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Southern California Edison Company

SCE

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H. B. RAY
STATION MANAGER

July 2, 1982

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

Attention: Mr. R. H. Engelken, Regional Administrator

Dear Sir:

Subject: Docket No. 50-361
14-day Follow-up Report
Licensee Event Report No. 82-034
San Onofre Nuclear Generating Station Unit 2

Reference: Letter, H.B. Ray (SCE) to R.H. Engelken (NRC), Written Confirmation of Reportable Occurrence, dated June 22, 1982

In accordance with Appendix A Technical Specification 6.9.1.12.b to Operating License NPF-10, for San Onofre Nuclear Generating Station Unit 2, this submittal provides the required 14-day follow-up and Licensee Event Report (LER) involving the Core Protection Calculator (CPC). LER No. 82-034 is enclosed.

As stated in the referenced letter, during performance of the post-core hot functional testing, discrepancies were discovered involving Reactor Coolant Pump (RCP) shaft speed and Control Element Assembly (CEA) inputs to the CPC. Our investigations indicate that these were two separate problems.

RCP Shaft Speed Inputs

1. Problem Description

The RCP shaft speed input problem was originally identified in May during Post Core Hot Functional Instrument Correlation Tests. The CPC operator reported that the CPC point identifications (PID's) for the RCP shaft speed displayed at the CPC operator's console did not correspond to actual pump inputs.

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2. Cause of Occurence

The problem resulted because the plant RCP numbering scheme did not appear to correspond to the vendor's CPC software numbering. The vendor issued a design change on June 10, 1982 to make revised RCP assignments compatible with his understanding of the field wiring of RCP shaft speed inputs. This action was incorrect. Subsequent investigation determined that the originally wired RCP shaft speed input was correct. This was verified by disconnecting individual RCP speed inputs to the RCP sensors and verifying the correct CPC operator's console indication. The vendor then cancelled the original design change on June 22, 1982, and the wiring was restored and tested.

3. Corrective Action

No additional corrective actions are required.

4. Impact on Plant Safety

If the suggested RCP wiring change input to the CPC's had been made, the CPC's would have been operating with RCP's juxtaposed in its logic. This would have had no effect on safety, for flow related events where all RCP's are equally affected. For example, an electrical frequency transient would be seen by all RCP's and would thus be seen in the CPC's as affecting all the RCP's, however they were configured. For any RCP coastdown combination, from loss of one RCP up to and including a complete loss of flow, protection would not have been degraded. The CPC software is configured to provide a trip signal upon detection of loss of any one or more RCP's, irrespective of which RCP is lost.

Under certain conditions, normal steady-state operation may have been seen by the CPC as slightly different from actual plant conditions. This might occur if one pump is rotating at a different speed because of individual pump/motor characteristics or loop flow resistance characteristics. Had the suggested input juxtaposition been made, the deviating pump speed would be seen as being in a different loop from the actual deviating loop. Slightly different total mass flows and delta-T power calculation could have occurred. This is not considered a problem as no reduction of the protection provided by the CPC would result.

CEA Position Indication Inputs

1. Problem Description

The CEA position indication problem was identified on June 10, 1982 during Control Element Drive Mechanism (CEDM) Rod Drop Testing. It was noticed that the CPC operator's console CEA assignments did not correspond to actual CEA assignments.

2. Cause of Occurence

Investigation of the problem revealed that while adequate procedures existed to implement and verify the CEA input order, an error was made in the implementation. The CPC software inputs were assigned according to increasing CEA subgroup number while the hardware provided CEA inputs according to increasing CEA number.

3. Corrective Action

The decision was made to revise the CEA inputs to make them compatible with the existing CPC software. The vendor issued a design change on June 23, 1982 to revise the CEA inputs. This design change included rewiring the CEA inputs to the CPC and conducting verification checks of the circuits to verify the correct pin assignments.

A review of the mechanism for this error has indicated it is an independent event related to the hardware/software interface. The vendor is developing a software/hardware interface specification to clarify the CPC assembly and testing. This will preclude recurrence on future installations.

4. Impact on Plant Safety

If the CEA assignment problem had remained undetected and the CPC had been in service, response would have been conservative compared to the FSAR analysis. The CEA assignments as seen by the CPC's were sufficiently juxtaposed so that any authorized bank positioning in the core (i.e., outside of the top deadband) would have resulted in very conservative subgroup or out-of-sequence penalty factors being applied to the DNBR and Local Power Distribution (LPD) calculations. This would have resulted in a reactor trip or would have alerted the operators to the problem.

If all the CEA's are out of the core, no penalty factors would have been applied. In particular, during the plant startup procedure the CPC's are scheduled to be placed in service with all CEA's fully out of the core except that the lead regulating group, group 6, will be about 110 inches withdrawn. When the CPC's are removed from bypass with this CEA configuration, a CPC trip on DNBR would have been perceived by the CPC's as one of the subgroups in shutdown group A. Thus, the CPC's would see all rods out except a shutdown subgroup. Penalty factors would be applied because of subgroup deviation and radial peaking. This combined effect would result in a multiplicative penalty factor of approximately 20. At low powers, the CPC's assume a power level of 20%. This penalty factor of 20 coupled with the power level of 20% would have guaranteed an immediate reactor trip. There was no impact on health and public safety.

Please contact me if you have further questions concerning this matter.

Sincerely,

Enclosure: LER No. 80-034

cc: Mr. A. E. Chaffee (USNRC Resident Inspector, San Onofre Unit 2)

U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement

U. S. Nuclear Regulatory Commission
Office of Management Information & Program Control

Institute of Nuclear Power Operations