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Docket Nos.: 50-361 and 50-362

> LICENSEES: Southern California Edison Company (SCE) San Diego Gas and Electric Company City of Anaheim, California City of Riverside, California

FACILITY: San Onofre Nuclear Generating Station, Units 2 and 3

SUBJECT: SUMMARY OF MEETING TO AUDIT THE CORE PROTECTION CALCULATOR (CPC) TEST PROGRAM AND OBSERVED THE STATUS OF THE INADEQUATE CORE COOLING (ICC) INSTRUMENTATION

On December 7 and 8, 1982, members of the NRC staff and a consultant visited the San Onofre site to audit the CPC startup test program and to observe the status of the ICC instrumentation at San Onofre Unit 3. A summary of the meeting is given below.

CPC Audit

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The audit was initiated with a meeting to discuss the various review items which had been identified to SCE in advance. At the meeting the staff was informed that Combustion Engineering (CE) and SCE personnel, in perparing for the audit, had discovered a non-conservative error in the values of the power multiplier addressable constants used to define instrument uncertainties. The error results in a non-conservative power calibration uncertainty value of 7.5 percent compared to a required value of 10 percent. The latter value was transmitted to SCE from CE by letter dated August 20, 1981. The letter was said to be lost and the modification was not implemented. This resulted in a Technical Specification violation and will be reported in more detail in an LER regarding the event.

A review of the August 20 letter and discussion of the procedures regarding modifications of this nature revealed that the procedures are inadequate. CE/SCE indicated their intent to review and revise their QA procedures for modifications of this nature. The revised procedures are to be submitted for staff review.

SCE/CE provided prepared written responses to the audit items which had been identified by the staff. Their preparation was through and served to expedite the audit. A summary of our findings follow:

(a) Operator training, including two four hour courses in the details of CPC operation, was described. Operators are permitted to enter only four addressable constants without engineering approval. These are:

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Pt ID	Symbol	
60	FC1	flow calibration constant
61	FC2	flow calibration constant
64	TPC	thermal power calibration constant
65	KCAL	neutron flux power calibration constant

A notebook of pertinent operator procedures was provided to the staff.

(b) Constants affecting the core power distribution calculations are maintained at values which always result in conservative outputs with respect to predicted values during power escalation. The following examples were given for radial peaking factor (RPF):

Power		
Level	Predicted Maximum Value of RPF	Measured Value
20%		1.38
50%	1.44*	1.4135
100%	1.40	(incomplete)

Combustion Engineering agreed to provide curves of predicted outputs for power dependent variables to illustrate that CPC outputs are conservative for intermediate power levels between measurements during power escalation. These will be provided informally for staff review unless questions result from that review.

It was unclear from the documents available at the meeting whether CPC constants would be verified above the 50 percent power level (80 percent and 100 percent) during start-up testing. SCE agreed that further information mation will be provided to the staff and procedures will be justified if they do not include high power verification of constants.

(c) SCE provided a prepared description of their CPC flow calibration procedures and results. A description of the resolution of an apparent problem involving reactor coolant pump (RCP) shaft speed inputs, which was the subject of a license condition, was also provided. The staff was satisfied with these responses.

*Maximum CPC value during power escalation.

Corrective actions being taken to avoid recurrence of this type of error involves additional training of software design personnel at CE in the application of QA standards to the generation and independent review of software documentation. In addition, a new document detailing the standards to be followed in the generation and review of software documentation is being prepared. CE agreed to submit this document for staff review as a supplement to software change procedures for CPC systems still under review.

CPC Observation

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A periodic test disc was inserted for a test of the siftware on one calculator. A listing of the addressable constant data base was obtained. Spot checks of addressable constant values in other calculators were performed at the console. A listing report on data base values in the CPCs add the CEAC calculators was obtained from the plant computer. No software errors were evident.

It was noted that with the plant at about 50 percent power, the CPC indicated power level was about 2.5 percent less than the COLSS indicated power level. The CPC indicated power was in close agreement with the secondary calorimetric power. When questioned, available SCE personnel could not explain the descrepancy and did not know which power indication would be used to ascertain when the plant is operating at the license power limit. A written response to these questions was promised.

Staff Recommendations Resulting from CPC Audit and Observation

- (1) Quality Assurance and Software Change Procedures for CPC/CEAC software should be revised to correct deficience is identified during this audit and should be submitted for staff review and approval prior to approval of CPC systems for plants still in the licensing process.
- (2) The software error which precludes application of the CEAC penalty factor to LPD calculations in accordance with approved software design specifications is known to exist in the ANO-2, Waterford, and San Onofre 2 and 3 software systems. CPC operation with this
- e error has been justified by CE on the basis that DNB trips would occur occur prior to any LPD trips that might be initiated when applying the CEAC penalty factor. The staff has not reviewed this justification in detail, but believes that the nature of the problem precludes complete assurance that this conclusion is true. Even if the conclusion is valid, we believe that the errors degrades the protection provided by the CPCs by effectively eliminating one software trip path to the protection circuit. While the safety concern does not appear serious enough to warrant plant shutdowns for correction, we believe that the software should be corrected as soon as practical without imparing operation.

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Observation of Status of Installation ICC Instrumentation During the meeting the staff observed the status of the ICC instrumentation and found that installation progress appeared to be on schedule.

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Harry Rood, Project Manager Licensing Branch No. 3 Division of Licensing

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MEETING SUMMARY

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