total Release	Curies	1.7(-5)	6 (-5)	3 (-4)	1.2(-4)	IA	IA							5(-4)
b) Avg. Concentration Released	μCi/ml	5.7(-12)	1(-12)	6 (-12)	2.7(-12)	-	-							
5. Volume of liquid waste to discharge canal	Liters	6.93(5)	6.02(6)	9.39(6)	5.79(6)	8.40(5)	4.48 (5)							2.32(7)
6. Volume of Dilution Water	Liters	2.91(10)	4.58(10)	4.97(10)	4.41(10)	3.33(10)	4.84(10)							2.40(11)
7. Isotopes Released	Curies													
Ba + La-140		NDA	NDA	NDA	NDA	NDA	NDA							NDA
Sr-89		6.9(-5)	8.4(-4)	2 (-4)	1 (-4)	IA	IA							1.2(-3)
I-131		NDA	NDA	1.04(-2)	2.19(-3)	2.85(-2)	2.99(-3)							4.41(-2)
Xe-133		NDA	NDA	2.71(-2)	3.73(-3)	2.47(-1)	1.41(-1)							4.19(-1)
Xe-135		NDA	NDA	1.79(-2)	8.52(-3)	5.19(-3)	NDA							3.16(-2)
Cs-137 / Cs-134 (Combined)		4.93(-1)	1.32	3.85(-1)	7.22(-2)	5.00(-1)	2.13(-1)							2.98
Co-60		7.53(-3)	NDA	2.28(-3)	2.44(-3)	1.73(-2)	2.96(-2)							5.92(-2)
Co-58		1.98(-2)	NDA	1.80(-2)	2.83(-3)	8.70(-2)	4.89(-2)							1.77(-1)
Cr-51		NDA	NDA	NDA	NDA	1.42(-1)	4.49(-2)							1.87(-1)
Mn-54		1.9(-3)	NDA	NDA	NDA	IA	IA							1.9(-3)
Zn-65		NDA	NDA	NDA	NDA	NDA	NDA							NDA
Sr-90		1.7(-4)	1.2(-4)	1 (-4)	6 (-5)	IA	IA							4.5(-4)
I-133		NDA	NDA	1.80(-3)	1.14(-3)	1.28(-2)	1.63(-2)							3.20(-2)
Xe-131m		NDA	NDA	5.46(-1)	2.04(-1)	1.56(-1)	2.62(-1)							1.17
C-14		1.3(-2)	2 (-3)	6 (-3)	1.7 (-3)	IA	IA							2.3(-2)
Fe-59		2.6(-3)	NDA	NDA	NDA	IA	IA							2.6(-3)
Ag-110m		8.04(-3)	NDA	NDA	NDA	IA	IA							8.04(-3)
Sb-124		2.2(-3)	NDA	NDA	NDA	IA	IA							2.2(-3)
Unidentified		NDA	NDA	NDA	NDA	NDA	NDA							NDA
Others (Specify)														
8. Percent of Tech. Spec. Limit For Total Activity Released	%	1.97(-1)	3.22 (-1)	1.81(-1)	4.66 (-2)	4.95(-1)	1.06(-1)							2.30(-1)

NDA- No Detectable Activity   IA - Independent Analyst

TABLE I

II. AIRBORNE RELEASES

	UNITS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
1. Total Noble Gases	Curies	5.99	1.39(1)	1.06(2)	5.21(2)	1.43(1)	7.99(1)							7.41(2)
2. Total Halogens	Curies	NDA	NDA	NDA	NDA	NDA	NDA							NDA
3. Total Particulate Gross Radioactivity (β,γ)	Curies	NDA	NDA	NDA	NDA	NDA	NDA							NDA
4. Total Tritium	Curies	NDA	NDA	NDA	7.36(1)	NDA	NDA							7.36(1)
5. Total Particulate Gross Alpha Radioactivity	Curies	NDA	NDA	NDA	NDA	NDA	NDA							NDA
6. Max. Noble Gas Release Rate	μCi/sec	1.55(2)	1.23(2)	7.76(2)	7.61(3)	2.47(2)	1.37(3)							7.61(3)
7. Percent of Applicable Limit For:														
a. Noble Gases	%	1.79(-3)	1.03(-2)	7.02(-2)	3.56(-1)	9.26(-3)	5.40(-2)							8.35(-2)
b. Halogens	%	NDA	NDA	NDA	NDA	NDA	NDA							NDA
c. Particulates	%	NDA	NDA	NDA	NDA	NDA	NDA							NDA
8. Isotope Released:	Curies													
Particulates		NDA	NDA	NDA	NDA	NDA	NDA							NDA
Cs-137														
Ba-La-140														
Sr-90														
Cs-134														
Sr-89														
Halogens		NDA	NDA	NDA	NDA	NDA	NDA							NDA
I-131														
I-133														
I-135														
Gases														
Kr-85		NDA	NDA	4.38(1)	1.86(1)	3.49(-2)	1.29							6.37(1)
Xe-133		8.33(-1)	1.30(1)	5.03(1)	4.15(2)	1.25(1)	6.98(1)							5.62(2)
Kr-88		NDA	NDA	NDA	NDA	NDA	NDA							NDA
Kr-87		NDA	NDA	NDA	NDA	NDA	NDA							NDA
Kr-85m		9.04(-4)	8.64(-4)	7.43(-1)	9.61(-2)	5.00(-4)	7.74(-3)							8.49(-1)
Xe-138		NDA	NDA	NDA	NDA	NDA	NDA							NDA
Xe-135m		NDA	NDA	NDA	NDA	NDA	NDA							NDA
Ar-41		NDA	NDA	NDA	NDA	NDA	NDA							NDA
Xe-131M		1.63	4.72(-1)	4.29	2.15(1)	1.08	3.46							3.24(1)
Xe-133M		3.42	4.00(-1)	6.44	6.18(1)	6.89(-1)	5.16							7.79(1)
Xe-135		1.02(-1)	NDA	9.42(-2)	3.92	NDA	1.51(-1)							4.27
Unidentified		NDA	1.04(-4)	NDA	NDA	NDA	NDA							1.04(-4)

NDA - No Detectable Activity

ATTACHMENT 1

TEST DIFFICIENCIES

TEST	MINIMUM FREQUENCY	RESULTS	CAUSE	CORRECTIVE ACTION REQUIRED
Carrier Test	Once/day	March/74 Chino and Santiago 220 KV line relay carrier failure	Failures of Westinghouse type MS-2000 tuner units	Replaced Westinghouse line trap tuners and arrestors type MS-2000 with Westinghouse improved units.
Boric Acid Flow Verification Test	Once/week	4/3/74 Boric acid flow verification test not completed when initially tested	No flow through CV-334, boric acid alignment to the charging pump suction	Verified no line stoppage at CV-334. Installed and tested additional electrical heat tracing on valve body and support.
Weekly Diesel Generator Test	Once/week	5/21/74 #2 diesel-generator failed to start using air start	Air filter element had collected debris	Air start filters and elements were renewed on #1 and #2 diesel-generators with improved units.

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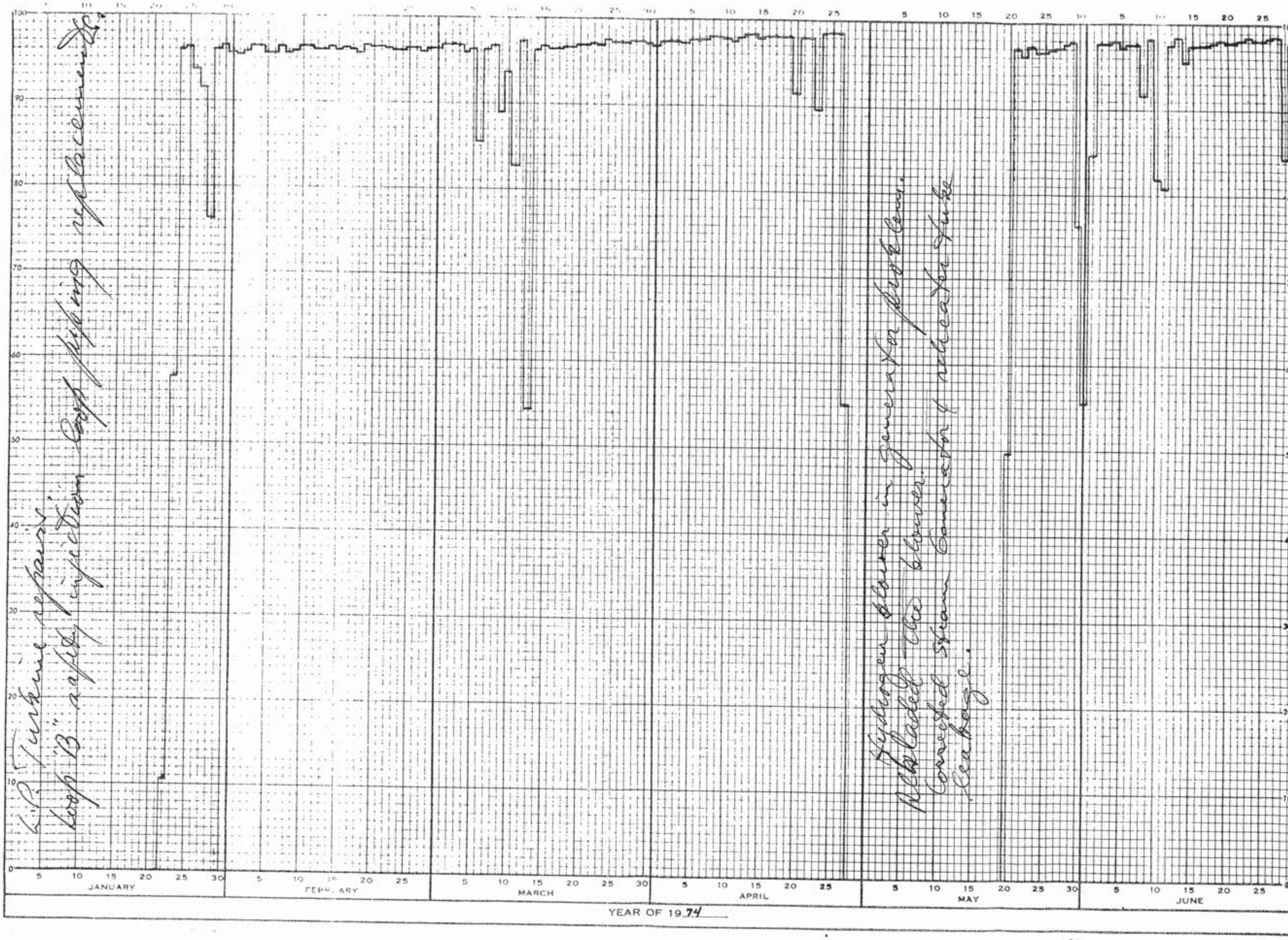
ATTACHMENT 2



FPR

SAN ONOFRE NUCLEAR GENERATING STATION

SEMI-ANNUAL OPERATING REPORT NO. 15

FOR THE PERIOD INCLUDING

JULY 1, 1974, TO DECEMBER 31, 1974

Submitted in Accordance With:

Operating License No. DPR-13

Submitted by:

Southern California Edison Company

San Diego Gas & Electric Company

SAN ONOFRE NUCLEAR GENERATING STATION

SEMI-ANNUAL OPERATING REPORT

UNIT 1

The following report is submitted in compliance with Section 6.5 of the Technical Specifications for the San Onofre Nuclear Generating Station, Unit 1.

A. OPERATIONS SUMMARY

The unit operated at full power (450 MWe) from the start of the reporting period until July 7, 1974, when it tripped from an indicated overpower condition caused by water intrusion into the detectors for two nuclear instrumentation power range channels. This condition is further discussed in incident report 74-06 and a letter to the Commission dated July 15, 1974.

The unit returned to service on July 9, 1974, and operated until August 20, 1974, when it tripped on an indicated pressurizer high level while testing pressurizer level channels. This trip is further discussed in incident report 74-11.

The unit returned to service the same day and operated until September 4, 1974, when it was removed from service to replace one nuclear instrumentation power range detector package and install axial offset detectors.

The unit returned to service on September 5, 1974, and operated until October 18, 1974, when it was removed from service for reheater maintenance and operator licensing examinations.

The unit was returning to service on October 21, 1974, when it was manually tripped because of dropped rods. This is further discussed in incident 74-12.

The unit returned to service October 21, 1974, and operated at full load for the remainder of the reporting period.

1. Changes in Facility Design

No.	Title	Description
73-30	Modify Yard Drainage Collection and Discharge System	A collection sump and two discharge pumps were added to accomodate yard runoff.
73-32	Install Automatic Sampling System in Radwaste Discharge Line	An integrator on the flow transmitters was added to actuate sample collection at preset intervals during each release.

No.	Title	Description
74-06	Install Solenoid Valve in Control Air Line to ORMS Channel 1218 Bypass Control Valve	A valve was added to close the bypass allowing more flow thru ORMS channel 1218 during flushing.
74-11	Relocate Southern Plant Boundary Fence	This fence was moved in closer to Unit 1 to facilitate construction of Units 2 and 3.
74-14	Install Continuous Axial Offset Monitoring System	Two independent nuclear power range channels using UIC's were installed to measure and indicate reactor axial Δ flux.
74-15	Replace South Waste Gas Compressor Rupture Disc with a Relief Valve	The rupture disc was replaced with a relief valve identical to the valve installed for the same service on the north waste gas compressor.
74-17	Relocate Switchyard Western Fence	This fence was moved in closer to the switchyard to facilitate construction of Units 2 and 3.
74-23	Install Emergency Radiation Monitoring System	Three single-channel area radiation monitoring systems and a three-pen recorder were installed to provide high range dose indications in the event of an accident involving significant release of radioactivity into the containment.
74-28	Off-Site Parking For Unit 1	A parking lot was constructed outside the plant boundary fence.
74-30	Modify Feedwater Override Control System	The override for positioning the main feedwater valves for TAVE above 540°F following a turbine trip was removed. For TAVE less than 545°F, the feedwater override was set to position the valves at 5% full load feedwater flow.
74-31	Install Drain Lines on Housings of Fans A8, A8S and A8SS	Drain lines were added to prevent water from building up within the fan housings.

2. Performance Characteristics

The reactor and turbine plants were routinely monitored during the six month reporting period. No significant deviations in performance from expected values were noted with the exception of degraded performance of the east reheaters. Average burnup of the core for Cycle 4 for the reporting period was 4062.13 MWD/MTM.

3. Changes in Operating Methods

The following is a summary of those operating methods that were required due to changes in facility design or performance characteristics.

Design Change		Affected Procedures	
73-30	Modify Yard Drainage	S-0-6	Contingency Plan for Oil Spills
74-06	Axial Offset System	S-3-1.16	Excore Axial Offset
74-23	Emergency Radiation Monitoring System	a) S-3-3.7	Area Radiation Monitoring System
		b) PSSO-145	Area Radiation Monitoring System Testing
		c) S-VIII-1.3	Plant Evacuation
		d) S-VIII-1.4	General Evacuation
74-30	Modify Feedwater Override Control System	S-3-5.1	Emergency Shutdown
74-32	Auto Sampling System in Radwaste Liquid Discharge	S-VII-1.15	Liquid Radioactive Waste Releases
		S-E-111	Radioactive Waste Disposal & Records
		S-3-2.26	Receiving, Storage, Processing & Discharge of Liquid Waste

4. Surveillance Tests and Inspections

All surveillance tests, checks and calibrations required by the Technical Specifications were performed at the frequencies stipulated. All results are within required limits. Minor difficulties encountered are noted in Attachment I.

5. Periodic Containment Leak Rate Tests

7/9/74 Tests following a shutdown

Location	Leakage (% of Allowable)
POV-9, POV-9A	0.048
POV-10, POV-10A	0.049

9/5/74 Tests following a shutdown

Location	Leakage (% of Allowable)
POV-9, POV-9A	0.14
POV-10, POV-10A	0.14

10/20/74 Regular six month test

Location	Leakage (% of Allowable)
CV-10, CV-40, CV-116	2.49
CV-146, SV-1212-8	0.22
CV-147, SV-1212-9	0.02
CV-948, CV-949	2.78
Equipment Door	0.03
South Air Lock	2.56
North Air Lock	0.40
POV-9, POV-9A	0.08
POV-10, POV-10A	0.07
Flg. to Flg. & W. 4 KV	0.16
East Elect. Penet.	1.79
West Elect. Penet.	3.22
CV-102, CV-103	0.01
CV-104, CV-105	0.46
CV-106, CV-107	0.01
SIS "B" & "C" Vent Lines	0.00

All results were within Technical Specification requirements.

6. Changes, Tests and Experiments Requiring Commission Authorization

Technical Specification Changes Nos. 15, 16 and 17 were approved during the reporting period by the Commission pursuant to 10 CFR Part 50, Section 50.59(a)

Technical Specification Changes

Change No. 15

This change revised Technical Specification 4.3 modifying the frequency for testing of containment type D penetrations.

Change No. 16

This change deleted the present appendix "B" to provisional operating license DPR-13, "Allocation of Special Nuclear Materials", and added a new appendix "B", Environmental Technical Specifications".

Change No. 17

This change revised Technical Specification 1.0, adding definitions regarding the excore axial offset system.

It revised Technical Specification 3.10 to include correlation of excore axial offset with incore axial offset.

It revised Technical Specification 4.1 to include the minimum frequency for testing and calibration of the axial offset system.

Technical Specification 3.11 regarding continuous power distribution monitoring was added.

Technical Specification 3.5.2.b regarding energy weighted rod position was deleted.

7. Plant Operating Staff Changes

There were no changes in the key supervisory or technical personnel in the plant operating staff during the reporting period.

8. Station Incidents

74-06

At 11:34 AM on July 7, 1974, the unit tripped from an indicated overpower condition when nuclear power range channels 1206 and 1207 failed from water intrusion. Power range channels 1205 and 1208 remained operable throughout the occurrence and verified that no nuclear overpower occurred.

Nuclear instrumentation source range channel 1202 and intermediate range channel 1204 also failed during the occurrence. Later it was noted that the output from source range channel 1201 was decreasing. Since one source range and one intermediate range channel are required to maintain hot shutdown, the reactor coolant system was borated to greater than 10% $\Delta K/K$ shutdown margin in accordance with the Technical Specifications.

Water intrusion into the nuclear instrumentation power range detector thimbles will cause short circuits or grounds. In either case, the detector current indication will increase toward the high level trip point. This type failure is in the conservative direction as the indicated nuclear overpower will trip the reactor.

During a routine monthly autostart test of the turbine plant cooling water pumps, two cooling coil head gaskets in control rod drive mechanism cooling fans A8SS failed due to pressure fluctuation in the turbine plant cooling water system. This system supplies cooling water to all the air conditioning fan units inside the containment as well as turbine plant equipment. Fan A8SS is one of three that cool the control rod drive mechanisms by pulling containment air across the area above the reactor head into a torus which surrounds the head and up a duct which is common to all three fans. Fan A8SS is located about 40 feet above the reactor flange and attached to the west side of the "B" steam generator and pressurizer enclosure. Leakage from the fan A8SS cooler collected in the intake plenum and overflowed into the duct leading to the other two fans and the common duct leading to the reactor head area. Air flow up this duct caused water to collect in the other two fan intake plenums. Most of this water leaked from the plenums to the operating deck, evaporated, or was carried into the containment atmosphere by the air flow.

After the fan intake plenums flooded, some water flowed through the duct to the reactor head area. This water contacted the fan air inlet thermocouple which is mounted on the side of the duct near the fans and caused a drop in recorded temperature from 190 degrees F to 100 degrees F. This alerted operators to the possibility of a fan cooler leak.

During the initial containment entry, operators noticed water leaking from all three fan inlet plenums, the connecting ductwork, from the torus surrounding the outside of the reactor head insulation and to the area where the nuclear instrumentation thimbles are located. Water from these sources made it difficult for the operators to pinpoint and isolate the source of leakage.

A total of approximately 3400 gallons of turbine plant cooling water (as calculated by tank level change) leaked through the failed gaskets at a rate of approximately 15 gallons per minute.

Of this amount, about 2900 gallons was ultimately collected in the sphere sump via drains from the operating deck. Another 40 gallons collected in the reactor cavity sump and about 140 gallons collected in the detector thimbles. The remaining 320 gallons evaporated into the containment atmosphere.

Water intrusion in the detector thimbles caused failure of nuclear instrumentation power range channels 1206 and 1207, intermediate range channel 1204 and source range channel 1202 prior to or during the reactor shutdown. Several hours later nuclear instrumentation source range channel 1201 also failed. The initial alarm, which indicated "NIS Detector Hi Temperature" was caused by water having shorted the associated temperature detector.

The following items were accomplished prior to unit startup:

All nuclear instrumentation detector packages were removed and the water was pumped from the detector thimbles.

Inspections, tests and repairs to the NIS channels were accomplished as listed below:

Channel	Action
1201	Replaced detector and cable
1202	Replaced detector and cable. Repaired preamplifier
1203	Inspected and tested satisfactorily
1204	Replaced detector and cables
1205	Inspected and tested satisfactorily
1206	Replaced detectors and cables
1207	Replaced detectors and cables
1208	Inspected and tested satisfactorily

A special preoperational test program was conducted on all four NIS power range channels.

The cooling coil head gaskets on fan A8SS were replaced and all three control rod mechanism cooling fans (A8, A8S & A8SS) were leak tested satisfactorily.

A design change was accomplished to install drains from the A8, A8S and A8SS fan inlet plenums. This will prevent water accumulation in these plenums from overflowing to the duct and the reactor head area.

All other containment cooling fans supplied by the turbine plant cooling water system were inspected and found in satisfactory condition.

An engineering evaluation has been initiated to determine if additional equipment modifications are warranted.

74-07

On July 9, 1974, the unit was returned to service following the outage for repair of the NIS. While increasing load, there appeared to be a flow restriction in the feedwater line to steam generator "C". This restriction resulted in load being limited to approximately 285 Mwe.

Load was reduced to approximately 150 MWe. At this point, the auxiliary feedwater regulator and manual bypass valves to "C" steam generator were used to supply feedwater. The "C" steam generator main feedwater regulator downstream check valve was isolated for investigation. The flapper of the check valve was found detached from the arm and lying in the check valve body thus causing the flow restriction. Maintenance was performed while on line, the check valve was returned to service and load was subsequently increased to 450 MWe.

74-09

On July 24, 1974, at 3:30 AM, a telephone call was received from the Federal Bureau of Investigation notifying the Station that a sabotage threat had been made against this facility. The threat later proved to be false.

The FBI said it received a telephone call from a Los Angeles man who stated that a car with several persons was en route to San Onofre to try to "blow up" the generating station. FBI agents interrogated the caller, who subsequently retracted his statements and admitted his story was a hoax.

74-10

During the semi-annual capacity testing, conducted on August 13, 1974, the No. 2 diesel-generator tripped from high temperature after 42 minutes of running time. Investigation revealed that one of the four bolts on the turbo-charger after cooler pump coupling had sheared off. This indicated the possibility of internal binding in the pump causing sufficient torque to shear the bolt. The pump was removed, disassembled and inspected. The impeller and casing were damaged indicating that an object had apparently passed through the pump. The size and nature of the object could not be determined since a search failed to locate it. Repairs consisted of replacing the pump with a spare.

The diesel-generator was subsequently test operated on August 16, 1974, at its rated load of 600 KW for one hour without the cooling water temperature exceeding 185°F.

In accordance with Technical Specification requirements, the No. 1 diesel-generator remained operable during the period the No. 2 diesel-generator was out of service.

This matter was discussed in detail in a letter to the Commission dated August 28, 1974

74-11

On Tuesday, August 20, 1974, at 1:33 PM, Unit 1 tripped off the line while carrying 450 MW.

The pressurizer instrumentation was undergoing the routine two week interval testing. Pressure channels I, II, III and level channels I and II had been successfully tested. Level channel III had been placed in the trip mode and testing had commenced when the reactor tripped. The events recorder and first-out annunciator indicated the trip was from pressurizer high level. During this phase of the test, the pressurizer level recorder is connected to level channel III to verify that the recorder responds properly and the only level signal being recorded is the test signal injected into channel III.

The most probable cause of the trip was a spurious trip signal from one of the two level channels not being tested. It has been concluded that an Operator inadvertently may have cleared the partial matrix alarm while acknowledging other alarms occurring during the trip.

A temporary recorder was connected to record level indications on Level Channels II and III while the Control Room Recorder monitors Channel I to detect any further spurious level indications.

All level channels were thoroughly tested with no abnormal conditions being found.

All bistable and BF relays in the pressurizer level circuitry were checked for loose wiring and/or misaligned contacts. None were found.

After completing the steps outlined above, the reactor was returned to service at 5:28 PM, and the unit was placed on the line at 6:28 PM the same day. Full load was reached at 12:25 AM the following day, Wednesday, August 21, 1974.

74-12

On Monday, October 21, 1974, No. 1 Unit was manually tripped while carrying 310 MW.

The unit was being returned to full load after completion of an outage for reheater maintenance, insulator cleaning and regreasing and operator licensing examinations. At 4:38 PM the rod position-rod bottomed and nuclear dropped rod-rod stop alarms were received. The operator verified that the four rod bottom lights associated with Control Bank II, subgroup 8 control rods were lit. He immediately tripped the reactor and turbine-generator manually.

Control Bank II, subgroup 8 control rods dropped into the core because of a malfunction in the rod drive apparatus. The electrical circuits, relays, contactors and timer that are common to these four rods were carefully inspected. All connections were found to be tight, the contacts on relays and coil contactors were found to be clean and properly adjusted. The time delay relay, its auxiliary relay and the half power relay in the movable gripper circuit were found to function properly.

All contacts were then solvent cleaned and Control Bank II rods were cycled approximately 1000 steps in each direction with no evidence of malfunction. The unit was subsequently returned to service and full load was reached at 4:50 AM, October 22, 1974.

B. POWER GENERATION

1.	Gross Thermal Power Generated (MWH)	5,509,411
2.	Gross Electrical Power Generator (MWH)	1,873,200
3.	Net Electrical Power Generated (MWH)	1,782,407
4.	Hours Reactor Critical	4,270.84
5.	Hours Generator On-Line	4,260.54
6.	Histogram of Thermal Power vs Time	(See Attachment II)
7.	Maximum Dependable Capacity	450 Mwe Gross
8.	Reserve Shutdown Hours	0

C. SHUTDOWNS

74-02

1. Cause: On July 7, 1974, the unit tripped from an indicated overpower condition caused by water intrusion into the detectors for two of the nuclear instrumentation power range channels.

2. Shutdown method: Automatic trip

3. Duration: 54.65 hrs from 11:34 AM, July 7, 1974, to 6:13 PM, July 9, 1974

4. Unit Status: Hot shutdown

5. Corrective Action:
   a. All nuclear instrumentation detector packages were removed and the water was pumped from the detector thimbles.

   b. Inspections, tests and repairs to the NIS channels were accomplished as listed below:

Channel	Action
1201	Replaced detector and cable
1202	Replaced detector and cable Repaired preamplifier
1203	Inspected and tested satisfactorily
1204	Replaced detector and cables
1205	Inspected and tested satisfactorily
1206	Replaced detectors and cables
1207	Replaced detectors and cables
1208	Inspected and tested satisfactorily

5. Corrective Action: c. The cooling coil head gaskets on fan A8SS and all three control rod mechanism cooling fans (A8, A8S & A8SS) were leak tested satisfactorily.

d. A design change was accomplished to install drains from the A8, A8S and A8SS fan inlet plenums. This will prevent water accumulation in these plenums from overflowing to the duct and the reactor head area.

e. All other containment cooling fans supplied by the turbine plant cooling water system were inspected and found in satisfactory condition.

74-03

1. Cause: On August 20, 1974, the unit tripped on an indicated pressurizer high level while testing pressurizer level channels.

2. Shutdown Method: Automatic trip

3. Duration: 4.58 hrs. from 1:53 PM, August 20, 1974, to 6:28 PM, August 20, 1974.

4. Unit Status: Hot shutdown

5. Corrective Action: All pressurizer level channels were thoroughly tested. No abnormal conditions were found. The unit returned to service the same day.

74-04

1. Cause: On September 4, 1974, the unit was removed from service to replace one nuclear power range detector package.

2. Shutdown Method: Manual load reduction

3. Duration: 23.6 hrs. from 9:27 PM, September 4, 1974, to 9:00 PM, September 5, 1974

4. Unit Status: Hot shutdown

5. Corrective Action: a. Power range channel 1207A detector high voltage cable was repaired.

b. Power range channel 1208A and B detector package were repaired.

5. Corrective Action: c. Excore axial offset detectors (4) were installed.

d. Miscellaneous leaks were repaired in the secondary plant.

74-05

1. Cause: On October 18, 1974, the unit was removed from service for reheater maintenance and operator licensing examinations.

2. Shutdown Method: Manual load reduction

3. Duration: 66.7 hrs from 12:36 PM, October 18, 1974, to 7:08 AM, October 21, 1974

4. Unit status: Hot shutdown

5. Corrective Action: a. Reheater repairs were made which included plugging 1 and 52 leaking tubes in the southeast and northeast reheaters respectively and reinstallation of the divider plates on the tube side of both east reheaters.

74-06

1. Cause: On October 21, 1974, while returning to full load, the unit was manually tripped because of dropped rods.

2. Shutdown Method: Manual trip

3. Duration: 7.12 hrs from 4:38 PM, October 21, 1974, to 11:45 PM, October 21, 1974.

4. Unit Status: Hot shutdown

5. Corrective Action: a. Control Bank II, subgroup 8 control rods dropped into the core because of a malfunction in the rod drive apparatus. The electrical circuits, relays, contactors and timer that are common to these four rods were carefully inspected. All connections were found to be tight, the contacts on relays and coil contactors were found to be clean and properly adjusted. The time delay relay, its auxiliary relay and the half power relay in the movable gripper circuit were found to function properly.

b. All contacts were then solvent cleaned and Control Bank II rods were cycled approximately 1000 steps in each direction with no evidence of malfunction.

D. CORRECTIVE MAINTENANCE ON SAFETY RELATED EQUIPMENT

EQUIPMENT	MALFUNCTION CAUSE	MALFUNCTION RESULT	EFFECT ON SAFE OPERATION	CORRECTIVE ACTION	SPECIAL PRECAUTIONS
Aeroball system	Unknown	Inoperative	None	Aligned diverter valves and reloaded balls	None
Control rod bank 2 shutdown margin computer	Failed potentio-meter	Erratic operation	None	Replaced potentiometer and recalibrated	None
ORMS channel R-1214	Failed detector	Indicated high	None	Replaced detector and calibrated	None
ORMS channel R-1211 particulate monitor	Selector switch dirty contacts	Erratic operation	None	Cleaned switch contacts	None
East charging pump seal water low flow alarm	Seal switch failed	Continuous alarm	None	Replaced seal switch	None
Nuclear instrumenta-tion source range channels N 1201 and N 1202	Flooding of detec-tors	Channels inoperative	None	Replaced detectors	None
Nuclear instrumenta-tion power range channels N 1206 and N 1207	Flooding of detec-	Channels inoperative	None	Replaced detectors	None
Fan A8SS	Failed gasket in cooling coil	Water shorted NIS channels causing plant shutdown	None	Replaced cooling coil head gaskets	None

D. CORRECTIVE MAINTENANCE ON SAFETY RELATED EQUIPMENT

EQUIPMENT	MALFUNCTION CAUSE	MALFUNCTION RESULT	EFFECT ON SAFE OPERATION	CORRECTIVE ACTION	SPECIAL PRECAUTIONS
No. 2 Diesel Generator	Failed cooling water pump coupling	Engine high Temperature	None	Replaced pump	None
Axial offset system	Water in detector thimbles	Detector inoperative	None	Replaced detectors	None
Nuclear instrumentation system power range channel N1208	Failed detector package support cable	Channel inoperative	None	Replaced detector assembly	None
Nuclear instrumentation system power range channel N1207	Failure of high voltage cable to "B" detector	"B" channel inoperative	None	Repaired cable	None
Boric acid blend selector switch	Deterioration of star wheel	Erratic operation	None	Replaced indexing star wheel	None
Charging test pump	Scored valves	Leakage by valves	None	Resurfaced seats, installed new poppets	None
No. 2 inverter	Failed undervoltage relay	Inverter shutdown	None	Repaired undervoltage relay	None
North charging pump low flow alarm	Worn float stem	Float stuck	None	Replaced float	None
Axial offset system	West signal cable failed	Channel inoperative	None	Replaced cable	None
Pressurizer level controller	Calibration drift	2% error between programmed and actual levels	None	Recalibrated	None

D. CORRECTIVE MAINTENANCE ON SAFETY RELATED EQUIPMENT

EQUIPMENT	MALFUNCTION CAUSE	MALFUNCTION RESULT	EFFECT ON SAFE OPERATION	CORRECTIVE ACTION	SPECIAL PRECAUTIONS
Control rod bank 2 insertion alarm	E/I converter drift	Alarm set point high	None	Recalibrated	None
Nuclear instrumentation power range channel N1208	Failed capacitor in "B" signal circuit	Drifting % power indication	None	Replaced capacitor and recalibrated	None
No. 5 slave cycler	Failed motor	Slave cycler stopped	None	Replaced with spare motor	None
Steam generator "C" remote-manual control station	Set point potentiometer failed open	Inoperative on automatic control	None	Replaced set point potentiometer	None

E. CHA' 'S IN FACILITY DESIGN CARRIED OUT WITHOUT PRIOR (1ISSION APPROVAL

NO.	TITLE	DESCRIPTION	SAFETY ANALYSIS SUMMARY
73-30	Modify Yard Drainage Collection and Discharge System	A collection sump and two discharge pumps were added to accomodate yard runoff.	The yard drainage system is not connected to or associated with any control or engineering safeguard systems.
73-32	Install Automatic Sampling System in Radwaste Discharge Line	An integrator on the flow transmitters was added to actuate sample collection at preset intervals during each release.	The modification permits collection of a more representative composite sample thereby improving the accurary of release accounting.
74-06	Install Solenoid Valve Control Air Line to ORMS Channel 1218 Bypass	A valve was added to close the bypass allowing more flow thru ORMS channel 1218 during flushing.	A system functional modification is not involved. Increasing the flushing flow improves the overall operation of the system.
74-11	Relocate Southern Plant Boundary Fence	This fence was moved in closer to 1 to facilitate construction of Units 2 & 3.	Relocation of the boundary fence does not effect plant safety.
74-14	Install Continous Axial Offset Monitoring System	Two independent nuclear power channels using UIC's were installed to measure and indicate reactor axial Δ flux.	This system demonstrates that total nuclear peaking factor does not exceed limiting values at any power level as specified in the licensing requirements.
74-15	Replace South Waste Gas Compressor Rupture Disc with a Relief Valve	The rupture disc was replaced with a relief valve identical to the valve installed for the same service on the north waste gas compressor	Installation of the relief valve will reduce maintenance requirements without changing the function or operation of the system.
74-17	Relocate Switchyard Western Fence	This fence was moved in closer to the switchyard to facilitate construction of Units 2 and 3.	Relocation of the boundary fence does not effect plant safety.
74-23	Install Emergency Radiation Monitoring System	Three single-channel area radiation monitoring systems and a three-pen recorder were installed to provide high range dose indications in the event of an accident involving significant release of radioactivity into the containment.	This equipment will not interconnect with or interfere with any existing safety related equipment.

E. CHANG IN FACILITY DESIGN CARRIED OUT WITHOUT PRIOR COI SION APPROVAL

NO.	TITLE	DESCRIPTION	SAFETY ANALYSIS SUMMARY
74-28	Off-Site Parking for Unit 1	A parking lot was constructed outside the plant boundary fence.	All non essential vehicle traffic has been removed from the site. This change provides for the level of protection described in the security plan.
74-30	Modify Feedwater Override Control System	The override on the main feedwater valves for TAVE above 540°F following a turbine trip was removed. For TAVE less than 545°F, the feedwater override was set at 5% full load feedwater flow.	This modification reduces the possibility of excessive cooldown while retaining sufficient control margins following a unit trip.
74-31	Install Drain Lines on Housings of Fans A8, A8S and A8SS.	Drain lines were added to these fan housings to prevent water from building up within the fan housings.	This modification is to prevent water from building up in the fan housings and reaching a level high enough to flow through the duct work resulting in flooding of the refueling cavity.

F. RADIOACTIVE EFFLUENT RELEASES

Attached are tables which summarize radioactive releases from the plant for the subject reporting period. An independent laboratory performs some of the analyses on monthly liquid composite samples. As a consequence, the October, November and December data do not contain strontium 89 or 90 values. These data will be included in a future report as they become available.

1. Gaseous Effluents

   a. Gross Radioactivity Releases

      1) Total gross radioactivity releases were 1.04×10^{-3} curies 1.04E3

      2) The maximum gross radioactivity release rate for a one hour period was 1.83×10^{7} μCi/hr

      3) Total gross radioactivity data by nuclide released are shown in Table 1

      4) The percent of technical specification limit for noble gases is 1.15×10^{-1} percent

   b. Iodine Releases

      1) Iodine radioactivity released during this period is shown by isotope in Table 1.

      2) The percent of technical specification limit for iodine-131 is 6.31×10^{-5} percent.

   c. Particulate Releases

      1) Total gross radioactivity released was 8.74×10^{-5} curies

      2) No alpha activity was detected

      3) The total gross radioactivity for nuclides with half lives greater than eight days was 8.74×10^{-5} curies

      4) The percent of technical specification limit for particulate radioactivity is 7.33×10^{-6} percent

2. Liquid Effluents

   a. Total gross radioactivity released, excluding tritium and noble gases, was 1.52 curies. The average concentration released to unrestricted areas was 5.12×10^{-9} μCi/ml.

b. The maximum concentration of gross radioactivity released to the unrestricted area was 1.01×10^{-6} μCi/ml.

c. The total tritium released to the unrestricted area was 2.38×10^{3} curies. The average tritium concentration released to the unrestricted area was 8.01×10^{-6}μCi/ml. Alpha radioactivity released to the unrestricted area was 1.9×10^{-5} curies through September 1974. The average alpha concentration released to the unrestricted area was 6.4×10^{-14} μCi/ml (based on total dilution water volume for period).

d. The total dissolved gas radioactivity released to the unrestricted area was 1.75 curies. This quantity yielded an average concentration of 5.89×10^{-9} μCi/ml released to the unrestricted area.

e. The volume of liquid waste released was 3.17×10^{6} liters.

f. The total volume of dilution water was 2.97×10^{11} liters.

g. Total gross radioactivity by nuclide is shown in Table II.

h. The percent of the technical specification limit for liquid releases is 1.09×10^{-1}.

G. SOLID WASTE

1. A total of 3.88×10^{2} cubic feet of solid waste was shipped off site.

2. A total of 3.8×10^{-1} curies was estimated to have been shipped during the past six months.

3. One waste shipment was made on July 29, 1974. All shipments were made under a burial contract with Nuclear Engineering Co., Inc. The burial site is in Beatty, Nevada.

4. Two spent fuel assemblies were shipped off site during the reporting period. They were shipped to the General Electric Reprocessing Center, Morris, Ill.

H. ENVIRONMENTAL MONITORING

1. Media sampled, analyzed and reported to SCE during the second and third quarters of 1974 are shown below.

Radiation Levels

a. A diagram showing the location of twelve combination film badge/TLD packs is shown in Figure 1.

b. Twenty-three film badge/TLD packs were evaluated during the reporting period.

c. No locations were found to be above local background levels.

d. One film badge registered 13 mr gamma greater than the detection limit of 10 mr gamma. The corresponding TLD did not confirm this radiation level. This film badge reading is believed invalid. All other sample points showed less than the detection limit for film badge/TLD packs.

Marine Specimens

a. One location was sampled during this reporting period.

b. One sea hare was analyzed and reported during this period.

c. All radioactivity levels were within the previously observed ranges.

d. The sea hare was collected at Intertidal Station No. 2. Data are shown below for flesh and are reported as nCi/Kg dry weight.

	$\beta^{-40}K$
Observed	20

Kelp, Marine Grass and Algae

a. One location was sampled during this reporting period.

b. One sample was analyzed and reported during this period.

c. All radioactivity levels were within the previously observed range.

d. The sample of marine grass was collected from the Intertidal Station 5.5. Data are shown below and are reported as nCi/Kg dry weight.

	$\beta^{-40}K$
Observed	4

Vegetable Samples

a. There is one sampling location for vegetable samples.

b. Seven different vegetable samples were collected and analyzed.

c. Levels of radioactivity were within the previously observed range.

d. A tomato collected during the second quarter showed the highest radioactivity content of the vegetables analyzed. Data are shown below and are reported as nCi/Kg dry weight.

	$\beta - {}^{40}K$
Highest	22
Lowest	3
Average	8

Air Samples

a. Samples are collected from two stations.

b. A total of 51 samples were counted during this period.

c. No sample showed radioactivity levels above normal background. Some airborne radioactivity due to atmospheric weapons testing is believed present.

d. A sample collected from the Camp Pendleton site showed the highest activity level for this period. Data are shown below and are reported in pCi/m^3 for total β and in fCi/m^3 for gross α.

	Total β	Gross α
Highest	0.65	0.3
Lowest	0.20	<0.1
Average	0.08	<0.2

Drinking Water Samples

a. Samples were collected from two sites.

b. Four samples were collected during this period.

c. No sample location showed activity levels above normal background.

d. A sample collected from the Capistrano Beach reservoir showed the highest activity level for this period. Data are shown below and are reported in pCi/l.

	Filtrate plus Suspended Solids	
	Gross β	Gross α
Highest	23.6	<5.3
Lowest	19.3	<4.2
Average	22.2	<4.5

Beach Sand Samples

a. Samples are collected from one location about 0.2 miles south of the plant.

b. Two samples were collected during this period.

c. Activity levels were within those previously observed.

d. Data are shown below and are reported in nCi/Kg.

	Gross γ
Highest	6
Lowest	6
Average	6

Ocean Bottom Sediment Samples

a. No samples were collected during this period.

Secondary Coolant Water Samples

a. Samples were collected from one location.

b. One sample was collected during this period.

c. The activity level was within the previously observed range.

d. Data are shown below and are reported in fCi/cc.

	β-^{40}K
Observed	8

2. Levels of radioactive materials in the environmental media as determined by our environmental monitoring program did not indicate the likelihood of public intakes in excess of 1% of those that could result from continous exposure to the concentration values listed in Appendix B, Table II of Part 20.

3. No statistically significant variations of offsite environmental concentrations were observed.

I. OPERATIONAL PERSONNEL RADIATION EXPOSURE

All persons required to wear film badges while on site during the reporting period are included in this report. Exposures are grouped according to the following levels:

<100 mrem
100-500 mrem
501-1250 mrem
1251-2500 mrem
>2500 mrem

Individuals with exposures greater than 500 mrem for the reporting period are classified according to the following six job categories:

Administrative and Engineering - This category includes Station and general office administrative and engineering personnel.

Chemical-Radiation Technicians - These individuals perform all radiation monitoring and other health physics functions.

Contractors - The major portion of exposure accumulated by these persons occurs while working on steam generators and/or performing the required in-service inspections during refuelings.

Maintenance - Major exposures to these persons occur during refuelings while working on steam generators, reactor coolant pumps and other equipment within the containment. Routine jobs which result in above average exposures include baling of radioactive trash and changing of reactor coolant or radioactive waste system filters and ion exchange resin beds.

Nuclear Instrument Technicians - These persons perform all instrument calibrations, repairs and tests.

Operations - These individuals are responsible for performing all plant equipment and reactor operational functions.

Personnel occupational radiation exposures for July through December, 1974, are shown below.

Exposure (mrem)	No. Persons
<100	195
100-500	27
501-1250	7
1251-2500	4
>2500	1

A total of twelve individuals received exposures greater than 500 mrem during this reporting period. These exposures are shown below as a function of the job category.

Category	No. Persons
Administrative and Engineering	3
Chemical Radiation Technicians	2
Contractors	0
Maintenance	1
Nuclear Instrument Technicians	2
Operations	4

JVG:RVW:dkm

FIGURE I SAMPLE LOCATIONS FOR RADIAT MONITORING

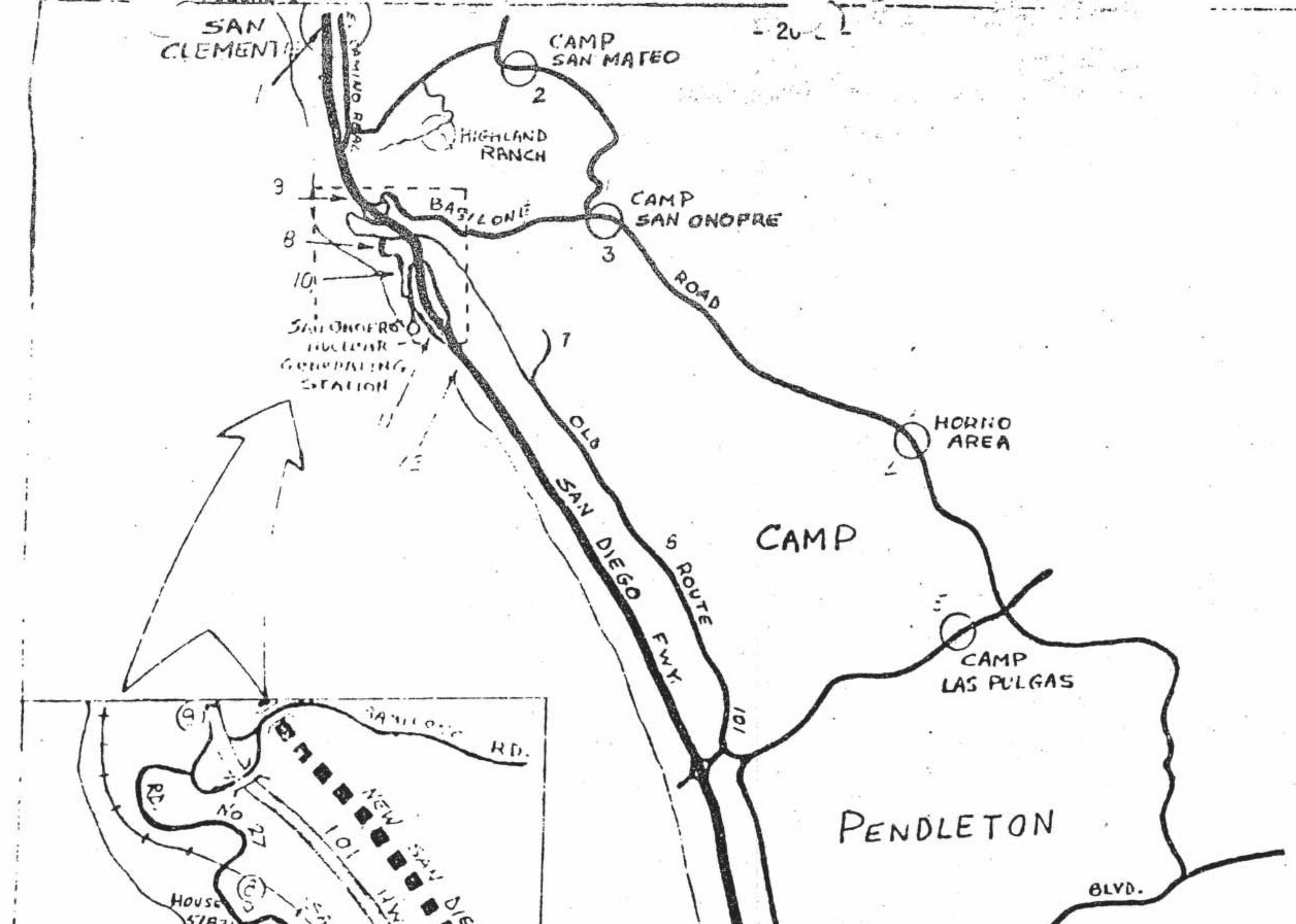


TABLE I

AIRBORNE RELEASES

	UNITS	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
1. Total Noble Gases	Curies	2.12(2)	7.73(1)	4.36(2)	2.52(2)	5.47(1)	5.02	1.04(3)
2. Total Halogens	Curies	4.09(-5)	NDA	9.47(-5)	9.51(-5)	NDA	NDA	2.31(-4)
3. Total Particulate Gross Radioactivity (β,γ)	Curies	NDA	NDA	NDA	8.74(-5)	NDA	NDA	8.74(-5)
4. Total Tritium	Curies	2.46	NDA	7.68	7.63	NDA	NDA	1.78(1)
5. Total Particulate Gross Alpha Radioactivity	Curies	NDA	NDA	NDA	NDA	NDA	NDA	NDA
6. Max. Noble Gas Release Rate	μCi/sec	2.18(2)	1.86(3)	5.07(3)	4.03(2)	1.14(3)	2.47(2)	5.07(3)
7. Percent of Applicable Limit For:								
a. Noble Gases	%	1.38(-1)	5.16(-2)	2.97(-1)	1.64(-1)	3.75(-2)	3.25(-4)	1.15(-1)
b. Halogens	%	8.10(-5)	NDA	1.94(-4)	1.15(-4)	NDA	NDA	6.50(-5)
c. Particulates	%	NDA	NDA	NDA	4.33(-5)	NDA	NDA	7.33(-6)
8. Isotope Released:	Curies							
Particulates								
Cs-137 + 134		NDA	NDA	NDA		NDA	NDA	
Ba-La-140					8.74(-5)			8.74(-5)
Sr-90								
Cs-134								
Sr-89								
Halogens								
I-131		4.09(-5)	NDA	9.47(-5)	5.20(-5)	NDA	NDA	1.88(-4)
I-133		NDA		NDA	1.21(-5)			1.21(-5)
I-135		NDA		NDA	3.10(-5)			3.10(-5)
Gases								
Kr-85		NDA	NDA	NDA	NDA	2.34(-1)	NDA	2.34(-1)
Xe-133		1.80(2)	6.17(1)	3.56(2)	2.18(2)	4.04(1)	4.76	8.61(2)
Kr-88		NDA	NDA	NDA	NDA	NDA	NDA	NDA
Kr-87		NDA	NDA	NDA	NDA	NDA	NDA	NDA
Kr-85m		2.50(-3)	NDA	1.91(-2)	NDA	2.66(-2)	NDA	4.82(-2)
Xe-138		NDA	NDA	NDA	NDA	NDA	NDA	NDA
Xe-135m		NDA	NDA	NDA	NDA	NDA	NDA	NDA
Ar-41		NDA	NDA	NDA	NDA	NDA	NDA	NDA
Xe-131M		1.42(1)	4.44	3.34(1)	1.59(1)	4.44	2.25(-1)	7.26(1)
Xe-133M		1.81(1)	1.02(1)	4.35(1)	1.82(1)	8.85	3.20(-2)	9.89(1)
Xe-135		2.61(-1)	9.83(-1)	3.48	NDA	7.27(-1)	NDA	5.45
Unidentified		NDA	NDA	NDA	NDA	1.17(-3)	1.59(-4)	1.33(-3)

NDA- No Dectable Activity

TABLE II

	UNITS	JUL	AUG.	SEPT.	OCT.	NOV.	DEC.	T L
1. Gross Radioactivity (β,γ)								
a) Total Release	Curies	4.65(-1)	3.85(-1)	1.39(-1)	1.12(-1)	1.01(-1)	3.08(-1)	1.52
b) Avg. Concentration Released	μCi/ml	9.18(-9)	7.60(-9)	2.80(-9)	2.38(-9)	2.08(-9)	6.07(-9)	5.12(-9)
c) Max. Concentration Released	μCi/ml	1.01(-6)	9.00(-8)	3.14(-7)	9.31(-8)	7.61(-8)	2.68(-7)	1.01(-6)
2. Tritium								
a) Total Release	Curies	4.26(2)	1.89(2)	6.43(2)	4.32(2)	3.94(2)	2.61(2)	2.38(3)
b) Avg. Concentration Released	μCi/ml	8.48(-6)	3.75(-6)	1.30(-5)	9.19(-6)	8.11(-6)	5.15(-6)	8.01(-6)
3. Dissolved Noble Gases								
a) Total Release	Curies	8.64(-2)	6.09(-1)	1.45(-1)	5.19(-2)	8.54(-1)	NDA	1.75
b) Avg. Concentration Released	μCi/ml	1.72(-9)	1.21(-8)	3.71(-10)	1.10(-9)	1.76(-8)	-	5.89(-9)
4. Gross Alpha Radioactivity								
a) Total Release	Curies	<1.2(-5)	<6.5(-6)	9.1(-7)	IA		IA	<1.9(-5)
b) Avg. Concentration Released	μCi/ml	<2.4(-13)	<1.3(-13)	3.1(-15)	-		-	
5. Volume of liquid waste to discharge canal	Liters	5.96(5)	3.25(5)	4.12(5)	3.77(5)	5.75(5)	8.84(5)	3.17(6)
6. Volume of Dilution Water	Liters	5.02(10)	5.05(10)	4.96(10)	4.70(10)	4.86(10)	5.07(10)	2.97(11)
7. Isotopes Released	Curies							
Ba + La-140		NDA	NDA	5.25(-3)	IA	IA	IA	5.25(-3)
Sr-89		<1.2(-5)	4.9(-4)	6.6(-4)	IA	IA	IA	1.2(-3)
I-131		NDA	NDA	5.43(-4)	2.35(-3)	NDA	NDA	2.89(-3)
Xe-133		8.64(-2)	6.09(-1)	1.50(-4)	5.93(-3)	3.69(-4)	NDA	7.02(-1)
Xe-135		NDA	NDA	8.11(-4)	2.23(-3)	NDA	NDA	3.04(-3)
Cs-137) Combined Cs-134)		4.57(-1)	2.34(-1)	1.08(-1)	1.17(-1)	6.85(-2)	8.00(-3)	9.93(-1)
Co-60		4.42(-3)	NDA	5.15(-3)	3.43(-4)	2.88(-4)	2.97(-4)	1.05(-2)
Co-58		NDA	1.50(-1)	1.21(-2)	NDA	1.36(-2)	NDA	1.76(-1)
Cr-51		NDA	NDA	NDA	NDA	NDA	NDA	NDA
Mn-54		1.6(-3)	6.8(-4)	9.8(-4)	IA	IA	IA	3.3(-3)
Zn-65		NDA	NDA	NDA	NDA	NDA	NDA	NDA
Sr-90		9.12(-4)	4.6(-5)	1.2(-4)	IA	IA	IA	1.1(-3)
I-133		NDA	NDA	NDA	NDA	NDA	NDA	NDA
Xe-131m		NDA	NDA	1.44(-1)	4.38(-2)	8.54(-1)	NDA	1.04
C-14		<1.8(-4)	<6.5(-5)	<1.7(-4)	IA	IA	IA	4.2(-4)
Fe-59		NDA	NDA	NDA	IA	IA	IA	NDA
Ag-110m		NDA	NDA	NDA	IA	IA	IA	NDA
Sb-124		1.6(-3)	NDA	NDA	IA	IA	IA	1.6(-2)
Na-24		NDA	NDA	NDA	NDA	NDA	3.00(-1)	3.00(-1)
Ba-140		NDA	NDA	5.49(-3)	IA	IA	IA	5.49(-3)
Unidentified		NDA	NDA	NDA	NDA	1.86(-2)	NDA	1.86(-2)
Others (Specify)								
8. Percent of Tech. Spec. Limit For Total Activity Released	%	1.08(-1)	5.59(-2)	3.19(-2)	4.44(-2)	3.99(-1)	2.15(-2)	1.09(-1)

NDA- No Detectable Activity
IA - Independent Analyst

ADDITIONS

Table II, Liquid Radioactive Releases, of the January-June 1974 report should be updated for May and June as shown below.

	UNITS	MAY	JUNE	TOTAL	
1. Gross Radioactivity (β,γ)					
a) Total Release	Curies	7.99(-1)	3.72(-1)	4.68	3.51
b) Avg. Concentration Released	μCi/ml	2.31(-8)	7.36(-9)		
c) Max. Concentration Released	μCi/ml	1.21(-6)	4.86(-7)		
2. Tritium					
a) Total Release	Curies	5.94(2)	1.44(2)	2.21(3)	1.47E3
b) Avg. Concentration Released	μCi/ml	1.78(-5)	2.98(-6)		
3. Dissolved Noble Gases					
a) Total Release	Curies	4.08(-1)	4.03(-1)	2.43	1.62
b) Avg. Concentration Released	μCi/ml	1.23(-8)	8.33(-9)		
4. Gross Alpha Radioactivity					
a) Total Release	Curies	3.6(-4)	2.3(-4)	1.1(-3)	5E-4
b) Avg. Concentration Released	μCi/ml	1.1(-11)	4.8(-12)	4.6(-12)	
5. Volume of liquid waste to discharge canal	Liters	8.40(5)	4.48(5)	2.40(7)	2.32E7
6. Volume of Dilution Water	Liters	3.33(10)	4.84(10)	2.22(11)	2.40E11
7. Isotopes Released	Curies				
Ba + La-140		NDA	NDA		
Sr-89		8.4(-6)	4(-6)	1.2(-3)	
I-131		2.85(-2)	2.99(-3)		
Xe-133		2.47(-1)	1.41(-1)		
Xe-135		5.19(-3)	NDA		
Cs-137		5.00(-1)	2.13(-1)		
Cs-134					
Co-60		1.73(-2)	2.96(-2)		
Co-58		8.70(-2)	4.89(-2)		
Cr-51		1.42(-1)	4.49(-3)		
Mn-54		2.7(-3)	4.3(-3)	8.9(-3)	
Zn-65		NDA	NDA		
Sr-90		2.4(-3)	4.75(-4)	3.3(-3)	
I-133		1.28(-2)	1.63(-2)		
Xe-131m		1.56(-1)	2.62(-1)		
C-14		2.1(-4)	9(-5)	2.3(-2)	
Fe-59		1.5(-2)	NDA	1.8(-2)	
Ag-110m		NDA	8.5(-3)	1.7(-2)	
Sb-124		8 (-3)	2.7(-3)	1.3(-2)	
Unidentified		NDA	NDA		
Others (Specify)					
8. Percent of Tech. Spec. Limit For Total Activity Released	%	6.15(-1)	1.26(-1)		

TABLE III

SOLID WASTE

	UNITS	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
1. Total solid waste packaged	Ft^3	3.88(2)	0	0	0	0	0	3.88(2)
2. Total est. radioactivity	Curies	3.8(-1)	0	0	0	0	0	3.8(-1)
3. Dates of shipment and Disposition if shipped Offsite.								
JULY 29								
Nuclear Engr. Co.								
AUGUST								
No shipments								
SEPTEMBER								
No shipments								
OCTOBER								
No shipments								
NOVEMBER								
No shipments								
DECEMBER								

ATTACHMENT -

TEST DEFICIENCIES

TEST	MINIMUM FREQUENCY	RESULTS	CAUSE	CORRECTIVE ACTION REQUIRED
Emergency Radiation Monitoring System	Once/day	10/15/74 Channel 1250 did not respond to check source	Dirty selector switch	Cleaned selector switch.
ERMS	Once/day	10/27/74 Channel 1251 did not respond to check	Design deficiency	Unit was removed from service and repaired.
ERMS	Once/day	10/29/74 Channel 1250 responded poorly to check source	Design deficiency	Unit was removed from service and repaired.
Auxiliary Water Pump 6 mo overspeed		8/12/74 Speed reached 5000 RPM without tripping	Overspeed trip mechanism linkage out of adjustment	Adjusted linkage. Retested satisfactorily.
Operational Radiation Monitoring System	Once/week	8/9/74 Channel 1214 tested low in calibration	Failed detectors	Replaced four (4) detectors.
ORMS	Once/week	9/20/74 Channel 1214 erratic	Failed detectors	Replaced four (4) detectors.
ORMS	Once/week	10/4/74 Channel 1218 out of tolerance-low	Loose plug in channel	Tightened plug.
ORMS	Once/week	11/15/74 Channel 1214 out of limits in calibration	Dirty selector switch	Cleaned selector switch.
ORMS	Once/week	11/29/74 Channel 1212 above limits in "test" position	Circuit component tolerance changed	Adjusted circuit for proper indication.
220 KV PCB Trip Test	Bimonthly	PCB trip alarm works intermittently	Actuating linkage out of adjustment	Adjusted linkage.
Power Range Channel	Once/week	10/11/74 Channels 1205 & 1207 deviation alarms are 1% 10w	Circuit drift	Recalibrated circuit.

CORRECTIONS AND ADDITIONS

The previous report for January 1, 1974 through June 30, 1974 should be corrected to show a total of 8 spent fuel assemblies having been shipped offsite. It was previously reported that 10 spent fuel assemblies were shipped offsite during the reporting period.

The report for July 1, 1973 through December 31, 1973 should be corrected to show the duration of shutdown No. 73-5 as 2243.94 hours. The duration of this shutdown was previously reported to be 2489.93 hours.

FPR

Southern California Edison Company

P. O. BOX 800

2244 WALNUT GROVE AVENUE

ROSEMEAD, CALIFORNIA 91770

February 21, 1975

Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Code: Beth 042
Washington, D.C. 20545

Docket 50-306

Dear Sir:

The histogram of thermal power versus time was inadvertently omitted when the Semi-Annual Operating Report No. 15 for San Onofre Nuclear Generating Station was forwarded to your office. Attached herewith is the subject histogram.

Yours truly,

R. V. Knapp

R. V. Knapp
Manager of Steam Generation

JCS:djm

Attachment

ATTACHMENT 2