

The Light company

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

April 7, 1994
ST-HL-AE-4753
File No.:G26
G02
10CFR50.73

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

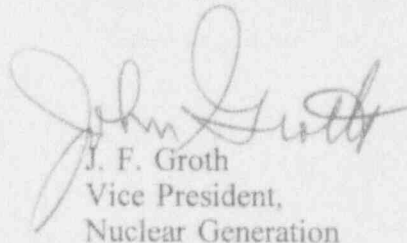
South Texas Project
Unit 1
Docket No. STN 50-498
Licensee Event Report 94-012
Failure to Meet the Requirements of Technical Specification due to
Standby Diesel Generator 11 Being Technically Inoperable as a result of an
Intermittent Failure of the K1 Contactor for the Voltage Regulator/Field Flash Circuit

Pursuant to 10CFR50.73, Houston Lighting & Power (HL&P) submits the attached Unit 1 Licensee Event Report 94-012 regarding failure to meet the requirements of Technical Specification due to Standby Diesel Generator 11 being technically inoperable as the result of an intermittent failure of the K1 contactor for the Voltage Regulator/Field Flash Circuit. This event did not have an adverse effect on the health and safety of the public.

In addition this LER incorporates the requirements to submit a Special Report with regard to the valid failure that occurred on March 1, 1994 and the supplement to the Special Report submitted on March 7, 1994

On March 31, 1994 an extension of the due date of this letter to April 7, 1994, was requested and granted by Mr. L. A. Yandell of NRC Region IV.

If you should have any questions on this matter, please contact Mr. J. M. Pinzon at (512) 972-8027 or me at (512) 972-8664.


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Attachment: LER 94-012 (South Texas, Unit 1)

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Project Manager on Behalf of the Participants in the South Texas Project

c:

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LICENSEE EVENT REPORT (LER)

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.

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

FACILITY NAME (1) South Texas Unit 1	DOCKET NUMBER (2) 05000 498	PAGE (3) 1 OF 6
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TITLE (4) Failure to Meet the Requirements of Technical Specification due to Standby Diesel Generator # 11 Being Technically Inoperable as a result of an Intermittent Failure of the K1 Contactor for the Voltage Regulator/Field Flash Circuit

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 NAME	DOCKET NUMBER
03	11	94	94	-- 012 --	00	04	07	94	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9) 5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)																				
POWER LEVEL (10) 0	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(vii)(A)	<input type="checkbox"/> 50.73(a)(2)(vii)(B)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 73.71(b)	<input type="checkbox"/> 73.71(c)	<input checked="" type="checkbox"/> OTHER
	(Specify in Abstract below and in Text, NRC Form 366A)																				
	Special Report																				

LICENSEE CONTACT FOR THIS LER (12)

NAME Jairo Pinzon - Senior Engineer	TELEPHONE NUMBER (Include Area Code) (512) 972-8027
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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
X	EK	CNTR	I005	YES					

SUPPLEMENTAL REPORT EXPECTED (14)	YES (if yes, complete EXPECTED SUBMISSION DATE).	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On March 11, 1994, Unit 1 was in Mode 5 at 0% power. At approximately 1000 hours, it was determined that the valid failures which had occurred on Standby Diesel Generator 11 on February 3, 1994 and March 1, 1994 were due to the same cause. In both cases, the Standby Diesel Generator failed to develop rated voltage upon starting. The cause of the valid failures was an intermittent failure of the K1 contactor for the Voltage Regulator/Field Flash circuit. Therefore, Standby Diesel Generator 11 was technically inoperable since February 3, 1994, resulting in a failure to meet the requirements of Technical Specifications. Corrective actions include: replacing the voltage release relays (VR1/2) in the voltage regulator circuits and the K1 contactor of Standby Diesel Generator 11, developing preventive maintenance activities for the Field Flash circuit, enhancing the existing preventive maintenance activities on the K1 contactor, and performing an independent assessment of the control panel installation by a qualified vendor.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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.

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		94	-- 012 --	00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

DESCRIPTION OF EVENT

On March 11, 1994, Unit 1 was in Mode 5 at 0% power. At approximately 1000 hours, it was determined that the valid failures which had occurred on Standby Diesel Generator 11 on February 3, 1994 and March 1, 1994 were due to the same cause. In both cases, the Standby Diesel Generator failed to develop rated voltage upon starting. The cause of the valid failures was an intermittent failure of the K1 contactor for the Voltage Regulator/Field Flash circuit. Therefore, Standby Diesel Generator 11 had been technically inoperable since February 3, 1994 resulting in a failure to meet the requirements of Technical Specifications.

On February 3, 1994 at 0204 hours, Unit 1 was in Mode 4, performing the Standby Diesel Generator 11 Operability Test. Standby Diesel Generator 11 failed to obtain normal voltage and frequency during an emergency-mode start. The engine came up to rated speed, however, there was no indication of generator voltage output. The engine was subsequently secured. The diesel start was classified as a Valid Failure, and Standby Diesel Generator 11 was declared inoperable.

Static checks were performed on the voltage regulator and exciter field flash circuits. The troubleshooting efforts identified faulty contacts on the VR1 (voltage release) relay that supplies power to the Field Flash (FF) relay. The normally-closed contacts were found intermittently open, discolored, and badly pitted.

Troubleshooting also identified a potential problem with two other relays. Relays 14FFX1 and 14FFX2 were not picking up on first application of test voltage. Subsequent testing of these relays, in which each went through 100 cycles, failed to repeat this problem. Several other similar relays were removed from the panel and tested, all with satisfactory results. The cause of the initial problem was determined to be the test hookup used in the field.

The potential transformers that feed the voltage regulators were tested for continuity. The circuit was found to be operating normally. The potential transformers are connected to the regulator circuit through a set of stabs. These stabs were found to be clean and functioning as designed. The operation of the K1 contactor, which shorts the generator field on shutdown, and resets for operation, was tested satisfactorily.

All other inspected components of the voltage regulator and exciter field flash circuits were found satisfactory. The VR1, VR2, 14FFX1, and 14FFX2 relays were replaced. The Standby Diesel Generator was test started, both in the test mode, and in the emergency mode. Standby Diesel Generator 11 operated as designed, coming up to speed and voltage within the required 10 seconds. No anomalies were noted in the operation of the field flash circuit, or the voltage regulator. A satisfactory 4½ hour surveillance test was performed. Since February 3, Standby Diesel Generator 11 has been placed on increased surveillance frequency with three additional surveillances conducted satisfactorily.

LICENSEE EVENT REPORT (LER)
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TEXT (if more space is required, use additional copies of NRC Form 366A) (17)

DESCRIPTION OF EVENT: (Cont'd)

On March 1, 1994, at 1120 hours, during the fourth start subsequent to the February 3 failure, Unit 1 was in Mode 3. Standby Diesel Generator 11 again failed to obtain normal voltage and frequency during an emergency-mode start test. The diesel start was classified as a Valid Failure, and Standby Diesel Generator 11 was declared inoperable.

Troubleshooting focused on the Voltage Regulator/Field Flash circuit. All components, including the just replaced voltage release relays, tested satisfactorily. Cyclic testing was performed on the K1 contactor. During one of the operations, the relay failed to reset. The relay was removed for testing in the shop. On repeated cyclic testing, the K1 contactor periodically failed to reset.

The K1 contactor was disassembled to inspect the mechanical actions, reset coils and auxiliary contacts. The reset coils were found to have badly pitted contacts, and a small spring, used to stabilize the moving contact, was broken and loose inside the reset coil housing. The spring appeared to have shorted across the contacts.

The K1 contactor was replaced. The circuit was functionally tested in place for at least twenty cycles, with proper operation. The decision was made to also replace the balance of the components in the field flash circuit. Upon completion of the replacement activity, the entire circuit was functionally tested, and the diesel was restored for post-maintenance testing.

The output of the generator supplies the voltage regulator. The K1 contactor functions to terminate voltage production by shorting the voltage regulator power when the generator is in shutdown. On start, the contactor is reset to open, allowing the voltage regulator to function and produce voltage output. The malfunction of the K1 contactor in this case was the failure to reset on a start signal, thereby keeping the voltage regulator from functioning.

The first operational test of the diesel was performed with the field flash disabled, to simulate the postulated failure of February 3, 1994, lack of field flash. This test was to determine if the generator had sufficient residual magnetism to excite the voltage regulator without the injection of a field flash. With sufficient residual magnetism in the generator, the resultant output would be of sufficient strength to drive the voltage regulator and self-excite the field, assuming an operational K1 contactor.

The results were that the generator did initiate voltage production on the available core magnetism, with the field building slowly over a ten second period.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

DESCRIPTION OF EVENT: (Cont'd)

Based on the identical recording of 55 volts generator output in both of these starts (resultant from the core magnetism), the residual magnetism was sufficient to excite the generator during the first K1 contactor failure to reset on February 3. The validity of this test indicated that the root cause of the failure on February 3 was the K1 contactor failure to reset on a valid start signal.

Following this test, the controls were completely restored for a final post-maintenance test. On completion, a successful 4½ hour surveillance was performed.

The two failures to come to voltage on February 3 and March 1 were reviewed and determined to be due to the same cause therefore, Standby Diesel Generator 11 was technically inoperable since February 3, 1994. This resulted in a failure to meet the requirements of Technical Specifications.

CAUSE OF EVENT:

The cause of the individual failures of the Standby Diesel Generator 11 was the intermittent failure of the K1 contactor to the Voltage Regulator/Field Flash circuit.

The cause of not meeting the requirements of Technical Specifications was due to lack of recognition that the intermittent failure of the K1 contactor was the cause of the February 3, 1994 event. This subsequently resulted in declaring Standby Diesel Generator 11 operable when in fact the Standby Diesel Generator was technically inoperable. Since the failure was intermittent, the K1 contactor tested satisfactory during the troubleshooting activity and six subsequent successful starts.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

ANALYSIS OF EVENT:

Failure to meet the requirements of Technical Specifications is reportable pursuant to 10CFR50.73(a)(2)(i)(B). Standby Diesel Generator 11 was technically inoperable from February 3, 1994 until the time when Standby Diesel Generator 11 was declared operable after the March 1, 1994 event. There was a period of 25 days where it was not known that the diesel was inoperable. Failure to restore Standby Diesel Generator 11 to operable condition within 72 hours is in violation of Technical Specification 3.8.1.1.(b). Technical Specification 3.8.1.1.(d), requires systems that depend on the remaining operable Standby Diesel Generators as a source of emergency power remain operable. During this time frame the other two Standby Diesel Generators were operable. In addition a one time exception for the allowed out of service time for Auxiliary Feedwater Pump 14 was in effect. The exemption stated that all three Standby Diesel Generators would be operable during Auxiliary Feedwater Pump 14 unavailability. Auxiliary Feedwater Pump 14 was inoperable starting on February 8, 1994 to February 13, 1994 for approximately 121 hours and 30 minutes. However, during the majority of this time frame, the Auxiliary Feedwater Pump 14 was, in fact, functional and capable of performing its safety function.

If the Standby Diesel Generator was challenged, it may have not been able to perform its safety function because the failure of the K1 relay was intermittent. There were six successful starts between the two failures. Therefore, there was a probability that the Standby Diesel Generator would have started and performed its safety function.

Based on the above, plus the fact that the decay heat resulting from this startup was insignificant, the safety consequences of this situation are minimal.

CORRECTIVE ACTIONS:

The following corrective actions have been taken or will be taken as a result of this event:

1. The voltage release relays (VR1/2) in the voltage regulator circuits and the K1 contactor of Standby Diesel Generator 11 have been replaced.
2. The K1 contactor preventive maintenance activity will be enhanced. This action will be completed by June 30, 1994.
3. A preventive maintenance activity will be developed for both Units for the field flash circuit. This action will be completed by June 30, 1994.
4. An independent assessment of the control panel installation will be performed by a qualified vendor. This assessment will be completed by July 31, 1994. Any necessary corrective action will be developed based on the results of the assessment.

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ADDITIONAL INFORMATION:

The failed component is VR1, a Potter Brumfield model number KUP-14D15 110vdc 3-pole double-throw relay.

The K1 relay is a latching type lighting contactor supplied by ITE/TELEMECANIQUE. The K1 model number is 143ED12-X3 (Cooper Entronics Part # 2-04E-204-012). This device is composed of one set of main contacts, a main contactor coil, four auxiliary contacts, and a reset coil.

As it has been determined that the same root cause was responsible for both voltage regulator failures, the classification of both tests are being combined into one valid failure. Therefore, including this event, there have been two valid failures in the past twenty (20) valid tests and four valid failures in the last one hundred (100) tests, therefore, testing frequency will remain at the accelerated rate of weekly for Standby Diesel Generator 11.