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SUBJECT: Provides addl info re Proposed Change Notices 266 & 267.

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MANAGER OF NUCLEAR LICENSING

September 5, 1989

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U.S. Nuclear Regulatory Commission
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To NRC
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Enclosed is a duplicate dated letter. The
original letter was not dated.

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362
Amendment Applications 64, 65 and 50, 51
San Onofre Nuclear Generating Station
Units 2 and 3
Request for Additional Information
TAC Nos. 71794, 71795, 71603 and 71604

THANK YOU.

NUCLEAR LICENSING DEPARTMENT

Date

- References:
1. SCE to NRC letter, dated December 30, 1988, regarding Amendment Application 64 and 50, Proposed Change Notice NPF-10/15-266
 2. SCE to NRC letter, dated December 19, 1988, regarding Amendment Application 65 and 51, Proposed Change Notice NPF-10/15-267
 3. NRC to SCE letter, dated June 26, 1989, regarding request for additional information
 4. SCE to NRC letter, dated August 4, 1989, regarding request for additional information

The purpose of this letter is to provide additional information regarding Southern California Edison's (SCE) Proposed Change Notices (PCNs) 266 and 267. The proposed changes would revise the 18 month surveillance requirement associated with the Containment Area and High Range Monitors to a "refueling interval," nominally 24 months. These surveillance tests require that each Containment Purge Isolation Area Monitor and Containment High Range Monitor be demonstrated operable by performance of a channel calibration.

Reference 3 identified additional information which would be required in order to evaluate SCE's request to change the instrument calibration frequency. During the course of providing this information, SCE established a need to update the calibration surveillance data. References 1 and 2 provided calibration experience for intervals from August 5, 1983 to March 1, 1988. Data is now available from March 1, 1988 to August 1, 1989. This data has been included to further substantiate SCE's request.

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September 5, 1989

The review of all 18 month channel calibrations performed reaffirmed that no inoperable conditions were detected by the unique portions of the channel calibration test that would not have been captured by the 31 day channel functional test. A review of all corrective maintenance actions taken on these monitors revealed that all problems that affected operability were detected, or would have been detected, by the channel functional test, alarms or indications to the operator. Channel functional testing, alarms and operator indication for the operability verification of these monitors provide adequate technical justification for extending the 18 month interval for channel calibration to a nominal 24 months, or maximum 30 months. The 30 month interval is the maximum 25% extension of the surveillance interval permitted by Technical Specification 4.0.2.

A summary of the results of this update effort, including answers to the questions in reference 3, is provided in Attachment A.

If you have any questions regarding this additional information, please call me.

Very truly yours,

A handwritten signature in dark ink, appearing to read "J. B. Martin", is written over the typed name.

cc: J. B. Martin, Regional Administrator, NRC Region V
C. Caldwell, NRC Senior Resident Inspector, San Onofre Units 1, 2 and 3

ATTACHMENT A

I. BACKGROUND

PCN 266 requested a revision of calibration surveillance requirements from the current 18 month interval to an interval at least once per refueling (nominally 24 months) for the Containment Area Monitors (2RI-7856-1, 3RI-7856-1, 2RI-7857-2 and 3RI-7857-2).

These Containment Area Monitors are included in Technical Specifications 3/4.3.2, "Engineered Safety Features Actuation System," and 3/4.3.3.1, "Radiation Monitoring." The safety function of these monitors is to alarm on a LOCA condition or fuel handling accident and actuate a containment purge isolation signal. These area monitors do not have post accident indication requirements.

PCN 267 requested a revision of calibration surveillance requirements from the current 18 month interval to an interval at least once per refueling (nominally 24 months) for the Containment High Range Monitors (2RI-7820-1, 3RI-7820-1, 2RI-7820-2 and 3RI-7820-2).

These Containment High Range Monitors are included in Technical Specification 3/4.3.3.1, "Radiation Monitoring." The safety function of these monitors is to alarm on high containment radiation and provide for long-term post accident monitoring of radiation conditions inside containment.

In order to provide the requested information, and be responsive to Question 4 of Reference 3, SCE established a need to update the calibration surveillance data. References 1 and 2 provided calibration experience for intervals from August 5, 1983 to March 1, 1988. The nature of the questions was such that more detail regarding instrument problems, which had been identified as failures, was warranted. What was identified as an out of tolerance instrument linearity failure, in the original PCN 266 and 267 submittal, was not an instrument operability failure but simply the identification of instrument accuracy outside of test acceptance criteria, i.e., outside of tolerance. A Reliability Centered Maintenance (RCM) methodology was used as a basis for evaluating the monitor problems.

The objective of any Technical Specification surveillance is to verify if the specified limiting condition(s) of operation is (are) being met. Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation. It is this aspect of Technical Specification surveillances that the RCM approach concentrates on.

In order to evaluate a surveillance interval, with the intent of surveillance interval extension, two reviews are necessary:

1. A review to determine if the existing surveillance is finding equipment problems, i.e., performance/accuracy, hidden failures, or degraded conditions, and if operability is affected; and

2. A review of corrective maintenance history to ensure that all problems affecting operability were detected by a condition or time directed means, i.e., surveillance, alarm, or indication to the operator.

A surveillance becomes a candidate for interval extension under the following circumstances. The corrective maintenance review shows that failures affecting operability are detected and corrected in an expedient manner, without performing the surveillance. And, the surveillance does not have a repeated history of finding failures affecting operability.

The results of the evaluation are provided in Section III, for Containment Area Monitors and Containment High Range Monitors.

II. GENERAL

The responses to Reference 3 questions are as follows:

Question 1:

"Define an out of tolerance linearity failure"

Response:

In order to define an out of tolerance instrument linearity failure, tolerance and linearity must first be defined. These definitions are derived from ANSI/ISA S51.1-1979 and ANSI/IEEE Std 100-1984.

Linearity is the condition wherein the change in value of one quantity, e.g., input, is directly proportional to the change in the value of another quantity, e.g., output. Linearity is also defined as the closeness to which a curve approximates a straight line.

Tolerance can be defined in terms of an accuracy rating and is given as the limit that errors will not exceed when the instrument is used under reference conditions. For radiation monitoring purposes, tolerance is generally expressed in terms of percent of linear full-scale value. Under special circumstances, as dictated by the equipment manufacturer, percent of reading can be used.

What was identified as an out of tolerance instrument linearity failure, in the original PCN 266 and 267 submittal, was not an instrument operability failure, but simply the identification of instrument accuracy outside of test acceptance criteria, i.e., outside of tolerance. This deviation is determined during a linearity check over the full span of the instruments. Linearity came into the failure discussion because the allowance bands for the readings are provided in terms of percent of linear full scale. The use of the term "out of tolerance linearity failure" was not intended to describe monitor operation in the non-linear range. It was used to describe an out of

tolerance condition with tolerances defined in percent of linear full scale.

Question 2:

"Describe how your monthly channel functional tests would detect gross (e.g., a factor of two or more deviation from an expected value) non-linearities."

Response:

Procedural guidance for monthly channel functional testing ensures the detection of out of tolerance conditions that would compromise the monitors' function. Surveillance procedures provide acceptance criteria for radiation monitor performance. Linearity and accuracy/tolerance rating requirements are captured within the surveillance acceptance criteria for each monitor. The acceptance criteria are established such that a factor of 2 deviation, will cause the channel to be declared inoperable. Deviation from the surveillance acceptance criteria will result in the monitor being declared inoperable, as defined in the Technical Specifications, and initiation of the appropriate administrative and corrective actions.

Question 3:

"Discuss how the area and high range monitor readings would be interpreted and used during an emergency. In particular, consider and scope how non-linearities at various dose rates could adversely affect decision-making (emergency actions) given elevated monitor readings in various decades over the detector/instrumentation ranges."

Response:

The effect of non-linearities have been accounted for in the system design and required monitor operation. The normal band of instrumentation has within it an accuracy and a tolerance which have been accounted for in instrument use. Non-linearities which result in the identification of monitor accuracy out of specified tolerance, are identified by the monthly channel functional test and result in an instrument being declared inoperable, in accordance with Technical Specification requirements. Extending the 18 month calibration interval to 24 months will not affect the capability of identifying monitor operability problems. For this reason, there will be no adverse affect on decision making or emergency actions.

The Containment Area Monitors, however, are only required to alarm on high radiation and actuate a containment purge isolation signal. These monitors are not required for post accident monitoring. The channel functional tests will identify monitor accuracy, out of tolerance conditions, and verify operability of alarm and trip functions. Unacceptable test results will require the monitor to be declared inoperable and appropriate actions taken.

The Containment High Range Monitors are required for post accident monitoring. Each of Units 2 and 3 has two Containment High Range Monitors. The channel functional tests will identify monitor accuracy, out of tolerance conditions, and verify operability of alarm function. Unacceptable test results will require the monitor to be declared inoperable and appropriate actions taken.

As the Technical Specifications provide adequate guidance for actions to be taken when the monitors are declared inoperable, monitor accuracy out of specified tolerances will not affect decision making or emergency actions.

Question 4:

"Your calibration experience during surveillance intervals from August 5, 1983 to March 1, 1988 (10 failures out of 12 attempts for area monitors and 2 failures out of 15 attempts for high range monitors) is not supportive of your request to extend your average calibration interval from 18 months to 24 months. Please provide additional discussion of the significance of these failures and address any alternatives that might provide increased confidence in the equipment over a 24 month surveillance interval."

Response:

The confidence that the equipment will perform the required Technical Specification defined function, over the increased surveillance interval, is provided by performance of the monthly channel functional tests. The supporting evaluation augments the original analysis performed prior to submitting the request for surveillance interval extension. The conclusion reached in the original analysis remains unchanged. This conclusion is that all problems that affect monitor operability were detected, or would have been detected, by the 31 day channel functional test, alarms or indications to the operator. Extending the surveillance interval to a nominal 24 months interval, or maximum 30 months will not adversely affect monitor operability. A more detailed discussion of the significance of these problems is provided in Section III, below.

III. RELIABILITY CENTERED MAINTENANCE EVALUATION

Approach

The Reliability Centered Maintenance (RCM) approach was applied to confirm the candidacy potential of the 18 month channel calibration extension to 24 months. This supporting evaluation augments the original analysis performed prior to submitting the request for surveillance interval extension. This subsequent evaluation includes the original evaluation data. More recent surveillance data confirmed equipment operability and verified that no new failure modes had developed.

The justifications provided in the proposed change notices for calibration extension were that the monitor problems would be detectable through either the daily or 31 day channel functional test. A review of all 18 month channel calibrations was performed. This review was to identify if operable conditions were detected by the unique portions of the channel calibration test that would not be captured by the 31 day channel functional test. The 18 month channel calibration and the 31 day channel functional test surveillances were evaluated in detail. In addition to performing a channel functional test, the 18 month channel calibration performs the following:

1. Physical inspection of the equipment and cable routing paths in containment;
2. Isotopic calibration;
3. Channel response time test; and
4. A more detailed subassembly assessment; e.g. individual test point verification within a loop.

Physical inspection of the equipment in containment may identify degraded equipment conditions or obvious equipment deficiencies but is not relied on for verifying monitor operability.

The isotopic calibration uses radioactive fields to verify monitor operability. The cross correlation between isotopic radiation and the LED source is verified by this test. The type of problem which is identified by the isotopic calibration will also result in a low radiation failure alarm during normal operation. Additionally, the pulsed Light Emitting Diode (LED) check provides essentially the same verification as the isotopic calibration. The pulsed LED check covers the same range as the isotopic test. The pulsed LED check is provided in the channel functional test to provide operability verification.

The channel response time test provides a measure of module response time, i.e., the loop response from radiation detection to valve isolation actuation. This test is not the lone check of this alarm logic. The failure alarm test, performed in the monthly channel functional test, actually goes through the logic and causes the same circuits to actuate, only the response time is not measured. Additionally, review of the channel calibration records indicates that the monitors have consistently passed this test.

The more detailed subassembly assessment, which consists of individual test point verification within a loop, is not necessary for operability determination. The channel functional test will perform an assembly assessment which envelopes the individual test point verification.

All corrective maintenance actions taken on these monitors were reviewed. This review was to determine whether identified problems would affect Technical Specification operability and to identify the method of problem detection.

Summary

The review of all 18 month channel calibrations performed has found that no inoperable conditions were detected by the unique portions of the channel calibration that would not be captured by the 31 day channel functional test, with the exception of two identified conditions. These two conditions, which were identified for monitor 3RI-7820-1 (See Table 1), have been further evaluated. The first was an out of tolerance low voltage reading at a subassembly test loop. The second was a high voltage degradation at the power supply. If the channel calibration had not been conducted, the channel functional test would have identified the low voltage condition. The degraded high voltage power supply would have resulted in an alarm before monitor operability was adversely affected. An alternate means of detection exists for these problem conditions. Therefore, all operability problems were detected, or would have been detected, by the channel functional test, alarms, or indications to the operator.

A review of all corrective maintenance actions taken on these monitors revealed that all problems that affected operability were detected by the channel functional test, alarms or indications to the operator. Tables 2 through 5 summarize the corrective maintenance review findings for the Containment Area Monitors. Tables 6 through 9 summarize the corrective maintenance review findings for the Containment High Range Monitors.

Channel functional testing, alarms, and operator indication for the operability verification of these monitors provide adequate technical justification for extending the 18 month interval for channel calibration to a nominal 24 months, or maximum 30 months. The 30 month interval is identified pursuant to the maximum 25% extension of the surveillance interval permitted by allowance of Technical Specification 4.0.2.

TABLE 1
RADIATION MONITOR 18 MONTH CHANNEL CALIBRATION
SURVEILLANCE SUMMARY SHEET

Surveillance (SV)
Maintenance Order
(MO) Date

Problem Found

Notes

2RI-7856-1

03/87	None	
10/85	None	
10/84	J6 voltage out of tolerance	(1)
07/83	None	

3RI-7856-1

01/88	J2,J6 voltage out of tolerance	(1)
08/86	None	
04/85	None	
12/83	J5,J6 voltage out of tolerance	(1)

2RI-7857-2

01/89	None	
06/87	Box meter sticking	(2)
10/85	None	
10/84	J5,J6 voltage out of tolerance	(1)
07/83	None	

3RI-7857-2

01/88	Box meter sticking	(2)
08/86	J2 voltage out of tolerance	(1)
04/85	None	
12/83	J2,J3,J6 voltages out of tolerance	(1)

TABLE 1
RADIATION MONITOR 18 MONTH CHANNEL CALIBRATION
SURVEILLANCE SUMMARY SHEET
(CONTINUED)

<u>SV MO Date</u>	<u>Problem Found</u>	<u>Notes</u>
<u>2RI-7820-1</u>		
12/88	None	
03/87	None	
10/85	None	
10/84	None	
07/83	None	
<u>3RI-7820-1</u>		
01/88	None	
08/86	None	
10/85	TP3 voltage out of tolerance, low	(3)
01/85	None	
12/83	High voltage power supply degraded; Action pack output failed	(4)
<u>2RI-7820-2</u>		
12/88	None	
03/87	None	
10/85	None	
10/84	None	
<u>3RI-7820-2</u>		
01/88	None	
08/86	None	
10/85	None	
01/85	None	

TABLE 1
RADIATION MONITOR 18 MONTH CHANNEL CALIBRATION
SURVEILLANCE SUMMARY SHEET

(CONTINUED)

NOTES:

- (1) As found loop values were within operability requirements, however some mid-loop voltages were found outside their narrower calibration ranges.
- (2) This finding does not affect operability. Repaired as indicated on Corrective Maintenance Summary Tables 4 and 5 by MOs 87090535 and 88050197, respectively.
- (3) This degradation, although discovered on the 18 month SV, would have been detected by the 31 day SV had it been performed at this time.
- (4) HV power supply was found degrading, and preventive maintenance was performed. A more degraded condition affecting operability would have alarmed. Action pack isolator found failed, refer to Note (3). Repaired as indicated on Corrective Maintenance Summary Table 7 by MO 84000669.

TABLE 2
RADIATION MONITOR CORRECTIVE MAINTENANCE
SUMMARY

MONITOR NO. 2RI-7856-1

Corrective Maintenance Order Date	Description of Problem	Technical Specification Operability Affected?	Method of Detection
12/87	Setpoint out of tolerance	NO	31 Day SV
09/87	Noise spikes	NO	Alarm
09/87	Noise spikes	YES	Alarm
12/86	Readings out of tolerance, Low	YES	31 day SV
12/85	Readings out of tolerance	YES	31 day SV
10/85	HP, plant computer out of tolerance	NO	31 day SV
08/84	Recorder, computer out of tolerance	YES	31 day SV
07/84	Recorder, computer out of tolerance	NO	31 day SV
02/84	Setpoint out of tolerance	YES	31 day SV
08/83	Monitor spiking	YES	Alarm
07/83	Readings out of tolerance	YES	31 day SV

TABLE 3
RADIATION MONITOR CORRECTIVE MAINTENANCE
SUMMARY

MONITOR NO. 3RI-7856-1

Corrective Maintenance Order Date	Description of Problem	Technical Specification Operability Affected?	Method of Detection
05/88	CPIS "A"	YES	Alarm, trip
01/87	Detector will not calibrate	YES	31 day SV
12/85	Readings out of tolerance	YES	31 day SV
08/85	HP computer out of tolerance	NO	31 day SV
12/84	Voltages out of tolerance	YES	31 day SV
09/84	Plant computer out of tolerance	NO	31 day SV
07/84	CPIS Initiation	NO	Alarm, trip
01/84	Detector meter out of tolerance	NO	18 month SV
11/83	Readings out of tolerance	YES	31 day SV
10/83	Setpoint out of tolerance	YES	Alarm
09/83	Setpoint out of tolerance	YES	31 day SV

TABLE 4
RADIATION MONITOR CORRECTIVE MAINTENANCE
SUMMARY

MONITOR NO. 2RI-7857-2

Corrective Maintenance Order Date	Description of Problem	Technical Specification Operability Affected?	Method of Detection
01/89	Monitor failed low	YES	Alarm
11/88	Readings out of tolerance	YES	31 day SV
10/88	Readings out of tolerance	YES	31 day SV
07/88	Readings out of tolerance	YES	31 day SV
06/88	Readings out of tolerance	YES	31 day SV
04/88	Monitor spiking, failure	YES	Alarm, trip
12/87	Erratic indication	YES	Alarm, trip
10/87	Power supply ripple	NO	31 day SV
09/87	Module spiking	YES	Alarm
09/87	Detector failed to calibrate	YES	18 month SV (1)
09/87	Box meter sticking	NO	18 month SV
06/87	Reading out of tolerance	YES	31 day SV
06/86	Monitor goes into failure	YES	Alarm
09/85	Reading out of tolerance	YES	31 day SV (2)
07/85	Plant computer indication out of tolerance	NO	31 day SV
06/85	Readings out of tolerance	YES	31 day SV (2)
05/85	Readings out of tolerance	NO	31 day SV
02/85	No check source response	NO	31 day SV

TABLE 4
RADIATION MONITOR CORRECTIVE MAINTENANCE
SUMMARY
(CONTINUED)

MONITOR NO. 2RI-7857-2

Corrective Maintenance Order Date	Description of Problem	Technical Specification Operability Affected?	Method of Detection
10/84	Readings out of tolerance	YES	31 day SV (2)
08/84	Readings out of tolerance	YES	31 day SV
12/83	Monitor indicates failure	YES	Alarm

NOTES:

- (1) Failure detectable by 31 day SV.
- (2) Out of tolerance readings are not Technical Specification inoperable, but equipment is conservatively considered inoperable until repaired.

TABLE 5
RADIATION MONITOR CORRECTIVE MAINTENANCE
SUMMARY

MONITOR NO. 3RI-7857-2

Corrective Maintenance Order Date	Description of Problem	Technical Specification Operability Affected?	Method of Detection
08/88	Monitor reads low	YES	31 day SV
05/88	Box meter sticking	NO	18 month SV
01/88	Alarm not functioning	NO	31 day SV
03/87	High meter reading	NO	Operations indication
01/86	High alarm failure	YES	31 day SV
02/85	Monitor failure	YES	Alarm
01/85	Monitor failure	YES	Alarm
12/84	High Range out of tolerance	YES	31 day SV
06/84	Calibration potentiometer inoperative	NO	31 day SV

TABLE 6
RADIATION MONITOR CORRECTIVE MAINTENANCE
SUMMARY

MONITOR NO. 2RI-7820-1

Corrective Maintenance Order Date	Description of Problem	Technical Specification Operability Affected?	Method of Detection
11/88	High voltage regulator failure	YES	Operation light out, alarm
04/88	Monitor spiked and failed	YES	Alarm
08/86	Green operation light off	YES	Alarm
10/84	High voltage out of tolerance	YES	31 day SV
09/84	Green operation light off	YES	Alarm
05/84	HV power supply failure	YES	31 day SV
11/83	Failed connector	YES	31 day SV
08/83	Failed set point	YES	31 day SV
08/83	Spurious trips	YES	Alarm

TABLE 7
RADIATION MONITOR CORRECTIVE MAINTENANCE
SUMMARY

MONITOR NO. 3RI-7820-1

Corrective Maintenance Order Date	Description of Problem	Technical Specification Operability Affected?	Method of Detection
01/88	Recorder failure	YES	31 day SV
01/84	No output from RY	YES	18 month SV (1)
09/84	Fail alarm setpoint failure	YES	31 day SV
03/84	Setpoint failure	YES	31 day SV
01/84	No output to QSPDS	YES	31 day SV
09/83	Setpoint out of tolerance	YES	31 day SV
09/83	Operation light off	YES	Alarm
09/83	Low output failure	YES	Alarm
08/83	Setpoint out of tolerance	YES	31 day SV

NOTE:

(1) Refer to Table 1, Note 4

TABLE 8
RADIATION MONITOR CORRECTIVE MAINTENANCE
SUMMARY

MONITOR NO. 2RI-7820-2

Corrective Maintenance Order Date	Description of Problem	Technical Specification Operability Affected?	Method of Detection
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08/88

Recorder failure

NO

31 day SV

TABLE 9
RADIATION MONITOR CORRECTIVE MAINTENANCE
SUMMARY

MONITOR NO. 3RI-7820-2

Corrective Maintenance Order Date	Description of Problem	Technical Specification Operability Affected?	Method of Detection
05/89	Setpoint out of tolerance	YES	31 day SV
03/89	Operation light flicker	NO	Operations indication
02/89	Setpoint out of tolerance	YES	31 day SV
11/88	Setpoint out of tolerance	YES	31 day SV
10/88	Setpoint out of tolerance	YES	31 day SV
03/88	Setpoint out of tolerance	YES	31 day SV
08/87	Setpoint failure	YES	31 day SV
06/87	Monitor spiking	YES	Alarm
08/84	Setpoint out of tolerance	YES	31 day SV
08/83/ 09/83	Operation light flicker	NO	Alarm
08/83	Setpoint out of tolerance	YES	31 day SV