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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: **Docket Nos. 50-361 and 50-362**
Compliance with Regulatory Guide 1.97, Revision 2,
"Instrumentation For Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident"
San Onofre Nuclear Generating Station
Units 2 and 3

References:

1) May 13, 1982, Letter from K. P. Baskin (SCE) to F. Miraglia (NRC), Subject: "Docket Nos. 50-361 and 50-362, San Onofre Nuclear Generating Station Units 2 and 3"

2) July 26, 1984, Letter from M. O. Medford (SCE) to G. W. Knighton (NRC), Subject: "Docket Nos. 50-361 and 50-362, San Onofre Nuclear Generating Station Units 2 and 3"

3) May 26, 1987, Letter from Harry Rood (NRC) to K. P. Baskin (SCE), Subject: "Safety Evaluation for Conformance to Regulatory Guide 1.97"

4) July 29, 1988, Letter R. J. Pate (NRC) to K. P. Baskin (SCE), Subject: NRC Inspection of San Onofre Units 2 and 3. Inspection Report Nos 50-361/88-18 and 50-362/88-19

In response to a request by the NRC Project Manager for San Onofre Units 2 and 3, this letter documents Southern California Edison's (SCE's) compliance with Regulatory Guide (RG) 1.97, Rev. 2 for San Onofre Units 2 and 3. SCE recently completed a thorough review of San Onofre Units 2 and 3 RG 1.97, Rev. 2 compliance which confirmed the completion of open items and identified seven items for clarification. The instrumentation installed at San Onofre Units 2 and 3 satisfies the intent of RG 1.97, Rev. 2 recommendations.

BACKGROUND

SCE committed to RG 1.97, Rev. 2 in reference 1 with specific exceptions. Additional detailed descriptions and scheduling information were later provided in reference 2 for each plant variable listed in RG 1.97, Rev. 2, Table 2, "PWR Variables." Based on a review of references 1 and 2 by EG&G

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Idaho, Inc., the NRC concluded (reference 3) that the instrumentation listed in references 1 and 2 was acceptable for meeting the recommendations of RG 1.97, Rev. 2 with two open items. The open items were 1) installation of several instruments during the first refueling outage for each unit and 2) acceptance of Reactor Coolant System (RCS) and Steam Generator (SG) pressure instrumentation which was contingent on resolution of Anticipated Transients Without Scram (ATWS) issues.

In May 1990, SCE initiated a comprehensive review of RG 1.97, Rev. 2 recommendations and compliance based on the SCE commitment made in Additional Information Item No. 4 in Licensee Event Report No. 89-012, Rev. 1 for San Onofre Unit 2. This review identified all RG 1.97 instrumentation in one controlled document. The environmental qualification, seismic classification, quality class, and operational controls and characteristics associated with each existing instrument were evaluated against RG 1.97, Rev. 2 recommendations and SCE commitments.

COMPLETED ITEMS

Instrument Installation

In reference 2 the following instruments were identified as not yet installed:

1. Neutron Flux Excore Detectors
2. Core Exit Temperature Unit 2 (Unit 3 installed)
3. Reactor Vessel Level Monitoring System Unit 2 (Unit 3 installed)
4. Degrees of Subcooling Unit 2 (Unit 3 installed)
5. Quench Tank Pressure
6. Containment Radiation Monitor RE-7828

In accordance with the commitment in reference 2, the remaining instrumentation was installed for each of these plant variables during the first refueling outage for each unit.

Anticipated Transients Without Scram (ATWS) Analysis

San Onofre instrumentation for RCS pressure and SG pressure was accepted by the NRC in references 3 and 4. However, this approval was contingent upon the final resolution of ATWS issues. The Diverse Scram System (DSS) and Diverse Emergency Feedwater Actuation System (DEFAS) were subsequently installed to comply with the ATWS rule. DSS performance analysis concluded that, following an ATWS with DSS operation, the peak RCS and SG pressures in the Updated Final Safety Analysis Report (UFSAR) remain limiting. Therefore, the existing RCS and SG pressure instrumentation ranges also remain acceptable with the installation of the DSS and DEFAS.

RG 1.97 COMPLIANCE CLARIFICATIONS

As a result of our recent review of compliance with RG 1.97, the following clarifications are necessary for seven instrumentation items. No further action is required.

Letdown Process Monitor

RG 1.97, Rev. 2 recommends instrumentation to determine radioactivity concentration or radiation level in the circulating primary coolant. An exception to this recommendation was requested in reference 2 and accepted by the NRC in reference 3. This exception was based on three existing alternative instruments which satisfy the intent of RG 1.97: the letdown process monitor, containment area monitors, and the post accident sampling system. However, the letdown process monitor has been inoperable since March 22, 1989 due to instrument noise and detector fouling problems. This is acceptable because the letdown process monitor is isolated from the RCS following most analyzed accident scenarios and is not used with post accident procedures. Therefore, the letdown process monitor is not required to satisfy RG 1.97, Rev. 2 post accident monitoring recommendations. Following any reactor trip, emergency operating procedures require RCS sampling and analysis of dose equivalent Iodine-131 for indication of fuel integrity. Post accident fuel cladding breach detection and quantification is obtained using Emergency Plan Implementing Procedures and Chemistry procedures for core damage assessment. The extent of post accident core damage is determined using the following input data sources:

- Isotopic analysis of the RCS, containment atmosphere, or containment sump using the post accident sampling system;
- High range containment area radiation monitors;
- Hydrogen gas levels in containment atmosphere;
- Core exit thermocouples.

The extent of fuel cladding failure can be detected through planned sampling. This sampling is available for timely post accident detection of fuel cladding breach without reliance on the letdown process monitor.

Therefore, SCE considers the letdown process monitor to be unnecessary to comply with RG 1.97, Rev. 2.

Area Radiation Monitor Energy Response

RG 1.97, Rev. 2 recommends the installation of Type C and Type E containment area radiation monitors. Type C area radiation monitors are located in areas with containment penetrations to indicate containment breach. Type E area radiation monitors are recommended where access may be required to service equipment important to safety for radiation detection, assessment, and long-term surveillance. RG 1.97, Rev. 2 recommends that Type C and Type E monitors should be capable of responding to "gamma radiation photons within any energy

range from 60 keV to 3 MeV, with an energy response accuracy of ± 20% at any specific photon energy from 0.1 MeV to 3 MeV."

Based on industry experience in meeting the requirements of RG 1.97, Rev. 2, the NRC issued Revision 3 of RG 1.97 in May 1983. Revision 3 did not include the photon energy response accuracy requirement.

The purchase specification for the area radiation monitors identified the energy response accuracy as "± 1.6% equivalent linear full scale from 100 keV to 2.5 MeV." This is equivalent to an accuracy of ± 20% within the 100 keV - 2.5 MeV range. The high range containment area radiation monitors are sensitive from 60 keV to 3 MeV with an unspecified accuracy above 2.5 MeV and below 100 KeV.

In addition, following an accident there are other indications used for area access control. The Emergency Plan describes the provisions in place for and requires Health Physics (HP) Technicians to accompany Emergency Response personnel performing activities in the protected area following an accident. The HP Technicians are equipped with portable radiation detectors and are in radio contact with the Operations Support Center HP coordinator. A change in radiological conditions is then quickly communicated to the Operations Support Center.

Therefore, SCE considers these features to satisfy the intent of RG 1.97, Rev. 2.

Containment Pressure Instrumentation Range

RG 1.97, Rev. 2 recommends containment pressure instrumentation with a range from 10 psia to three times the design pressure. The San Onofre Units 2 and 3 UFSAR Table 6.3.2 lists the containment design pressure as 60 psig which results in the recommended range for containment pressure instrumentation as -4.7 psig to 180 psig. In the UFSAR, Table 6.2-2, the minimum internal pressure for an inadvertent containment spray actuation is -2.8 psig.

The existing containment pressure instrument range is -4 to 200 psig. This instrumentation range was listed and accepted in the NRC inspection report, reference 4. However, this minor discrepancy with RG 1.97, Rev. 2 was not specifically identified. The existing instrumentation range provides containment pressure indication for all analyzed events and, therefore, satisfies the intent of RG 1.97, Rev. 2.

Therefore, SCE considers the containment pressure instrumentation range of -4 to 200 psig to satisfy the intent of RG 1.97, Rev. 2.

Volume Control Tank (VCT) Level Instrumentation Range

The existing VCT level instrumentation is calibrated for 0-100% from tap to tap, spanning 124". The high alarm setpoint is at 80%, and the low alarm

setpoint is at 35%. This arrangement excludes the tank volume above and below the instrument taps, which are 21.5" (13% of the VCT length) from the top and bottom of the VCT. RG 1.97, Rev. 2 recommends VCT level indication from the bottom to the top of the tank. This deviation from RG 1.97, Rev. 2 was not specifically identified. The existing instrumentation provides the necessary VCT level indication for all analyzed events. This arrangement is conservative because any operator actions required with VCT high or low level indication will take place with additional volume remaining.

Therefore, SCE considers the calibration of VCT level instrumentation from 13% to 87% of the VCT length to satisfy the intent of RG 1.97, Rev. 2.

Reactor Vessel Level Monitoring System (RVLMS)

In reference 2, Table 1, item 13, the RVLMS was credited with an instrument range of 0 - 100% from the top of the fuel alignment plate (approximately 32" above the active fuel) to the top of the head area. RG 1.97, Rev. 2, Table 2, recommends an instrument range for coolant level in the reactor from the bottom of the core to the top of the reactor vessel. No exception was requested by SCE for this instrument range.

The RVLMSs at Units 2 and 3 use a Heated Junction Thermocouple (HJTC) system designed by Combustion Engineering. There are 3 HJTC sensors in the head region providing indication of 0%, 20%, 48%, and 100% levels in the head region. There are also 5 HJTC sensors in the plenum region providing indication of 0%, 21%, 41%, 61%, 82%, and 100% levels in the plenum region.

The RVLMS was thoroughly discussed with the NRC Staff from 1981 through 1984, and SCE responded to all NRC questions in various letters. The Combustion Engineering HJTC design was approved by the NRC in NUREG/CR-2627, and the Unit 3 installation of the RVLMS was accepted by the NRC during a site visit documented in reference 4. Finally, RG 1.97, Rev. 3, Table 3, recommends an instrument range for coolant level in the reactor from the bottom of the hot leg to the top of the vessel.

Therefore, SCE considers the RVLMS instrument range from the top of the fuel alignment plate to the top of the head area to satisfy the intent of RG 1.97, Rev. 2.

Post Accident Sampling System (PASS) area radiation monitor

The Tag Number for the PASS area radiation monitor (Radwaste Building - 24 Elevation) is incorrectly listed as 2/3RE-7884 in reference 2, Table II. The correct Tag Number for the PASS area radiation monitor is 2/3RE-7883.

Containment Sump Level

RG 1.97, Rev. 2 recommends wide-range Containment Sump Water Level indication from the bottom of containment to a 600,000 gallon level equivalent. In

references 2 and 4 the containment sump water level was incorrectly listed with a range of 11' 11" to 30' 2". The correct instrument range is 11' 1" to 30' 2", which corresponds to 600,000 gallons.

SUMMARY

This letter documents SCE's compliance with RG 1.97, Rev. 2. Previously identified open items related to instrumentation installation and ATWS analysis have been closed. In addition, this letter provides clarification of RG 1.97, Rev. 2 compliance for seven instrumentation items. In conclusion, the installed instrumentation at San Onofre Units 2 and 3 satisfies the intent of RG 1.97, Rev. 2 recommendations.

If you have any questions concerning the above information, please contact me.

Very truly yours,

Harold C. Marsh

cc: B. H. Faulkenberry, Regional Administrator, NRC Region V
NRC Senior Resident Inspectors' Office, San Onofre Units 1, 2 & 3
M. B. Fields, NRC Project Manager, San Onofre Units 2 and 3