

February 6, 1997

Mr. William H. Bateman  
Director, Directorate IV- II  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Subject: Docket No. 50-362  
Request for Enforcement Discretion  
CEA Reed Switch Position Transmitter Surveillance Testing San  
Onofre Nuclear Generating Station, Unit 3

Dear Mr. Bateman:

The purpose of this letter is to provide written followup to a request for discretionary enforcement from the requirements of Surveillance Requirement (SR) 3.1.5.4 of Technical Specification (TS) 3.1.5, "CEA Alignment." This enforcement discretion is requested until the NRC approves, on an exigent basis a license amendment which will defer implementation of SR 3.1.5.4 until the next Unit 3 refueling outage. This request was discussed with the NRC in a telephone call on the morning of February 5 and verbally granted during a subsequent call at 10:45 a.m. Pacific Standard Time.

The need for this request results from an error in implementation of this SR. The SR was believed to be satisfied by a surveillance which simulated an input for each Reed Switch Position Transmitter (RSPT) into each Control Element Assembly Calculator (CEAC) and verified the correct response of the CEAC.

On February 4, 1997, Edison recognized that the existing Unit 3 surveillances of record did not fully satisfy SR 3.1.5.4. The SR requires that a channel functional test be performed on each RSPT. This test will require that each RSPT be exercised over the measurement range and the output of each RSPT be monitored over the full range of Control Element Assembly (CEA) travel to ensure that the output is continuous. It is not possible to perform this functional test with the Unit in Mode 1.

9702110034 970206  
PDR ADOCK 05000362  
P PDR

After reviewing existing documentation, however, Edison believes that the CEA position indication is fully functional and capable of performing its intended safety functions, as demonstrated by inherent reliability of the reactor protection system design, the RSPT component design, and operating history at the Unit. In fact, existing testing demonstrates operability of each RSPT. Granting this request for enforcement discretion would avoid an undesirable transient associated with an unnecessary plant shutdown and thus minimize potential safety consequences and operational risks associated with such action.

A. Requirements For Which The Notice of Enforcement Discretion Is Requested

The following surveillance requirement applies:

SR 3.1.5.4

Perform a CHANNEL FUNCTIONAL TEST of each reed switch position transmitter channel.

The Bases which accompany this SR are (in part):

Performance of a CHANNEL FUNCTIONAL TEST of each reed switch position transmitter channel ensures the channel is OPERABLE and capable of indicating CEA position over the entire length of the CEA's travel. Since this test must be performed when the reactor is shut down, a 24 month Frequency to be coincident with refueling outage was selected.

B. Circumstances Surrounding the Situation:

Unit 2 is currently in a refueling outage, and Unit 3 is operating at full power. In response to a recent unrelated, but similar, problem with SR 3.8.1.9, Edison was in the process of reviewing other surveillances to ensure full compliance with the TSs. During this review, and as noted above, on February 4, 1997, Edison recognized that the existing surveillances of record did not fully satisfy SR 3.1.5.4 requirements.

This is considered to have been caused by personnel error. During implementation of this SR, it is believed that the individuals involved concluded that in accordance with the definition of a CHANNEL FUNCTIONAL TEST, the test of the RSPTs did not need to include the sensors themselves.

Because the surveillance testing did not strictly satisfy the requirements of the SR, Edison was not able to conclude the tests of record fully complied

with the surveillance requirements. As such, Edison declared a missed surveillance on CEA RSPTs for Unit 3, and entered the provisions of SR 3.0.3 at 5:06 pm on February 4, 1997.

C. Compensatory Measures:

The recent operational history and inherent reliability of the Unit 3 RSPTs provide adequate assurance that the transmitters are operable and fully capable of performing their intended safety functions. Consequently, Edison does not consider any compensatory actions, beyond this request for enforcement discretion and an exigent change to the TS, are warranted. A copy of the proposed change to the TS that will be submitted on an exigent basis is enclosed.

Additionally, for Unit 2, the RSPTs will be tested in accordance with this SR prior to return to Mode 2 from the current refueling outage. Moreover, in the event of a planned or unplanned shutdown of Unit 3 prior to the cycle 9 refueling outage, testing in accordance with the SR will be performed prior to return to Mode 2.

D. Safety Basis For This Request:

1. System Description

The RSPTs are part of the Reactor Protective System (RPS) which includes the CPCs and the CEACs.

Four independent CPCs are provided, one in each protection channel. Calculation of Departure from Nucleate Boiling Ratio (DNBR) and local power density is performed in each CPC. The DNBR and local power density so calculated are compared with trip setpoints for initiation of a low DNBR trip and the high local power density trip.

Each CPC receives the following inputs: core inlet and outlet temperature, pressurizer pressure, reactor coolant pump speed, excore nuclear instrumentation flux power, selected CEA position, and CEA subgroup deviation from the CEACs. The RSPTs provide CEA position information to the CEACs and the CPCs. Correction of excore flux power for shape annealing and CEA shadowing, fuel rod and coolant channel planar radial peaking factors based on CEA positions, and CEA group deviation alarm are functions performed in the CPCs or the CEACs.

Two independent CEACs are provided as part of the CPC system to calculate individual CEA deviations from the position of the other CEAs in their subgroup. Each CEA is instrumented by two independent CEA RSPTs. One set of the independent signals for all CEAs is monitored by one CEAC and the other set of signals by the other CEAC.

The CEAs are arranged into control groups that are controlled as subgroups of CEAs. The subgroups are symmetric about the core center. The subgroups are required to move together as a control group and should always indicate the same CEA group position. The CPCs utilize single CEA deviation penalty factors from the CEACs to modify calculational results in a conservative manner should a deviating CEA be detected by either CEAC.

Each CEAC monitors the position of all CEAs within each control subgroup. Should a CEA deviate from its subgroup position by more than 5", the CEACs will sound an annunciator in the Control Room, and, if appropriate, transmit "penalty" factors to the CPCs that will cause trip setpoints to be approached. RSPT inputs to the CEACs are checked for out-of-range values and excessive rate of change values. If the signal is out of range (greater than 155" or less than -5.8"), a sensor failure alarm is generated. This ensures conservative operation of the RPS, as any credible failure of a CEA reed switch assembly will result in an immediate operator alarm.

The RSPT consists of a series of magnetically actuated reed switches spaced at intervals along the CEA housing and wired with precision resistors in a voltage divider network. A magnet attached to the CEA extension shaft actuates the adjacent reed switches, causing voltages proportional to position to be transmitted for each assembly. The two RSPTs are physically and electrically separated from each other and are safety grade instruments.

The only active components within an RSPT are the magnetically actuated reed switches. At each CEA location, due to the length of the magnet, two pairs of reed switches are normally closed with all of the other reed switches normally open. If a single pair of reed switches were to stick in the closed position, the RSPT would not function properly and the failure would be detected by the cross channel calibration during power operation. A single switch failing to close would not normally cause a loss of position indication since another pair would be expected to be closed at each location. To lose position indication at any location would require at least one switch in each of the two adjacent pairs to fail to close. This would result in the loss of the RSPT output signal. A deviation alarm would be annunciated.

With the CEA at the fully withdrawn position, the cross channel check provides reasonable assurance that there is no pair of switches that are failed in the closed position below the CEA position. Monitoring of the CEA position during quarterly CEA exercises provides assurance that the reed switches corresponding to the fully withdrawn position are not stuck closed. Failure of two reed switches of adjacent reed switch pairs to close as the CEA is moved by that new location would be annunciated.

Additionally, there is an independent non-safety related CEA position system called the Pulse Counting CEA Position Indication System. The pulse counting CEA position indication system infers each CEA position by maintaining a record of the "raise" and "lower" control pulses sent to each magnetic jack control element drive mechanism (CEDM). This system is incorporated in the plant computer which feeds control board digital displays for a selected group and a selected individual CEA. If an alarm occurs, the operators will use the pulse counting CEA position system in conjunction with the RSPT to evaluate rod position.

## 2. Justification of Operability

Surveillance Requirement 3.1.5.4 requires a CHANNEL FUNCTIONAL TEST (CFT) of the RSPT channel. This defined requirement is expanded upon in the bases as ensuring that the channel is operable and capable of indicating CEA position over the entire length of the CEA's travel. Although Edison has not yet developed procedures and criteria for this surveillance, an adequate refueling interval test of the RSPTs would include the following objectives:

- A Verification of RSPT output at a known physical CEA position,
- B Verification of power supply to the RSPT to ensure proper scale and range,
- C Verification of RSPT circuit insulation is adequate to preclude signal degradation,
- D Verification of signal processing and display over the range of operation (CEAC), and
- E Verification of transmitter response across the entire length of CEA travel.



The following Surveillance Tests are currently performed on at least a refueling interval:

S023-V-12.2.4 Surveillance Requirement CEAC test and Calibration performs:

Verification of RSPT and display indication with all CEAs (Objective A) at the fully inserted position. This provides independent verification of RSPT output at a reference position.

Verification RSPT circuit insulation resistance  $>1.1\text{M ohm}$ . (Objective C) This demonstrates that the circuit insulation has not degraded.

Verification at 6 points of signal processing and display (Objective D) by injection of a simulated signal to the CEACs over the range of operation.

S023-V-12.2.2 CPC Channel Calibration and Functional Test performs:

Verification of power supply to each RSPT. (Objective B)

As evident above, Edison did not previously conduct a surveillance to achieve objective E. However, alarm features of the CEACs, in combination with plant operation and other surveillances of equivalent or shorter frequency, demonstrate transmitter response across the entire length of CEA travel such that it is concluded that the intent of objective E is met. These features and operations include:

CEA Withdrawal During Reactor Startup:

During reactor startup, CEAs are withdrawn from a fully inserted to the All Rods Out (ARO) condition, which moves each RSPT over the entire length of travel. Both CEACs were operable during the Unit 3 cycle 8 and the recent forced outage reactor startups. Between the two CEACs, every RSPT is monitored. As previously discussed, one of the CEAC functions is to generate a CEA deviation alarm whenever the spread of indicated CEA positions within a CEA subgroup exceeds 5 inches.

In the event an RSPT fault were to occur which is significant to the CEA alignment requirement, the CEAC involved would generate a CEA deviation alarm. The CEAC deviation alarm is based on the position indication of an individual CEA relative to the position indication of other CEAs within its subgroup. For a significant RSPT failure to go undetected, each of the other (typically 3) CEAs in the subgroup would need similar ( $>5$  inch) indication errors. This

is not considered credible. If a deviation alarm is generated, operating procedures require confirmation of this deviation against the other RSPT string and pulse counter monitoring the deviant CEA position.

Based on a review of Unit 3 cycle 8 and the recent forced outage startup data, no deviation alarms were attributed to RSPT failures. Additionally, no RSPT sensor failures were recorded during those startups. Therefore, the RSPTs were demonstrated to be operable. Although this is not a documented surveillance test, it strongly supports objective E.

#### Shiftly Channel Checks:

Operations Shiftly Surveillance procedure S023-3-3.25, requires a cross check that Channel-1 RSPTs indicate within 5 inches of the Channel-2 RSPT associated with the same CEA. This channel check is performed for all 91 CEAs. These checks are performed at a wide variety of CEA positions during the cycle, but are predominantly clustered around the ARO operating condition.

#### CEA Drop Time Test (S023-V-12.2.26):

Prior to reactor startup and in accordance with SR 3.1.5.5, all CEAs are withdrawn and one of the two available CEACs is loaded with test software. This software verifies the CEA drop time. A feature of this software is to generate a data file of the CEA positions every 50 milliseconds during CEA travel. This data is provided to the test engineers for detection of any anomalous indications. Although not specifically designed to meet SR 3.1.5.4 objective E, review of the Unit 3 data derived from the test using CEAC #1 demonstrated that all channel 1 RSPTs responded smoothly and consistently over the entire range of CEA travel at the points scanned during the CEA drop.

In summary, existing Surveillance test procedures, in combination with routine CEA operations and CEAC deviation alarms are sufficient to demonstrate operability of each RSPT.

### 3. Probabilistic Risk Assessment

Probabilistic risk assessment insights indicate that deferral of the tests until the Unit 3 refueling outage would expose the plant to no increase in risk over that of normal plant operations and would avoid the risks associated with shutting the unit down to perform the tests.

Specifically, the core damage and significant radioactive release risk impact of continued Unit 3 operation up to the next outage without performing the

subject CEA surveillance test has been determined to be negligible. The San Onofre Units 2/3 living probabilistic risk assessment (PRA) does not include detailed modeling of the control rods and drive mechanisms. Therefore, the potential impact of mis-positioned CEAs cannot be analyzed directly using the PRA. However, the potential mis-positioning of CEAs is not believed capable in design basis or severe accidents of causing more than localized fuel pin failure. There would be no increased threat of a loss of coolable core geometry or a challenge to RCS integrity from localized fuel failure. The impact on core damage risk from a forced unit shutdown to perform the subject surveillance test is estimated to be  $1E-6$ , which is non-negligible. Therefore, the safest course of action is to remain at power and conduct the surveillance testing during the next outage.

E. Justification for the Duration of the Enforcement Discretion:

Enforcement discretion is requested until the NRC approves on an exigent basis a license amendment which will revise SR 3.1.5.4 until the next refueling outage on Unit 3. This request will preclude the need to shut down Unit 3 before the refueling outage for the sole purpose of performing this SR. The start of the Unit 3 cycle 9 refueling outage is currently anticipated for April 12, 1997.

F. Basis for No Significant Hazards Conclusion:

10 CFR 50.92 defines that no significant hazards will occur if operation of the facility, in accordance with the enforcement discretion, does not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated; or
2. Create the possibility of a new or different kind of accident from any accident previously evaluated; or
3. Involve a significant reduction in a margin of safety.

Based on testing, operating experience, and the inherent reliability of the system, Edison concludes the RSPTs have demonstrated their capability to perform their specified safety function and are operable. Consequently, Edison does not consider this enforcement discretion to involve a potential detriment to the public health and safety, and that neither an unreviewed safety question nor a significant hazard is involved.

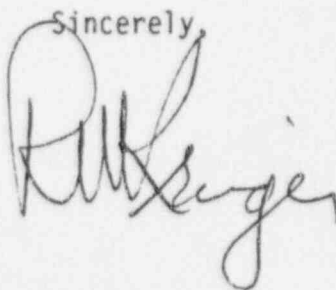


G. Basis for No Irreversible Environmental Consequences:

As this activity is confined to site boundaries, this request for an NRC notice of enforcement discretion involves no increase in the amounts, and no change in the types of any effluent that may be released offsite. There is also no increase in individual or cumulative occupational radiation exposure involved with this enforcement discretion. Accordingly, this temporary enforcement discretion meets the eligibility criteria for categorical exclusion set forth in 10 CFR Section 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the granting of the notice of enforcement discretion.

The San Onofre Nuclear Generating Station Onsite Review Committee reviewed and approved this request for an NRC notice of enforcement discretion.

If you have any questions or comments, or if you would like additional information, please let me know.

Sincerely,  


Enclosure

cc: U. S. Nuclear Regulatory Commission, Document Control Desk  
L. J. Callan, Regional Administrator, NRC Region IV  
K. E. Perkins, Jr., Director, Walnut Creek Field Office, NRC Region IV  
J. A. Sloan, NRC Senior Resident Inspector, San Onofre Units 2 & 3  
M. B. Fields, NRC Project Manager, San Onofre Units 2 and 3