The Light company
Houston Lighting & Power South Texas Project Electric Generating Station P. O. Box 289 Wadsworth, Texas 77483

March 19, 1993
ST-HL-AE-4377
File No.: G26
10CFR50.73

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project
Unit 1
Docket No. STN 50-498
Licensee Event Report 93-009
An Unanalyzed Condition due to Undersized Fuses
in the Solid State Protection System

Pursuant to 10CFR50.73, Houston Lighting & Power (HL&P) submits the attached Unit 1 Licensee Event Report (LER 93-009) regarding an unanalyzed condition due to undersized fuses in the Solid State Protection System. This event did not have any adverse effect on the health and safety of the public.

If you should have any questions on this matter, please contact Mr. J. M. Pinzon at (512) 972-8027 or me at (512) 972-7138.

S. L. Rosen
Vice President,
Nuclear Engineering

MAC/ag

Attachment: LER 93-009 (South Texas, Unit 1)

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IE22

c:

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
South Texas, Unit 1	05000 498	1 OF 5

TITLE (4) An Unanalyzed condition due to Undersized Fuses in the Solid State Protection System.

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									South Texas, Unit 2	05000 499
0 2	1 7	9 3	9 3	0 0 9	0 0	0 3	1 9	9 3	FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)					
POWER LEVEL (10)	0	20.402(b)		20.405(c)		50.73(a)(2)(iv)	73.71(b)
		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)	OTHER
		20.405(a)(1)(iii)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iv)	X	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 (Include Area Code)
Jairo Pinzon - Senior Engineer	(5 1 2) 9 7 2 - 8 0 2 7

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
X	YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		5	20	93

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On February 17, 1993, Unit 1 was in Mode 5 and Unit 2 was in Mode 4, both at 0% power. Plant personnel determined that an unanalyzed condition existed in both units related to a failed fuse event that occurred on February 13, 1993. This unanalyzed condition involved undersized fuses found in the Solid State Protection System (SSPS) in which an inrush current could cause the fuses to fail and prevent the fulfillment of SSPS's intended safety function. This resulted in Unit 2 entering Technical Specification Section 3.0.3 and plant cooldown to Mode 5 was initiated at 1030 on February 17, 1993 in response to the inoperable SSPS actuation cabinets. Unit 1 was already in Mode 5. The cause of this event was attributed to inadequate design. The actions taken to address this event are the 10 amp fuses were replaced with 20 amp fuses in both Units, other 20 volt vital A.C. distribution panels were reviewed for similar conditions, and testing was performed to determine actual inrush current.

REQUIRED NUMBER OF DIGITS/CHARACTERS
FOR EACH BLOCK

BLOCK NUMBER	NUMBER OF DIGITS/CHARACTERS	TITLE
1	UP TO 46	FACILITY NAME
2	8 TOTAL 3 IN ADDITION TO 05000	DOCKET NUMBER
3	VARIES	PAGE NUMBER
4	UP TO 76	TITLE
5	6 TOTAL 2 PER BLOCK	EVENT DATE
6	7 TOTAL 2 FOR YEAR 3 FOR SEQUENTIAL NUMBER 2 FOR REVISION NUMBER	LER NUMBER
7	6 TOTAL 2 PER BLOCK	REPORT DATE
8	UP TO 18 – FACILITY NAME 8 TOTAL – DOCKET NUMBER 3 IN ADDITION TO 05000	OTHER FACILITIES INVOLVED
9	1	OPERATING MODE
10	3	POWER LEVEL
11	1 CHECK BOX THAT APPLIES	REQUIREMENTS OF 10 CFR
12	UP TO 50 FOR NAME 14 FOR TELEPHONE	LICENSEE CONTACT
13	CAUSE VARIES 2 FOR SYSTEM 4 FOR COMPONENT 4 FOR MANUFACTURER NPRDS VARIES	EACH COMPONENT FAILURE
14	1 CHECK BOX THAT APPLIES	SUPPLEMENTAL REPORT EXPECTED
15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

REQUIRED NUMBER OF DIGITS/CHARACTERS
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12	UP TO 50 FOR NAME 14 FOR TELEPHONE	LICENSEE CONTACT
13	CAUSE VARIES 2 FOR SYSTEM 4 FOR COMPONENT 4 FOR MANUFACTURER NPRDS VARIES	EACH COMPONENT FAILURE
14	1 CHECK BOX THAT APPLIES	SUPPLEMENTAL REPORT EXPECTED
15	6 TOTAL 2 PER BLOCK	EXPECTED SUBMISSION DATE

DESCRIPTION OF EVENT:

On February 17, 1993, Unit 1 was in Mode 5 and Unit 2 was in Mode 4, both at 0% power. Plant personnel determined that an unanalyzed condition existed in both units related to a failed fuse event that occurred on February 13, 1993. This unanalyzed condition involved potentially undersized fuses found in the Solid State Protection System (SSPS) in which an inrush current could possibly cause the fuses to fail and prevent the fulfillment of SSPS's intended safety function.

On February 13, 1993, while performing Train S reactor trip breaker trip actuating device operational surveillance test in Unit 1, a 10 amp fuse in electrical distribution panel EDP1201, providing power to the Train A SSPS actuation cabinet failed. The unit was in Mode 5 at 0% power at the time of the failure. Testing was suspended and the event was referred to engineering for investigation. Engineering concluded that the fuse, sized for steady state current conditions, may have been undersized based on inrush current. The review determined that Westinghouse had provided 20 amp fuses in the SSPS actuation cabinet but the fuses in the electrical distribution panel feeding this cabinet had been sized at 10 amps. The 10 amp fuses were also installed in Unit 2.

An operability review was performed to determine the impact of having 10 amp fuses feeding the SSPS actuation cabinet. The initial results concluded that all three SSPS actuation trains were inoperable and as a result Unit 2 entered Technical Specification 3.0.3. At 1030 on February 17, 1993, plant cooldown to Mode 5 was initiated in Unit 2. Unit 1 was already in Mode 5 so entry into Technical Specification 3.0.3 was not required. Concurrently, plant change forms were initiated to revise the fuse size from 10 amp to 20 amp. Unit 2 exited Technical Specification 3.0.3 when the 10 amp fuses were replaced with 20 amp fuses.

CAUSE OF EVENT:

The cause of this event was inadequate design. The inrush current was apparently not taken into account when the fuse size or type was determined.

Circuit protection design normally is based on steady state current. Inrush current conditions are typically of a very short duration and most protective devices can operate through this transient with no problems. However, inrush currents for this circuit under a postulated main steam line break approach fault protection level for the particular type fuse.

ANALYSIS OF EVENT:

The SSPS contains three trains of Engineered Safety Features (ESF) actuation cabinets which actuates various ESF equipment via relays providing protection to mitigate the consequences of postulated accidents. When the correct logic requirements are met, master relays are energized which in turn energize a set of slave relays that operate the various ESF components.

In evaluating the design, the worst case accident scenario was determined to be a main steam line break, which would initiate the slave relays associated with steam line isolation and safety injection. This condition energizes 47 relays (43 latching and 4 non-latching) in the Train A or B actuation panel; 37 (33 latching and 4 non-latching) in the Train C actuation panel.

Analyses of the fuses are still being performed by an outside laboratory and further evaluation is being performed by HL&P engineering. When these evaluations are completed, a supplemental report will be submitted to expand on the analysis of this event.

The revised fuse size, 20 amps, provides adequate protection for the connecting cable between the distribution panel and the actuation panel. The revised fuse size is acceptable to properly ensure sufficient margin is available so that the inrush current does not degrade or fail the fuses.

ANALYSIS OF EVENT: (Con't)

Entry into Technical Specification 3.0.3 is reportable pursuant to 10CFR50.73 (a)(i)(B). With the units in an unanalyzed condition, this event is also reportable pursuant to 10CFR50.73(a)(ii)(A).

CORRECTIVE ACTIONS:

1. The fuses were replaced with 20 amp fuses. A 20 amp fuse provides adequate protection for this design and adequate margin for inrush current.

2. A comparative evaluation of vital 120 VAC distribution panel fuses and selected DC circuit breakers and the main protective devices in the panels fed by them has been done to determine if other problems exist. Vendor panels were found in which the panel protection is larger than the distribution panel protection but these cases were determined to be acceptable after review of the supplied load currents.

3. A review will be performed by Engineering on a random sample basis to determine the adequacy of the station design related to the size selection of fuses and/or circuit breakers within the original architect engineer design scope which interfaced with vendor designed safety related systems. This action will be completed by May 6, 1993.

4. An independent laboratory analysis is underway to determine the failure mode of the failed fuse removed from the Unit 1 Train A distribution panel EDP1201. In addition, various laboratory tests will be performed on the remaining 10 amp fuses removed from the other distribution panels. The analysis will be completed by April 15, 1993.

5. A supplemental report will be issued to provide further analysis on this event after the laboratory analysis and the engineering evaluations are completed. The supplemental report will be issued by May 20, 1993.

ADDITIONAL INFORMATION:

There have been no previously reported events concerning fuses being undersized causing an unanalyzed event.