Southern California Edison Company
P. O. BOX 128
SAN CLEMENTE, CALIFORNIA 92672

HAROLD B. RAY
VICE PRESIDENT & SITE MANAGER
SAN ONOFRE

TELEPHONE
714-361-8470

August 7, 1984

U.S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region V
1450 Maria Lane, Suite 210
Walnut Creek, California 94596-5368

Attention: Mr. J. B. Martin, Regional Administrator

Dear Sir:

Subject: Docket Nos. 50-361 and 50-362
NRC Inspection Reports 50-361/84-08 and 50-362/84-07 (IE-V-616)
Emergency Response Facility Appraisal
San Onofre Nuclear Generating Station, Units 2 and 3

Mr. M. D. Schuster's letter of July 9, 1984, issued Appraisal Report 50-361/84-08 and 50-362/84-07 resulting from the March 26 through March 30, 1984, special appraisal of the Emergency Response Facilities at San Onofre Nuclear Generating Station Units 2 and 3. No deficiencies or violations of NRC requirements were identified.

As requested in Mr. M. D. Schuster's letter, all the documents related to our verification of the computer dose projection program were assembled in a single folder, available for examination. Enclosure A to this letter describes the content of the folder which contains the test sequence and parameters for the verification, the hand calculations performed, and the results obtained.

In addition, several recommendations were identified in the subject NRC appraisal. SCE has reviewed these recommendations and Enclosure B of this letter describes our response to these items.

If you require any additional information, please so advise.

Sincerely,

Harold B. Ray

Enclosures

cc: A. E. Chaffee (USNRC, Resident Inspector Units 1, 2 and 3)
J. P. Stewart (USNRC, Resident Inspector Units 2 and 3)

1/1 IE-28

ENCLOSURE A

EMERGENCY ASSESSMENT RESPONSE SYSTEM (EARS)

DOSE CALCULATION VERIFICATION PROJECT

The folder, which contains the results of the SCE verification of the EARS computer system, consists of 20 computer runs (Table I) which varied input parameters. Each of the following parameters were adjusted as indicated:

(1) Verification of Release Rate Effects

Released rates of 1, 2 and 10 Ci/sec of gross noble gas in Runs #1, 2 and 3 for the whole body dose rate.

(2) Verification of Windspeed Effects

Wind speeds of 2, 5 and 10 mps in Runs #1, 4 and 5 for the whole body dose rate.

(3) Verification of Stability Class Effects

Stability classes of A, C and F in Runs #1, 6 and 7 for the whole body dose rate.

(4) Verification of Isotope Mix Effects

1 Ci/sec of gross noble gas and iodine will be input to the computer as indicated in Runs #1, 8, 10 and 11 for the whole body and thyroid dose rate.

(5) Verification of Isotope Specific Effects

1 Ci/sec of Cs-137, Xe-133 and I-131 in Runs #9, 10 and 11 for the whole body and thyroid dose rate.

(6) Verification of Dose Type Calculations

1 Ci/sec of Cs-137 in Runs #9 and 12 for the whole body and lung dose rate.

(7) Verification of Initial Effective Age Effects

1 Ci/sec of gross noble gas with effective ages of 0, 2 and 8 hours in Runs #1, 13 and 14 for whole body and thyroid dose rate.

(8) Verification of Plume Duration Effects

1 Ci/sec of gross noble gas with update durations o 15, 60 and 480 min in Runs #1, 15 and 16 for whole body and thyroid dose rate.

(9) Verification of Downwind Distance Calculations

1 Ci/sec of gross noble gas with a plume duration of 480 min in Run #16 for the whole body dose rate.

(10) Verification of Wet Deposition

1 Ci/sec of gross iodine with precipitation of 0, 0.1 and 0.5 mm during the update period in Runs #8, 17 and 18 for the thyroid dose rate.

(11) Verification of Dry Deposition

1 Ci/sec of Cs-137 and I-131 in Runs #9 and 11 for the whole body and thyroid dose rate.

(12) Verification of Mixing Height Calculation

1 Ci/sec of gross noble gas with mixing layers of 1627, 101 and 1000 m in Runs #1, 19 and 20 for the whole body dose rate.

TABLE I

Run #	Quantity Released Ci/sec	Wind Speed u(m/sec)	Mixing Height (meters) / Stability Class	Isotope	Type of Dose	Initial Eff. Age	Plume Duration (Min)	Distance Downwind	Wet Dep	Wind Direction	Verification Completed
1	1	2	1627 / A	Gross Noble Gas	Whole Body	0	15	EAB	0	45°	5-1-84
2	2	2	1627 / A	Gross Noble Gas	Whole Body	0	15	EAB	0	45°	5-7-84
3	10	2	1627 / A	Gross Noble Gas	Whole Body	0	15	EAB	0	45°	5-7-84
4	1	5	1627 / A	Gross Noble Gas	Whole Body	0	15	EAB	0	45°	5-8-84
5	1	10	1627 / A	Gross Noble Gas	Whole Body	0	15	EAB	0	45°	5-10-84
6	1	2	1627 / C	Gross Noble Gas	Whole Body	0	15	EAB	0	45°	5-21-84
7	1	2	1627 / F	Gross Noble Gas	Whole Body	0	15	EAB	0	45°	6-8-84
8	1	2	1627 / A	Gross Iodine	Thyroid	0	15	EAB	0	45°	6-12-84
9	1	2	1627 / A	Cs-137	Whole Body	0	15	EAB	0	45°	6-28-84
10	1	2	1627 / A	Xe-133	Whole Body	0	15	EAB	0	45°	6-18-84
11	1	2	1627 / A	I-131	Thyroid	0	15	EAB	0	45°	6-25-84
12	1	2	1627 / A	Cs-137	Lung	0	15	EAB	0	45°	6-28-84
13	1	2	1627 / A	Gross Noble Gas	Whole Body	2	15	EAB	0	45°	5-10-84
14	1	2	1627 / A	Gross Noble Gas	Whole Body	8	15	EAB	0	45°	5-10-84
15	1	2	1627 / A	Gross Noble Gas	Whole Body	0	60	EAB	0	45°	5-10-84
16	1	2	1627 / A	Gross Noble Gas	Whole Body	0	480	EAB	0	45°	5-14-84
	1	2	1627 / A					1 mile	0	45°	5-1-84
.	1	2	1627 / A					5 mile	0	45°	6-15-84
17	1	2	1627 / A	Gross Iodine	Thyroid	0	15	EAB	0.1	45°	6-13-84
18	1	2	1627 / A	Gross Iodine	Thyroid	0	15	EAB	0.5	45°	6-14-84
19	1	2	101 / A	Gross Noble Gas	Whole Body	0	480		0	45°	6-18-84
20	1	2	1000 / A	Gross Noble Gas	Whole Body	0	480		0	45°	6-21-84

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ENCLOSURE B

RESPONSE TO NRC INSPECTION REPORTS 50-361/84-08 AND 50-362/84-07

I. NRC COMMENT:

"1.0 Technical Support Center (TSC)

"1.1 Physical Facilities

"1.1.1 Design, Location and Structure

"It is suggested that Room 248A of the TSC, used by personnel who provide engineering support, needs additional working surface for examining drawings, schematics and other documents. Such space could be provided by a folding table attached to the wall."

RESPONSE:

The layout of Room 248A will be reviewed to determine how to provide additional wall space. If the review reveals that existing furniture can be relocated to allow more table space, a change will be made at that time.

II. NRC COMMENT:

"1.1.2 A detailed design review, including a human factors input, of the TSC layout has apparently not been performed. It is recommended that such a review be done, taking into account not only traffic flow but also information flow."

RESPONSE:

Lund and Associates, a Human Factor Consulting firm, conducted a review of the SONGS Emergency Response Facilities (ERFs), based on the NRC Emergency Preparedness Appraisal Criteria in 1981. Numerous changes were made to SONGS ERF's as a result of this report. Since the last modification to the Technical Support Center in early 1982, numerous drills have been conducted in which both traffic and information flow have been studied. Based on these drills, it has been determined that additional changes to the TSC would not be cost effective and alternatives have been developed to resolve traffic and information flow problems.

III. NRC COMMENT:

"1.1.3 Equipment and Supplies

"The examination of these supplies disclosed that no graph paper was provided. It is recommended that several different scales of graph paper be included in these supplies."

RESPONSE:

Different scales of graph paper have been provided to the TSC.

IV. NRC COMMENT:

"1.1.4 Communications System

"The appraisal also included discussions concerning the notification of licensee personnel for the purpose of augmenting the onshift emergency organization. The licensee stated that two backshift (notification) drills were held in 1982 and one was held in 1983. Because the 1983 drill was held immediately following a real occurrence, the response to this drill exceeded the one hour performance objective. On the basis of the 1983 drill results the licensee made some changes to the notification procedures. The drill to be performed in 1984 should test these changes and reverify the augmentation times."

RESPONSE:

The effectiveness of the changes made will be evaluated in the drill to be performed in August, 1984.

V. NRC COMMENT:

"1.1.5 Power Supplies

"It is recommended that one or two battery powered, relay activated, spotlight type lighting units be installed in the TSC to provide additional lighting in case of a loss of offsite power."

RESPONSE:

Temporary battery powered lights have been placed in the TSC emergency cabinet, to be dispensed upon a loss of offsite power.

VI. NRC COMMENT:

"1.2 Information Management

"1.2.2 Critical Functions Monitoring System

"At present the Unit 3 CFMS has a greater capability than the Unit 2 CFMS, although the Unit 2 capability provides an acceptable level of information. The licensee intends to upgrade the Unit 2 CFMS to that of the Unit 3 CFMS during the next Unit 2 outage. Future modifications are likely to occur to bring the QSPDS and CFMS into harmony with the soon to be completed symptomatic emergency operations procedures. It is recommended that a rigorous configuration management program be applied to any of these modifications to ensure the displays available in the CR, TSC and EOF are consistent with each other."

RESPONSE:

A design modification which upgrades the Unit 2 CFMS to be identical to Unit 3 CFMS has been initiated. This modification will be completed by the end of the next Unit 2 refueling outage. All future improvements and changes will be made system wide such that the CFMS's displays will be consistent with system design.

VII. NRC COMMENT:

"Based on the appraisal of the CFMS, it is recommended that the following features of the system be improved:

"a. The flashing feature is distracting and interferes with readability."

RESPONSE:

Flashing symbols and flashing numeric values are used to attract the attention of the user to a point that has just gone into alarm and has not been acknowledged. Once the alarm is acknowledged by the user, the flashing stops. This feature is very helpful to the user and no action is planned on this item.

VIII. NRC COMMENT:

"b. There is no provision for a page up/down function, only page forward/back."

RESPONSE:

The page up/down function is presently available, however, because the user has multiple selections available when moving from one level to the next, selection must be completed using the Page or Sector sequence. No action is planned on this item.

IX. NRC COMMENT:

"c. Blank pages in the middle of the current alarm list and bad data list could mislead the operator into thinking that there are fewer alarms or bad data points than there actually are."

RESPONSE:

When the front page is filled, the alarm blocks are filled on the adjacent back page, etc. To obtain access to these pages, the operator must page forward on the control keyboard. When an alarm condition returns to normal, the operator removes it from the list by pressing the keys 'RESET'. When this is done, it serves to remove the alarm from the list and compress the remaining alarms. As the alarms are cleared they will also be pulled from the back pages to the front page so that the operators will have to shift as little as possible. Because alarms are compressed and pulled from back pages to the front page, blank pages do not exist in the middle of the list. No action is planned on this item.

X. NRC COMMENT:

"d. Inconsistent indexing and page numbering between Unit 2 and 3 displays may cause unnecessary confusion and delay in display access, e.g. page 102 for Unit 2 is the 'Current Alarm List,' while page 102 for Unit 3 is the 'CFMS Monitor.'"

RESPONSE:

See response to NRC comment VI.

XI. NRC COMMENT:

"e. Alarms in the 'Current Alarm List' do not seem to be presented in any logical format (chronological scroll, etc.). They seem to jump up at various places on the screen, making the last-in alarm hard to find and making recurring alarms even more distracting than they would normally be."

RESPONSE:

The "current alarm" list displays the "current alarms" in a block format on the Current Alarm List page. This block format is designed to divide the page into three horizontal sections which contain the alarms as they are received. As soon as the upper block of the display page is filled, it is automatically transferred to the middle section of the page. This allows any new alarms to be presented to the operator in the upper block without disturbing the operator's concentration on existing alarms in the middle block. The new alarms are obvious to the operator. As the blocks become filled they are shifted down the page. No action is planned on this item.

XII. NRC COMMENT:

"f. Data validation is limited to range checking, as a result the system may lack credibility under some emergency conditions."

RESPONSE:

Currently, if a data value is out of range, it is display coded as follows:

OUT-OF-RANGE: (All analog inputs are checked for out-of-range conditions. The status of those instruments that are out-of-range is indicated on the Out-Of-Range List (PG 103), and indicated on the operational display by question marks ("????") in the value field.)

XIII. NRC COMMENT:

"In response to NUREG-0737 Task Action Plan Item I.D.1, Detailed Control Room Design Review, and Item I.D.2, Safety Parameter Display System, the licensee will review the CFMS displays. It is recommended that all improvements and changes made to the CFMS as a result of I.D.1 and I.D.2 be incorporated system-wide to assure that the Units 2 and 3 CR, TSC, and EOF are provided with identical data bases and display formats. This will minimize the possibility of confusion and delay arising from the use of different signal sources and/or inconsistent formats among facilities."

RESPONSE:

See response to NRC comment VI.

XIV. NRC COMMENT:

"1.2.5 Dose Assessment

"The NRC Staff found that the dose assessment capability at the TSC is adequate with the qualification that neither the licensee nor its contractor has completed a systematic verification of the EARS computer program. This systematic verification is necessary to satisfy the requirement in Paragraph 8.2.1.h of Supplement 1 to NUREG-0737. The licensee is in the process of verifying the EARS program.

"1.2.5 Dose Assessment (Continued)

"As a result of the discussion on the open item during the exit interview (see Section 5.0), a meeting between some of the NRC team members and licensee representatives was held immediately following the exit interview. This meeting concerned the efforts accomplished and to be accomplished by the licensee to verify the EARS computer program. The licensee committed to providing correspondence to the NRC Team Leader describing the verification program and providing the results. The licensee's April 12, 1984 letter, which has been included as Attachment B, addressed some of the items related to verifying the EARS program and provided some dose assessment results."

RESPONSE:

This information was presented informally to the Team Leader on July 2, 1984. We understand from subsequent telephone discussions with the Team Leader that no further action is required.

XV. NRC COMMENT:

"1.2.5.1 Source Terms

"EPIP SO23-VIII-40.100 describes a method of determining iodine and noble gas source terms from these measurements. It should be noted that this method assumes a LOCA scenario at time t=0 with a post-accident containment atmosphere isotopic inventory based upon Table 12-2-6C of the FSAR. The accuracy of this method must be recognized as scenario dependent. It is recommended that the licensee extend this method to other accident scenarios. Another alternative would be use of assumed design basis or severe accident source terms, such as TID-14844, Event V, or TMLB' (Generalized from WASH-1400). A mobile field monitoring and sampling capability is also available to provide source term projections during releases beyond containment."

RESPONSE:

The data presented in EPIP SO23-VIII-40.100 does assume a LOCA scenario at time t=0 with a post-accident containment atmosphere isotopic inventory as referenced. In addition, the same post-accident radiation monitor curve document shows the source term assumptions and resulting dose rates for five other accident scenarios. The LOCA at time t=0 was used as a worst case and, hence, most conservative assumption as the basis for source term calculations for the post-accident monitors.

EPIP SO23-VIII-40.100 also references the methodology for calculation of source terms using field monitoring data on the dose assessment worksheet (Attachment 2 of SO23-VIII-40.100).

XVI. NRC COMMENT:

"It is recommended that the relative usefulness of the three ex-containment accident radiation monitors be determined with respect to their usefulness in evaluating unmonitored release magnitudes via containment penetration pathways, since these releases are often difficult to assess. Also the use of an ex-containment flow rate of 1.6 CFM for containment penetration pathway should be verified."

RESPONSE:

The ERMs were superseded by the TMI requirement for in-containment high-range radiation monitors and were subsequently removed from the design (FSAR) in 1982-1983. They are now in the process of being removed from the physical plant in order to minimize Operations and Maintenance costs and eliminate confusion as a result of conflicting information.

The conservative ex-containment flow rate of 1.6 CFM is assumed until verification of a more accurate leak rate can be either confirmed or defined by the Technical Leader or STA. This rate appears on the Source Term Worksheet.

XVII. NRC COMMENT:

"1.2.5.3 Computerized Dose Assessment

"The following are recommendations for improving the program.

"(1) Include a subroutine on the EARS program to calculate cumulative surface contamination levels (e.g., mCi/m2) for important radionuclides."

RESPONSE:

The EAR's subroutine, discussed with the inspector during the inspection, prints out a cumulative deposition close calculaton in mR/hr. We believe a dose in mR/hr is more useful in an emergency situation than a surface contamination level (mCi/m2).

XVIII. NRC COMMENT:

"(2) Review the format of one table entitled 'Radiological Action Level Table' printed out by the EARS program (Attachment C). The format of the table is confusing because a '*' is listed next to the calculated 'Emergency Class Criterion,' rather than next to the calculated dose rates and/or doses due to the accident that exceed a specific criteria. The '*' should be placed next to the calculated dose rate and/or doses due to the accident, and a symbol should be placed following the '*' to indicate which criterion is exceeded.

XVIII. NRC COMMENT: (Continued)

"(3) Review the format of one figure printed out by the EARS program (Attachment D). The figure contains the title 'Edge Dose Rate and Type: _____ (numerical dose rate (body organ).' and presents lines showing the plume at different times following the accident. The information contained in the figure is confusing because the figure contains multiple edges to which the plume edge dose rate stated in the caption might apply. The higher dose rate at the centerline of the plume should also be provided."

RESPONSE:

SCE had conducted training prior to the inspection on these issues which, as demonstrated by evaluation by Emergency Preparedness during quarterly drills of operator performance on the EARS System, has been sufficient to prevent confusion on these specific items. No further action is planned.

XIX. NRC COMMENT:

"(4) Include a table of atmospheric dispersion factors averaged over the period of release for various distances and directions from the plant. Currently, atmospheric dispersion factors are provided for only one location (at the Exclusion Area Boundary), and this makes it difficult to reconcile differences between doses estimated by EARS and doses estimated by other computer programs available at NRC and in the industry."

RESPONSE:

Subsequent to the inspection, we showed that differences between EARS and the TARDAM dose program used by the inspectors accounted for the differences observed in calculated doses. Since both programs are consistent with regulatory guidance, we will contact the NRC, Office of Inspection and Enforcement, to arrange and perform similar comparisons between EARS and other computer programs available at the NRC to demonstrate that the dose differences observed are within those expected due to the use of different NRC-approved models.

XX. NRC COMMENT:

"(5) Include a table of all meteorological data (i.e., wind speed, wind direction and atmospheric stability) used as input to the dose rate and cumulative dose computation on each computer output."

RESPONSE:

The capability is now available on the EARS system. Previously, users were required to ask for it on the old version of EARMAN, however, it may now be printed out immediately with the new version.

XXI. NRC COMMENT:

"2.0 Control Room Response

"2.2 Dose Assessment

"The meteorological assessment consists of determining X/Q values from measurements of wind speed and atmospheric stability and identifying the affected sector(s) from measurements of wind direction. Meteorological measurements from the primary tower are recorded on strip charts in the CR. Wind direction and speed at the 10 m level and vertical temperature difference between the 10 and 40 m levels are recorded. This procedure is adequate. However, it would be helpful to include explicit instructions as to how to obtain average values of the meteorological parameters from the strip charts over time periods of about 15 minutes.

"The following improvements are recommended.

"(1) Provide explicit instructions on how to obtain appropriate values of the parameters from strip charts and indicators in the control room."

RESPONSE:

We will provide these explicit instructions by November 15, 1984.

XXII. NRC COMMENT:

"(2) Provide units on all tables and worksheets.

AND

"(3) Provide references for methodologies used."

RESPONSE:

An attachment will be added to SO23-VIII-40.100 to indicate methodologies, references, units, etc., used on the Dose Assessment Worksheet by October 1, 1984.

XXIII. NRC COMMENT:

"3.0 Operational Support Center (OSC)

"3.2 Functional Capability

"3.2.2 Operations

"It is recommended that station maintenance procedures and the training program for operators and maintenance personnel be revised to include a method to ensure that the CR is kept informed of all changes in system status resulting from emergency repair work in progress."

RESPONSE:

Procedure EPIP SO123-VIII-30 requires that the OSC Operations Coordinator keep the Control Room informed of any emergency repair work or maintenance that could affect system status. This EPIP will be modified to require the OSC Operations Coordinator to provide more specific information such as valve manipulations, electrical lineups, pump status, etc.

XXIV. NRC COMMENT:

"4.0 Emergency Operations Facility (EOF)

"4.1 Physical Facilities

"4.1.2 Design and location of the Backup EOF

"The licensee stated that the next revision to the Emergency Plan would include a description of the backup EOF."

RESPONSE:

The revised Emergency Plan, scheduled for publication in October 1984, will include reference to the backup EOF. A detailed description is included in the ESO procedure.

XXV. NRC COMMENT:

"4.1.4 Communications

"The licensee should verify the response times for the critical EOF personnel by some form of testing. Also information contained in the March 22, 1984 memo concerning helicopter pickup should be included in the ESO procedures."

RESPONSE:

Response times for all EOF and Emergency News Center personnel will be tested during the quarterly drill scheduled in August, 1984. The ESO procedure will be revised to specifically identify the critical or key positions and helicopter assignments will be included.

XXVI. NRC COMMENT:

"5.0 Exit Interview

"The licensee was informed that some recommendations for improving the emergency response facilities, equipment and employee actions were identified during the appraisal and they would be documented in the appraisal report. The following recommendations were specifically mentioned during the exit interview:

"a. The labeling of the radiation monitor readouts in the CR that are used to make the initial dose projections should be examined to make sure they correspond to the identifications in EPIP SO23-VIII-40.100. Also, the ability of the assigned health physics personnel to make the calculations in EPIP SO23-VIII-40.100 should be confirmed."

RESPONSE:

The labeling of the radiation monitor readouts in the control room used to make the initial dose projections has been examined and does correspond to the identifications in EPIP SO23-VIII-40.100. The health physics personnel have demonstrated the ability to perform the calculations in EPIP SO23-VIII-40.100.

XXVII. NRC COMMENT:

"b. Consideration should be given to making advance preparation for moving the OSC to the designated alternate location."

RESPONSE:

All unit specific items which have been identified as necessary in both the OSC and alternate OSC locations have been placed in both locations. As new items are identified they will also be added to the EPIP to be relocated.

XXVIII. NRC COMMENT:

"c. There is a need for some method to assure that the CR is kept informed of changes to systems and equipment made by the emergency teams."

RESPONSE:

See response to NRC Comment XXIII.