Southern California Edison Company

P. O. BOX 800
2244 WALNUT GROVE AVENUE
ROSEMEAD, CALIFORNIA 91770

M.O. MEDFORD
MANAGER, NUCLEAR LICENSING

TELEPHONE
(213) 572-1749

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Director, Office of Nuclear Reactor Regulation
Attention: D. M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket No. 50-206
Systematic Evaluation Program Integrated Assessment
San Onofre Nuclear Generating Station
Unit 1

References:
A. Letter, M. O. Medford, SCE, to D. M. Crutchfield, NRC, dated January 19, 1984

B. Letter, M. O. Medford, SCE, to D. M. Crutchfield, NRC, dated February 24, 1984

C. Letter, M. O. Medford, SCE, to D. M. Crutchfield, NRC, dated March 30, 1984

The referenced letters provided information concerning selected Systematic Evaluation Program topic assessments to be considered during the Integrated Assessment. In each of the letters it was indicated that additional information would be provided at a later date. The enclosure to this letter provides additional information on the following topics:

Topic No.	Title
II-3.A	Hydrological Description
II-3.B	Flooding Potential and Protection
II-3.B.1	Capability of Operating Plants to Cope with Design Basis Flood Conditions
VI-7.B	ESF Switchover from Injection to Recirculation
VI-7.C.2	Failure Mode ECCS
IX-3	Station Service and Cooling Water Systems
XV-1	Increase in Feedwater Flow

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Reference B indicated that a report documenting the results of our analysis on Topic IV-2, Reactivity Control Systems, would be provided to you by April 20, 1984. It was initially expected that the original calculations could be reviewed to demonstrate continued applicability. However, further review has determined that a more detailed analysis will be required to consider the effects of the single failures identified in the topic assessment. This analysis will be complete and the results submitted by August 15, 1984. Reference C indicated that details of the program developed to satisfy the requirements of Topic III-3.C, Inservice Inspection of Water Control Structures, would be provided at this time. Due to the manpower requirements of the seismic reevaluation work for the return-to-service program, final review of this topic has been delayed. The program is now expected to be submitted by May 14, 1984.

If you have any questions or require additional information, please let me know.

Very truly yours

M. D. Medford

Enclosure

Topic No.	Title
II-3.A	Hydrologic Description
II-3.B	Flooding Potential and Protection Requirements

In our February 24, 1984 submittal on Topic II-3.A and our January 19, 1984 submittal on Topic II-3.B, it was indicated that additional information regarding groundwater would be provided. That information is provided as Enclosure 2, "Summary of SONGS Unit 1 Groundwater Data." The results of the groundwater evaluation indicate that the median value for groundwater at the Unit 1 containment is estimated to be 5.6 ft. Mean Lower Low Water (MLLW). This value is based on approximately 23 years of data at an inland well and groundwater measurements taken at the site during 1963 and 1974. The highest groundwater level to occur at the site is estimated to be approximately 7.0 feet MLLW. As indicated in Regulatory Guide 1.135, Normal Water Level and Discharge at Nuclear Power Plants, the value to be used for normal groundwater is that value which has a probability of occurance of 0.5. Therefore, that value for groundwater would be the median value of 5.6 feet MLLW.

The NRC SER on this topic indicates that the Units 2 and 3 FSAR value should be reviewed for applicability to Unit 1. The San Onofre Units 2 and 3 FSAR indicates a design value for groundwater of 5.0 feet MLLW. The FSAR value, which continues to also be used at San Onofre Unit 1,and the recently estimated value are in close agreement and are considered to impose equivalent structural loads. It is expected that additional data would provide additional small variations in the median groundwater value which would also not affect design.

Topic No.	Title
II-3.B.1	Capability of Operating Plants to Cope with Design Basis Flooding Conditions

In our March 30, 1984 letter, we indicated that an analysis would be performed to determine the effect of not closing the tsunami gates during a design basis tsunami. The analysis has been completed and the results are provided here.

The San Onofre Units 2 and 3 FSAR indicates the design basis tsunami is 15.6 feet MLLW at the seawall. This includes a tsunami runup of 7.6 feet, a 7 foot extreme high tide and a 1 foot storm surge. This information is based on the study performed by Dr. Basil W. Wilson, "Estimate of Tsunami Effect at San Onofre Nuclear Generating Station, Units 2 and 3," dated December 1972. Utilizing the data in the report, the tsunami runup at the entrance to the intake and discharge structure was determined. The critical runup was at the discharge structure located 2,600 feet offshore. The combined tsunami runup and 8 foot high tide and storm surge was determined to be 12.4 feet MLLW. In addition, storm waves were superimposed upon the tsunami wave. These waves result in a pressure transient within the circulating water lines which result in a maximum head rise of 0.2'. The maximum water level in the intake structure due to a tsunami will be 12.6' MLLW.

The pathways available for flow from the intake structure and their corresponding exit elevations are as follows:

1. Yard Sump Inlet - 12'9" MLLW
2. North Ditch Overflow Inlet - 12.0 MLLW
3. Oil Water Separator Pump Outlet - 16' MLLW
4. Fouling Organism Test Facility Lines - 16' MLLW
5. Gate Chamber Gate Wells - 14'9" and 15' MLLW
6. Intake Structure Open Wells - 17' MLLW

The only exit from the intake structure which is exceeded by the tsunami induced water level is the North Ditch Overflow Inlet. The north ditch is part of the PMF drainage and is isolated from the plant area. Water flowing into the north ditch from the intake structure will not affect the plant.

The design basis tsunami will not affect any safety-related structures or equipment in the event the tsunami gates are open. We are proceeding to revise procedures which require closing the tsunami gates during a tsunami to provide a positive barrier against tsunami gate closure.

Topic No.	Title
VI-7.B	ESF Switchover from Injection to Recirculation

In our February 24, 1984 letter, we indicated that we would evaluate the need to provide additional RWST level indication in the control room. The RWST presently has a pneumatically operated level indicator and a low level alarm which are located in the control room. An additional level instrument, installed as part of TMI requirements, provides an input to the Technical Support Center computer adjacent to the control room. Also as part of TMI requirements, qualified, redundant containment sump level instrumentation has been installed which provides indication in the control room. The RWST level instrument and alarm in conjunction with the sump level instruments are available for the operators use to terminate safety injection and initiate recirculation.

In the event the RWST level indication fails during a LOCA, the containment sump level would give the operator indication that the sump was being filled. In addition, the RWST low level alarm will annunciate and the operator would terminate safety injection at that time. Following that, the operator would be able to monitor the containment sump level in order to initiate recirculation based on the water level in the sump. In the event the RWST level alarm failed, the existing RWST level and sump level would be available to indicate to the operator that he should terminate safety injection and initiate recirculation. In either case, the operator would also have available in the TSC the indication for the new RWST level instrument. Use of this instrumentation would require communication with individuals in the TSC located adjacent to the control room.

Based on this information, it does not appear necessary to provide additional RWST level indication in the control room. This resolves the remaining issue on this topic.

Topic No.	Title
VI-7.C.2	Failure Modes Analysis ECCS

In our February 24, 1984 letter, it was indicated that a schedule for completion of the issues related to this topic would be provided. The issues as previously outlined are as follows:

1. Relocate Air Horn above elevation 4' and provide a drip-proof cover.

2. Provide the following items with a power interrupt device actuated upon SIS operation or replace with qualified units:

Pumps	G20A and B, G56, Emergency Thermal Barrier Pump
Valves	CV276, CV287, CV288, CV412, CV413, CV102, CV104, CV106, CV542, CV956, MOV822 A and B, HCV602
Misc. Items	SV36 and SV73 for Pumps G21A and B, SV37 and SV38 for Pumps G45A and B, SV71 from Pump G39, PC600, TIC 604A and B

3. Reroute power cables for the following items to provide cable separation:

   Pumps G8A and B, G50A and B, G27A and B, G15A, B and C
   Valves MOV 720A and B

4. Reroute control cables for the following items to provide cable separation:

   Pumps G15A, B and C, G3A and B, G45A and B, G50A and B, G27A and B, G8A and B, G13A and B.
   Valves MOV/LCV1100B and D, MOV 720A and B, POV 5/SV24 and 6/SV25, and SV 81 and 82

5. Relocate the following items to provide adequate separation or provide the required barriers:

   Arrange Vital buses 1, 2, 3, 4 and Utility bus and associated transfer switches to provide physical separation between the units. Also provide for the physical separation of the input and output cables to those buses.

6. Provide missile barriers between the following pumps or confirm that the probability of missile impact or the energy of such a missile is sufficiently low:

   G50A and B, G15A, B and C, G8A and B

7. Provide missile barriers between the RWST and the following pumps or confirm that the probability of missile impact or the energy of such a missile is sufficiently low:

   G50A and B, G24A and B

8. Bypass thermal overload cutout switches for valves MOV 720A and B during SIS condition.

9. Provide isolation relays for PIC 1111X and PC605X controllers, and LS 54 switch contacts.

10. Provide separation and isolation for the pressurizer level and pressure instrumentation in the control room console.

11. Provide separation and isolation for the bistable output relays associated with the SIAS.

12. Rewire station lighting system to eliminate presence of both power trains in a transfer switch. Also separate emergency lighting to provide a connection to each of the dc busses while maintaining circuit independence.

13. Remove DC1 power from breaker 12C02 on 4160 volt bus 2C and all breakers on 4160 volt bus 1B. Isolate the cabling between breaker positions 11C11 on 4160 volt bus 1C and 12C11 on 4160 volt bus 2C.

14. Align 480 volt SWGR3 to the power associated with 4160 volt bus 2C and remove the DC 1 power from the switchgear. Isolate the cabling between breakers 1103 on 480 volt SWGR 1 and 1203 on 480 volt SWGR 2.

15. Obtain environmental qualification data or replace the following components with qualified units:

    LC951, PIC1111A, FCV 1115D, E and F, PC 605X
    SV81, SV82, LT1100, POV5, POV6

16. Modify breaker circuitry for circulating Air Fans A-10, A-11 and A-12 to ensure they are locked out by the sequencer in the event of an SIS, or modify ducting to eliminate possibility of sucking water into fan units.

It was indicated in the February 24, 1984 submittal that certain recommendations have been or would be resolved as part of other SEP Topics and NRC issues. A preliminary list was provided in the submittal. Based on our continuing review of the above recommendations other means for resolution may be available. SCE's position is that these issues require further evaluation to determine whether modifications are warranted. The schedule for completing this effort will be established after the Integrated Plant Safety Assessment Report for San Onofre Unit 1 is published.

Topic No.	Title
IX-3	Station Service and Cooling Water Systems

In our March 30, 1984 response to this topic, it was indicated that the open items on this topic were closed pending resolution of Topic II-3.B.1. As part of that topic we were assessing the effect of flooding due to a design basis tsunami with the tsunami gates open. The results of that analysis are provided in this submittal under Topic II-3.B.1. It indicates there will be no flooding of the plant during a tsunami with the tsunami gates open. Based on that determination, we are proceeding to revise procedures which require the tsunami gates to be closed during a tsunami. A positive barrier (e.g. locked open or removed) will be provided to maintain the gates in an open position. It is concluded that this topic is closed.

Topic No.	Title
XV-1	Increase in Feedwater Flow, Decrease in Feedwater Temperature, Increase in Steam Flow and Inadvertent Opening of a Steam Generator Relief or Safety Valve.

The analysis of the "Increase in Feedwater Flow" event has been completed. The results indicate that 10 minutes of operator action time cannot be demonstrated to be available to prevent violation of design limits. Potential corrective measures will, therefore, be identified as part of SEP Integrated Assessment. A proposed means of complying with the design requirements will be developed and provided to the NRC by January 15, 1985. The implementation schedule will then be developed in accordance with the process and procedures of the Intregrated Living Schedule.

Summary of SONGS Unit 1 Groundwater Data

USNRC Reg. Guide (1.135) recommends that when considering the impact of design basis events such as earthquakes, tornados, plane crashes, transportation accidents, etc., the designer must include in his calculations the loads caused by the groundwater level as well as the load on the structure or system caused by the design basis event. The Guide further states "Since the design basis events have a very low probability of occurrence, the water-level used in combination with the design basis event need not represent a condition with low probability of occurrence." The Guide recommends the use of the "normal water level" as that water level which is properly combined with design basis events and defines this level as that which has a probability of approximately 0.5 of occurrence at the time of interest.

Section 8 of Reg. Guide 1.135 states that the normal ground-water level should be the median level over a period of at least 20-years, and may be determined by correlation of a few years of site data to long-term records of nearby wells. In order to correlate site ground-water levels to an acceptably long period of record, additional records were obtained for the closest Camp Pendleton Well (No. 9S/7W-24H1, Hereafter referred to as H1). Well H1 is located approximately 2,000 ft. north of the Unit 1 Containment and is shown on Figure 1.

Records of 118 individual measurements or soundings of the water level in Well H1, taken between 1951 (when the well was drilled) and 1981, were obtained from U. S. Geological Survey and Camp Pendleton files. These data are presented graphically on Figure 2. It is apparent from Figure 2 that the water level in Well H1 was artificially depressed due to dewatering activities at Unit 1 from August 1964 through October 1965, and at Units 2&3 from June 1974 through 1981. Soundings which showed artificially depressed levels due to dewatering were not considered valid for estimating normal goundwater conditions and were therefore not used in this analysis.

Approximately 23 years of valid water-level data are available at Well H1 (dewatering years excluded) for establishing a long-term correlation. These data consist of 96 individual soundings reported to the nearest .01 ft. Table 1 presents pertinent statistics derived from these valid Well H1 data. Further inspection of the data shows that soundings are unevenly distributed over low and high water years, with the majority of soundings occurring in lower-water years. In order to compensate for this bias when calculating the long-term median water level for Well H1, the data were weighted. This was done by determining the average water level for each year and then taking the median of the yearly averages as the estimate of the long-term median water level. This method provides the best estimate of that water level at Well H1 which is exceeded 0.5 of time, or, the normal water level. As shown in Table 1, this water level is 9.56 ft. (MLLW).

TABLE 1

Summary of Statistics
Camp Pendleton Well No. 9S/7W-24H1
Valid Water-Level Data

No. of Soundings	96
Period of Record:	August 9, 1951 through July 1964 and November 1965 to February 5, 1974
Highest Measured Water Elevation:	10.76 ft. (MLLW) on May 22, 1970
Lowest Measured Water Elevation:	8.54 ft. (MLLW) on June 1, 1964
Measured Range of Water Elevation:	2.22 ft.
Weighted Median Water Elevation:	9.56 ft. (MLLW)
Standard Deviation of Data:	0.51 ft.

Between 1951 and 1974, the measured natural range of fluctuation in Well H1 was 2.22 ft. which indicates the relative stability of the water table in the portion of the groundwater basin near the Unit 1 site.

Between 1963 and 1974 the water table at the SONGS Unit 1 site was monitored during five separate periods of time. Table 2 shows these periods of on-site monitoring as well as the number of observation wells involved, and the total soundings taken.

TABLE 2

Periods of Water-Table Monitoring
SONGS Unit 1
1963 - 1974

Duration of Monitoring	Number of Observation Wells	Total Number of Soundings
5/20/63 - 8/29/63	8	109
4/11/67 - 6/26/67	5	13
3/17/70	4	4
12/23/70	4	4
4/22/74 - 4/29/74	7	500+

Of the five periods of site water-table monitoring, only the 1963 and the inital 1974 soundings were unaffected by site dewatering or test pumping activities and are, therefore, the only soundings available which are appropriate for establishing a correlation with the long-term H1 data. These two site water-level data sets, referred to as the 1963 and 1974 data sets, will be described briefly.

The 1963 data, obtained during the initial site investigation, consist of 109 individual soundings taken in 8, small-diameter observation wells located around the SONGS 1 site (Figure 1) as well as a continuous, 22-day recording in one of the seaward observation wells (TH13). Soundings were taken between May 20 and August 29, 1963 and indicate an average elevation at the center of the Unit 1 Containment of 5.1 ft. (MLLW) for this 3 month period.

The 1974 soundings were taken prior to and during the April 1974 dewatering system design pumping test for the construction of Units 2&3. The observation wells used in 1974 were located immediately south of the Unit 1 Turbine area (Figure 1). Graphs of the water elevations in the 5 shallow observation wells measured prior to the pumping phase of the test were used to correlate to the H1 Well data. The 1974 data indicate that the average water-table elevation at the center of the Unit 1 Containment at the time just prior to the April 1974 pumping test was 5.7 ft. (MLLW).

The 1963 and 1974 Unit 1 Containment water-table elevations were compared to the Well H1 water-level elevations and a correlation established assuming that at any given time, the site levels would be above or below the site median level by the same amount as the Well H1 levels were above or below the H1 median level. This is reasonable given: 1) the proximity of Well H1 to the site, 2) the flat water-table gradient which occurs in the vicinity, and 3) the fact that Well H1 is interposed between the site and the source of recharge, i.e., upgradient from the site.

Table 3 illustrates the method of correlation used and the computed median water-table elevation for the center of the Unit 1 Containment based on the 23 years of available data at Well H1.

TABLE 3

Correlation of Camp Pendleton Well 9S/7W-24H1
Water Levels to the Unit 1 Containment

Location	Median Water Table Elev. (Ft. MLLW)	Water Table Elev. May-Aug. 1963 (Ft. MLLW)	1963 Water-Level Deviation From Median	Water Table Elev. 1974 (Ft. MLLW)	1974 Water-Level Deviation From Median
Well 9S/7W-24H1	9.6	9.2	0.4 ft. Below	9.6	Same as Median
Unit 1 Containment	-	5.1	-	5.7	-

Based on 1963 data, estimated median at Unit 1 Containment =
5.1 + 0.4 = 5.5 ft. (MLLW)

Based on 1974 data, estimated median at Unit 1 Containment =
5.7 + 0.0 = 5.7 ft. (MLLW)

Average of 5.5 and 5.7 estimates = (5.6 ft. MLLW)

Separate estimates of median water-table elevation for the center of the Unit 1 Containment were made using the 1963 and 1974 site data sets. As indicated in Table 3, these values were in reasonable agreement (1963 = 5.5 ft and 1974 = 5.7 ft.). The average of these two estimates, Elevation 5.6 ft (MLLW), provides the best indicator of the median water-table elevation at the center of the Unit 1 Containment based on the data available.

A correlation to the long-term record at Well H1 was also used to estimate the high water-level experienced at the site during the subject period. The highest water-level measured during the 23-year period of record at the Well H1 was 10.76 ft. (MLLW) on May 22, 1970 or 1.2 ft. above the median water-level at that location. Based on correlation to the measured high level at the H1 Well, a corresponding water-table elevation at the Unit 1 Containment of 6.8 ft. is indicated.

The only year during the subject period (1951-1974) in which no measurement was made of the level in Well H1 was 1969. This was a year of higher than normal precipitation and was the wettest year during the 23-year period of record. It is likely, therefore, that during 1969, water levels may have exceeded the highest measured level (1970) somewhat. Based on the limited range of seasonal fluctuation experienced over the 23 years of record at the H1 Well (measured range = 2.22 ft.), the amount of exceedence is probably on the order of several tenths of a foot. This correlates to a maximum water-table elevation of about 7 ft. at the Unit 1 Containment for the 23-year period of record.

Conclusions

The above correlations between Well H1 and the wells at the site are based on an extensive record at H1 for some 23-years and two representative data sets at the site. This correlation indicates a median value of 5.6 ft (MLLW) at the Unit 1 Containment. Further, a similar correlation from Well H1 indicates a maximum water-table elevation at the Unit 1 Containment of about 7 feet for the period of record.