LICENSEE EVENT REPORT (LER)

Facility Name (1)	Docket Number (2)	Page (3)
SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2	0 5 0 0 0 3 6 1	1 of 0 3

Title (4)

Incorrect Rod Shadowing Factors in the Core Protection Calculators

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
Month	Day	Year	Year	Sequential Number	Revision Number	Month	Day	Year	Facility Names	Docket Number(s)
0 3	3 1	9 5	9 5	0 0 7	0 0	0 5	2 6	9 5	SONGS UNIT 3	0 5 0 0 0 3 6 2
										0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)					
5		___ 20.402(b)	___ 20.405(c)	___ 50.73(a)(2)(iv)	___ 73.71(b)		
POWER LEVEL (10)	0 0 0	___ 20.405(a)(1)(i)	___ 50.36(c)(1)	___ 50.73(a)(2)(v)	___ 73.71(c)		
		___ 20.405(a)(1)(ii)	___ 50.36(c)(2)	___ 50.73(a)(2)(vii)	X Other (Specify in Abstract below and in text) Voluntary Report		
		___ 20.405(a)(1)(iii)	___ 50.73(a)(2)(i)	___ 50.73(a)(2)(viii)(A)			
		___ 20.405(a)(1)(iv)	___ 50.73(a)(2)(ii)	___ 50.73(a)(2)(viii)(B)			
		___ 20.405(a)(1)(v)	___ 50.73(a)(2)(iii)	___ 50.73(a)(2)(x)			

LICENSEE CONTACT FOR THIS LER (12)

Name	TELEPHONE NUMBER
R. W. Krieger, Vice President, Nuclear Generation	AREA CODE 7 1 4 3 6 8 - 6 2 5 5

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)		Expected Submission Date (15)	Month	Day	Year
___ Yes (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On 3/31/95, an engineer noted an unexpected change in three Core Protection Calculator (CPC) addressable constants (ASM values) proposed for installation in the Unit 2 CPCs. ASM values correct the input from the excore nuclear instruments for rod shadowing.

Upon investigation, Edison determined: 1) ABB Combustion Engineering (ABB CE) had provided incorrect ASM values for both Units; and 2) Edison personnel had erroneously entered the Unit 2 ASM values into the Unit 3 CPCs. The Unit 2 values were used at Unit 3 due to cognitive personnel error. An engineer had inadvertently transcribed data from a Unit 2 data sheet rather than from the Unit 3 data sheet. Edison has revised our procedure to preclude utilization of the wrong unit data in the CPCs.

ABB CE is performing an investigation to determine why they provided incorrect ASM values. Edison will review the final investigation report and schedule a follow-up surveillance/audit if necessary.

Edison participated in a Joint Utility Audit of ABB CE in March, 1995, which assessed the adequacy and effectiveness of the ABB CE Quality Program as generally effective, but which identified deficiencies in the area of Design Control. Edison will receive periodic status reports of ABB CE corrective actions.

Edison has confirmed that both Units always remained within design limits and is providing this voluntary report due to NRC and industry interest.

DESCRIPTION OF THE EVENT:

Plant: San Onofre Nuclear Generating Station, Units 2 & 3
Reactor Vendor: Combustion Engineering
Event Date: March 31, 1995

Unit 2 Mode: Mode 5, Cold Shutdown
Pressure: 0 psig
Temperature: 105 F

Unit 3 Mode: Mode 1, Power Operation
Power: approximately 97%

On 3/31/95, while reviewing proposed Core Protection Calculator (CPC) [JC, CPU] addressable constants for the upcoming Unit 2 fuel Cycle 8, a supervising engineer (utility, nonlicensed) noted an unexpected change in three CPC addressable constants (ASM2, ASM3 and ASM4) proposed for installation in the four Unit 2 CPCs.

The ASM2, ASM3 and ASM4 values (ASM values) are multipliers on data base values used by the CPCs to correct the input from the excore nuclear instruments for rod shadowing in the calculation of core power and core power distribution. The CPCs calculate three reactor trips credited in the safety analysis that are affected by rod shadowing factors: the minimum Departure from Nucleate Boiling Ratio (DNBR) trip; the Linear Power Density (LPD) trip; and the Variable Overpower Trip (VOPT).

Upon investigation of the unexpected ASM values, Edison determined:

1) ABB Combustion Engineering (A3B CE) had provided incorrect ASM values for Cycle 7 operation for both Units, and

2) Edison personnel had erroneously entered the Unit 2 ASM values into the Unit 3 CPCs.

Due to these errors, Unit 2 operated through Cycle 7 with the incorrect ASM values and Unit 3 operated from 12/30/93 (the start of Cycle 7) through 3/31/95 with incorrect ASM values.

On 4/26/95, Edison and ABB CE confirmed our initial engineering judgement that both Units always remained within design limits. Therefore, the event does not meet the reporting criteria of 10CFR50.73. However, Edison is submitting this voluntary report due to potential NRC and industry interest.

CAUSE OF THE EVENT:

Incorrect Values provided by ABB CE

ABB CE is performing a formal root cause investigation to determine why they provided incorrect Cycle 7 ASM values to Edison. Preliminary results indicate that ASM values from Cycle 6 were not updated with values calculated for Cycle 7 due to personnel error. ABB CE has confirmed that the error that occurred in transmitting the Cycle 7 ASM values did not occur in any other cycle for either Unit.

Unit 2 values entered in Unit 3 CPCs by Edison

Edison has concluded that the Unit 2 values were used at Unit 3 due to cognitive personnel error. An engineer (utility, nonlicensed), while resolving comments to the Unit 3 Cycle 7 addressable constant installation document, inadvertently transcribed data from a copy of a Unit 2 data sheet rather than from the original

Unit 3 data sheet. Two technical reviewers (utility, nonlicensed) failed to note this error.

CORRECTIVE ACTIONS:

At the time of discovery, Unit 3 was operating with all control element assemblies (rods) fully withdrawn from the core (all rods out, ARO). In this configuration, the rod shadowing factors are not used by the CPC algorithms. While there was no immediate impact on Unit 3 core protection, Control Room operators were immediately instructed to maintain the ARO configuration until the CPCs were updated with correct Cycle 7 values, which occurred about three hours later.

Edison has revised the reload power ascension procedure to include additional data verification steps which will preclude utilization of the wrong unit data in the CPCs.

A Joint Utility Audit of ABB CE in Windsor, CT was performed on March 27-31, 1995. The audit team, led by Arizona Public Service (APS), consisted of auditors and technical specialists from APS, Baltimore Gas and Electric, Florida Power and Light, Entergy, and Southern California Edison. The audit team was divided into two teams, one for the engineering offices and the other for the manufacturing facility. The audit assessed the adequacy and effectiveness of the ABB CE Quality Program in assuring that the necessary controls are implemented for supplying nuclear fuel, core component fabrication, and associated computer software. The audit team determined that the ABB CE Quality Program is generally implemented in an effective manner. The audit identified deficiencies in the area of Design Control. APS issued Corrective Action Requests (CARs) and will follow up on the responses and verify implementation of corrective actions taken by ABB CE. Edison will receive periodic status of the CARs from APS.

Also, since ABB CE is performing a root cause investigation of why they provided incorrect ASM values to Edison, the Edison Procurement Quality organization will obtain a copy of the final ABB CE report for review, and will schedule a follow up surveillance/audit if necessary.

SAFETY SIGNIFICANCE:

As noted above, the CPCs calculate three reactor trips credited in the safety analysis that are affected by rod shadowing factors: the DNBR trip; the LPD trip; and the VOPT. Edison and ABB CE evaluated the impact of the incorrect ASM values on each of these reactor trip calculations. The evaluations were performed using a wide range of operating conditions and possible plant maneuvers. From this study it was concluded that there was sufficient conservatism contained in other CPC factors to more than offset the effect the incorrect ASM values had on the DNBR and LPD trips for all of Cycle 7 for both Units. Edison and ABB CE also confirmed that the VOPT remained conservative for all of Cycle 7 for both Units. Consequently, the CPCs remained capable of performing their safety functions throughout Cycle 7 for both Units. Edison has concluded that the safety significance of this event was minimal.

ADDITIONAL INFORMATION:

There have been no LER events involving CPC errors in the previous three years.

LER 2-93-007 reported a data input error made by ABB CE in a 1977 FSAR accident analysis. The cause of the error could not be determined because of the long time interval between the error and its discovery.