

U.S. NUCLEAR REGULATORY COMMISSION
REGION V

Report Nos. 50-361/84-12 and 50-362/84-12

Packet Nos. 50-361 and 50-362

License Nos. NPF-10 and NPF-15

Licensee: Southern California Edison Company
P. O. Box 800
2244 Walnut Grove Avenue
Rosemead, California 91770

Facility Name: San Onofre Units 2 and 3

Inspection at: San Clemente, California

Inspection conducted: May 14-18, June 3, 1984 and telephone conversations May 31, and June 5, 1984

Inspectors: Conrad I. Sherman
C. I. Sherman, Radiation Specialist

June 12, 1984
Date Signed

Approved by: G. P. Yuhos
G. P. Yuhos, Chief
Reactor Radiation Protection Section

6/12/84
Date Signed

Summary:

Inspection on May 14-18, May 31, June 3 and June 5, 1984 (Report Nos. 50-361/84-12 and 50-362/84-12)

Areas Inspected: Routine unannounced inspection of the Unit 3 startup test program including: radwaste systems, RCS chemistry control, process and effluent monitoring systems, and review of the Unit 3 bioshield effectiveness survey. Reactive onsite followup of unplanned radioactive gas release that occurred on June 2, 1984.

The inspection involved 39 hours onsite by two NRC inspectors.

Results: Of the areas inspected, no items of noncompliance or deviations were identified.

Details

1. Persons Contacted

- *J. Haynes, Station Manager
- *W. Moody, Deputy Station Manager
- *P. Knapp, Manager, Health Physics
 - R. Rosenblum, Manager, Technical
 - W. Kingsley, Shift Supervisor
- *E. Golden, Health Physics Engineer
 - R. Reese, Quality Assurance
 - J. Mortenson, Chemistry Supervisor Unit 2/3
- *L. Wright, U3 Power Ascention Test Operations Supervisor
 - D. Berry, Startup Engineer, Hoffman Technical Services
 - D. Beauchaine, Startup Engineer
- *D. Brevig, Nuclear Plant Chemistry Supervisor
 - M. Hyman, Shift Operating Foreman
 - D. Stickney, Instrument & Control Engineer
 - K. Barrow, Health Physics Foreman
 - S. Jones, Health Physics Foreman
 - R. Grey, Health Physics Supervisor Unit 2/3
 - K. Helm, Effluent Engineer
- *E. Bennett, Quality Assurance
- *C. Brandt, Startup Quality Assurance
- *C. Horton, Startup Quality Assurance Supervisor
- *P. Shaffer, Radwaste Operations Supervisor Unit 2/3
- *M. Speer, Compliance
 - R. Plappert, NSSS Support Engineer

*Denotes attendance at the exit interview on May 18, 1984

In addition to the above individuals, the inspector met with other members of the licensee's staff.

2. Action on Previous Inspection Findings

Open (50-361/84-14-01, 50-362/84-14-01) Noncompliance associated with failure to declare an "Unusual Event" within the time constraints expressed in Emergency Plan Implementing Procedure EPIP S023-VIII-I. On June 2, 1984 at 2003 PDT the licensee notified the NRC Headquarters Operations Officer (HOO) pursuant to 10 CFR 50.72(b)(2)(iv) of an unplanned release of fission product gas from Unit 2/3 that resulted in a concentration seven times the value specified in 10 CFR 20 Appendix B, Table 2 at the restricted area boundary. The licensee reported that although about 320 curies of gaseous activity had been released in one hour, an "Unusual Event" was not declared.

The Region V Duty Officer contacted the Chief, Reactor Radiation Protection Section (RRPS) in Los Angeles on June 3, 1984 and requested that he conduct an onsite review of the release. At 0930 PDT, June 3, 1984 the Chief, RRPS (the inspector) arrived at SONGS. The inspector discussed the June 2 releases with the Shift Supervisor,

Shift Technical Advisor, Effluent Engineer, Operating Foreman, Health Physics Foreman and Chemistry Technician. Operating logs, sample data sheets, multipoint recorder printouts, and changes to operating procedures were reviewed.

Based on this review, it appears that beginning early on June 2, 1984 the gaseous activity release rate was higher than normal. Unit 2 was at full power and Unit 3 was at 80% power. Throughout the day, operators were attempting to identify and isolate the source of gaseous activity. At about 1610 PDT an operator drained a level indicating device associated with the Unit 2 CVCS header. This two minute evolution released about 424 curies of gaseous activity. The licensee evaluated the release and made a four hour report to NRC pursuant to 10 CFR 50.72(b)(2)(iv) at 2003 PDT.

Observations:

- A. The licensee has recently revised the Offsite Dose Calculation Manual (ODCM) to allow higher set points for the effluent radiation monitors. Book, Serial No. 10 of the ODCM located in the Control Room did not contain the revision of the set point methodology.
- B. Operating and alarm response procedures (S023-5-2.24 and S023-5-2.7) have been revised.
- C. EPIP S023-VIII-1, "Recognition and Classification of Emergencies" has been revised to raise the radioactive release threshold for the declaration of an "Unusual Event" involving gaseous effluents to:

"Any radioactive gaseous effluent release which exceeds the limits of Technical Specification 3.11.2 and results in a whole body dose at the site boundary greater than 0.2 mrem in a single hour, as indicated by the following monitor readings:"
- D. S023-0-25, "Telephone Notification of the NRC for Significant Event", had not yet been revised to be consistent with other changes which had been made.
- E. S023-3-3.21, "Radiation Monitor Shiftly Surveillance" has been revised to require recording of effluent monitor alarms and the indication every 15 minutes when that channel is in the alarm mode. Data indicated that the high level alarm setpoint for 2RE7865 was exceeded at 1613 PDT. However, no log entries indicated that the alarm was actually activated. This matter was brought to the licensee's attention. The licensee stated that they will review the alarm time delay circuit.
- F. Multipoint recorder 2RDR7830 had been replaced and was working properly during the June 2, releases.
- G. The Shift Supervisor and Operating Foreman were very familiar with the revised EPIP S023-VIII-1 but did not have a copy of the setpoint calculations available.

- H. The release did not result in any significant dose to either workers or members of the public. From 1600 to 1800 PDT the wind was blowing at about 8 miles per hour from 225°. This indicates the whole body dose at the restricted area boundary would have been about 0.07 mrem due to the release. This dose was substantiated by Pressurized Ion Chamber 6 (located across I-5 which measured an increase from 0.0065 mrem/hr at 1600 PDT to 0.0103 mrem/hr at 1615 PDT and returned to 0.0063 mrem/hr by 1715 PDT. The projected dose rate based on historical atmospheric dispersion was 25% of the 0.2 mrem threshold for declaration of an "Unusual Event".
- I. The release was caused by the design of the pressure relief valve level switch drain system.

Conclusions:

Considering the licensee is developing a response to the Notice of Violation dated May 25, 1984 regarding a similar event that occurred on May 5, 1984 the Chief, Reactor Radiation Protection Section presented the following comments to Mr. Haynes and other members of the staff by telephone on June 5, 1984.

- The licensee should conduct an ALARA design review of the pressure relief valve level switch drain system.
- Recognizing that their corrective action were not yet fully complete, this matter will remain open pending additional inspector followup.
- Review of the revision of EPIP S023-VIII-1 will be performed by Region V and discussed in subsequent correspondence (50-361/84-12-03, 50-362/84-12-03).

Open (50-361/83-14-03, 50-362/83-14-03) Inspector identified item involving operability of the Unit 2 process radiation monitor. The inspector noted the monitor continues to be unavailable due to noise problems in signal cables. The licensee is taking steps to identify the problem and take corrective action. The Unit 3 device is operating as described in this report.

3. Biological Shield Survey

Section 14.2.12.97 and 14.2.12.81 of the FSAR describe tests to be performed to verify radiation shields are within acceptance criteria. The inspector examined the completed "official test copy" of startup test procedure 3LP-701-01, Biological Shield Effectiveness Survey Test Procedure and Health Physics Procedure S023VII-9.4, Biological Shield Survey Songs Unit 3 to determine how the test program met the criteria of NRC Regulatory Guide 1.68, "Initial Test Programs..." and ANSI/ANS 6.3.1-1980, "Program for Testing Radiation Shields...." Adequacy of the instrumentation used for the survey has been examined in previous inspection report 50-361/82-26. In addition to procedural review, the following documents were examined:

Memorandum: E. Goldin to R. Warnock, Subject: Biological Shield Survey Songs Unit 3, dated April 4, 1984

Memorandum: L. Bray to D. Breig, Subject: Unit 3, 100% Biological Shield Survey, dated November 16, 1983

Memorandum: L. Bray to R. Warnock, Subject: ITA No. E83-263, Internal Contamination of Eberline RO-2 Ion Chambers, dated November 16, 1983

Nonconformance Report 3-584 dated October 7, 1983

Memorandum: F. Marsh (BPC) to H. Richter, Subject: SONGS U2 & U3 100% Power Shielding Survey

Memorandum: F. Marsh to L. Fossum, Subject: SONGS U3 50% Power Shielding Survey, dated October 28, 1983

Memorandum: F. Marsh to L. Fossum, Subject: SONGS U3 80% Power Shielding Survey, dated November 21, 1983

Memorandum: F. Marsh to L. Fossum, Subject: SONGS U3 100% Power Shielding Survey

Test Working Group Meeting 396, Minutes Issued November 21, 1983

Test Exception Report Summary for 3LP-701-01/1-6

Temporary Charge Notice Summary for 3LP-701-01

Based on review of these documents and discussion with licensee representatives, the inspector concluded that commitments described in the FSAR regarding radiation zones have been met and acceptance criteria of FSAR 14.2.12.97 have been met. The inspector noted that dose rates in containment in the vicinity of the equipment hatch exceed predicted (design values) but are within zone criteria stated in the FSAR. Several areas on the refueling deck (63 foot elevation) were noted to have neutron plus gamma radiation dose rates in the range of 50 to 1400 millirem per hour. The highest in containment dose rates outside of the secondary shield ranged to 7500 millirem per hour at the edge of the refueling pool cavity. These values were extrapolated from measurements made at 50 percent power.

Examination of the data by the architect (Bechtel) indicated that no radiation streaming was detected and that no major problems or need to modify the shield was indicated. The inspector noted at the exit interview the need to schedule additional tests to verify adequacy of the fuel transfer tube shield.

No violations or deviations were identified.

4. Liquid Radwaste System Operation Startup

FSAR Section 11.2 and 11.3 describe the licensee's commitment to process radioactive materials and control releases to the environment. These

commitments are made regulatory requirements in Technical Specification 3.11.1 regarding liquid effluent concentration, dose and liquid waste treatment. The inspector examined this area in order to identify any problems associated with liquid radioactive materials processing. This examination consisted of a review of radwaste records and discussion with radwaste and chemistry personnel.

As a result of this examination the inspector noted the following.

The licensee does not presently recycle borated water collected by the Coolant Radwaste System. The inspector noted that approximately 1.0 E6 gallons of coolant radwaste were discharged in the first quarter of 1984. This water, prior to processing had specific activities in the range of 10-15 microCi/cc gross activity. This water is purified prior to release using filtration and ion exchange techniques. Water collected by the miscellaneous liquid waste system is purified similarly. The licensee does not use the liquid waste evaporator to process liquid radwaste, however the equipment is maintained operable and surveillance conducted pursuant to T.S. 4.11.1.3. The licensee discharged approximately 0.75 E6 gallons of miscellaneous liquid radwaste in the first quarter of 1984.

The inspector noted based on examination of the semiannual release report for July - December 1983, that liquid releases were within 10 CFR 20 limits pursuant to TS 3.11.1.1 and 10 CFR 50 Appendix I limits pursuant to TS 3.11.1.2. In addition the inspector noted that the licensee projects doses due to liquid releases monthly pursuant to T.S. 4.11.1.3.1.

In order to establish performance of the liquid radwaste processing system in view of the present operational techniques, the inspector compared releases for July to December 1983 with the estimated annual release from Table 11.2-38 of the updated FSAR. The following isotopes were selected for examination.

<u>Isotope</u>	<u>Curies Released</u>	<u>FSAR Expected</u>	<u>Ratio/Released/Expected</u>
I-131	.556	0.005	111
Co-58	.456	0.000034	13000
Co-60	.04	0.0000043	9300
Sr-89	5.3 E-4 (1 qtr)	0.00000071	700
Nb-95	.02	-	-
Mn-54	.015	0.00000067	22000
Fe-59	.022	0.0000021	10000

The inspector noted that FSAR estimates are based on assumption of different processing techniques than those presently used at the facility as noted above.

The inspector also compared total curies of fission and activation products and total curies of tritium on a normalized per annum basis with other U.S. PWR's. Tritium releases compared favorably with average released normalized to energy production, however, for fission and activation products the curies released from San Onofre were higher than the median PWR for the years compared. This information was discussed

with the Supervisor, Nuclear Plant Chemistry subsequent to the inspection. In discussion, it was noted that the licensee has gone through a large number of startups during Unit 3 testing which has resulted in the generation of large volumes of water. The licensee expects water volume to decrease as plant operations stabilize. The licensee representative stated that coolant grade water would not be recycled until the licensee could develop means to assure positive control of all liquids entering the coolant radwaste system in order to prevent contamination of the primary system with organic materials.

Licensee actions and plant performance in the area of liquid radioactive waste releases will be examined after the units accumulate more operational experience (50-361/84-12-01, 50-362/84-12-01).

No violations or deviations were identified.

5. Gaseous Radwaste System

The inspector briefly examined operational experience with the gaseous radioactive waste processing system. FSAR Chapter 11.3 describes the licensee's commitment to manage gaseous radwaste. Calculations presented in this chapter are based on the assumption of 30 day holdup of the waste gas decay tanks (WGDT). The inspector noted that WGDT holdup periods typically exceed 30 days. Problems related to the numerous unanticipated releases of gaseous radioactivity were discussed with the radwaste supervisor. The inspector noted that operating instruction S023-0-21 Rev. 1, attachment 8.1 Special Order 84-13 identified 10 operations known to cause increases in the effluent release rate and cautioned operators to take appropriate steps during these evolutions. The inspector also discussed with the cognizant engineer, actions initiated by the licensee to correct identified problems with the gaseous radwaste system. The inspector noted that while noble gas releases for 1983 and 1984 to date are higher than expected, they remain within the most restrictive NRC limits and FSAR projections based upon 0.12% failed fuel. The ability to maintain thirty day holdup and maintain releases within design values demonstrates that gaseous radwaste storage and release systems operate in accordance with design.

No violations or deviations were identified.

6. RCS Radiochemistry Tests

FSAR Section 14.2.12.92, RCS Chemistry and Radiochemistry Test, describes the licensee's commitment for verification of process monitor calibration, verification of RCS sampling techniques and following coolant radioactivity trends at each power plateau. The inspector examined several documents in order to determine how the test was conducted and if acceptance criteria were satisfied. The following documents were examined:

- i. Power Ascension Test Program, 3PA-344-01 Rev. 1
- ii. Special Chemistry Procedure S03-SPC-003 Rev. 0, Unit 3 Power Ascension Test Program, Chemistry Support

- iii. Memorandum, K. Johnson to R. Rosenblum, Subject: RCS Chemistry... Test...Unit 2, dated September 27, 1983
- iv. Graph Unit 3 RCS Activity vs. Power Level
- v. Calibration Chart, NMC SOA2162, S023-931-14-0 for 3RT-202, Linear Channel
- vi. Calibration Chart, NMC SOA2162, S023-931-14-0 for 3RT-202, Logarithmic Channel
- vii. Startup Report, Table 6.1.3.1, RCS Activity Levels

The inspector noted some disagreement between the process monitor readings and grab sample results at lower power levels however, excellent agreement was obtained at 100% power. The RCS activity expected based on data provided by CE was a factor of ten lower. Increased RCS activity is discussed in a subsequent paragraph.

Regarding acceptability of differences between process monitor and laboratory analytical results, the inspector discussed this matter with several licensee representatives. The process monitor is intended to be used as a trending device to provide prompt indication of fuel failure. Data reviewed by the inspector indicate the monitor functions adequately in this regard. The results of these tests are summarized in the Unit 3 startup report Table 6.1.3.1.

The inspector noted that while the operability record of the Unit 2 monitor has been poor, the Unit 3 monitor has a good operability history. This matter was discussed at the exit interview.

The inspector discussed coolant radiochemistry and verification of RCS sampling techniques with the Supervisor, Chemistry and the Unit 2/3 Chemistry Supervisor.

RCS sampling techniques were verified by comparing samples taken at local sample points and the chemistry lab remote sample station. In addition, tests were performed to determine minimum acceptable recirculation time for RCS samples. These tests were documented in the above referenced memorandum (iii) Johnson to Rosenblum, for Unit 2. This documentation has not yet been prepared for Unit 3.

The inspector examined lab sample results for RCS radioactivity analysis for the period preceding initial criticality to the present to establish that the licensee met the FSAR commitment and to verify the activity levels remained within Technical Specification limits. Based on review of data and discussion with the Supervisor, Chemistry, the inspector concluded that the licensee performed baseline data collection, followed reactor coolant activity levels and analyzed trends satisfying acceptance criteria of FSAR 14.2.12.92.4, A, B & C. In addition, the review did not indicate any reactor operation outside the bounds of Limiting Condition for Operation 3.4.7.

Based on this review, the following information was noted. The first determination of E-bar as provided for in T.S. 4.4.7 was 1.15 MeV corresponding to a gross activity limit of 87 microcuries per cc. Maximum gross activity of 23 microcuries per cc was reached March 26, 1984. RCS gross activity has trended downwards into the 14 to 18

microcurie per cc range through May 1st. RCS gross activity reached 11.4 microcurie per cc upon the initial full power plateau on December 16, 1983. Dose equivalent iodine exceeded 1 microcurie per cc for 20 hours in December 1983, 19.5 hours in January 1984 and 44 hours in March 1984. T.S. 3.4.7 provides for a cumulative limit of 800 hours in any consecutive 12 month period when dose equivalent iodine exceeds 1 microcurie per cc and a 48 hour time limit during one continuous interval for dose equivalent iodine to exceed 1 microcurie per cc. The inspector noted that while RCS activity is elevated from expected valves, limits of T.S. 3.4.7 items a, b & c have not been exceeded. The inspector examined a document, Memorandum to File, R. Waldo, Dated January 18, 1984 Subject: Kr-87 Activity in Songs Unit 3... which indicates that Kr-87 is a good indicator of fuel failure condition. The memo concludes based on power corrected Kr-87 RCS concentrations that fuel failure conditions have existed since October 1983 and may have been present since initial startup. The inspector was not able to independently verify this conclusion. Effects of higher Unit 3 RCS activity on effluent releases are discussed in paragraphs 4 and 5.

No violations or deviations were identified.

7. RCS Chemistry Tests The inspector examined records of RCS chemistry parameters required to be controlled by T.S. 3.4.6 and surveillance required by Table 4.4-3. Chemistry Procedure S0123-III 1.1.23 Rev. A, Unit 2/3 Chemistry Control of Primary Plant and Related Systems provides mode dependent sampling frequencies for the RCS. This procedure provides for surveillance of chemistry parameters.

Based on review of data, the inspector concluded that the licensee has trended data for the period preceding initial criticality and has demonstrated the ability to maintain chemistry parameters well below T.S. limits.

No violations or deviations were identified.

8. Effluent Monitor Startup Tests

FSAR section 14.2.12.32 describes the licensee's commitment to perform tests of the effluent monitoring systems. Regulatory Guide 1.68 provides criteria for comparing laboratory analysis of grab samples with effluent monitor readouts during the power ascension test program. With the exception of the Unit 3 Wide Range Gas Monitor, these devices are shared and would have been tested under the Unit 2 startup program. The inspector reviewed correspondence indicating that these tests were replaced by calibrations performed using NBS traceable isotopes and that tests of the actual effluent sample system were not intended under the FSAR commitment. The FSAR was subsequently changed to reflect this. The inspector noted that while the intent of FSAR 14.2.12.32 may have been to use laboratory analyzed calibration gas, the intent of R.G. 1.68 is to require an overall system test to verify collection, sample lines and instrument capabilities. The inspector noted that the licensee has performed studies of sample line plate out, however final results were not available at the time of the inspection. The inspector discussed the

subject of effluent monitor testing with licensee representatives and at the exit interview.

Regarding these tests, the licensee has developed procedure S013-III-5.17.23 Units 2/3 Radiation Monitor Response Release Sample Activity Comparison Surveillance to perform this test quarterly for the liquid and gaseous effluent pathways. The first comparison test was reviewed for gaseous releases in previous inspection report 50-361/84-10/50-362/84-10.

The licensee indicated that comparison tests had been performed for the liquid effluent monitor however, these were not available at the time of the inspection. Comparison tests of laboratory analysis and effluent monitor readings and final results of plate out studies will be examined in a subsequent inspection (open, 50-361/84-12-01, 50-362/84-12-02).

No violations or deviations were identified.

9. Exit Interview

The inspector met with licensee representatives (denoted in paragraph one) at the conclusions of the inspection on May 18, 1984. The inspector summarized the scope and findings of the inspection.

Regarding verification of fuel transfer tube shields, the licensee indicated that tests would be performed.

Regarding the liquid radwaste system releases, the inspector indicated he would perform in office review of plant effluent release data and identify concerns in the inspection report(see paragraph 4). This subject resulted in an open item to examine effluent release data and radioactive liquid processing systems after plant conditions have stabilized.

Regarding operability of the Unit 2 process radiation monitor, the inspector noted that due to apparent difficulty in isolating the cause of the electronic problem, this item would remain open.

Regarding comparison of effluent monitor reading to laboratory analysis, the inspector indicated that this matter would be reviewed at a future date after sufficient operational data had accumulated (open item).