

# The Light company

Houston Lighting & Power

South Texas Project Electric Generating Station P. O. Box 289 Wadsworth, Texas 77483

October 5, 1994  
ST-HL-AE-4901  
File No.: G26  
10CFR50.73

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

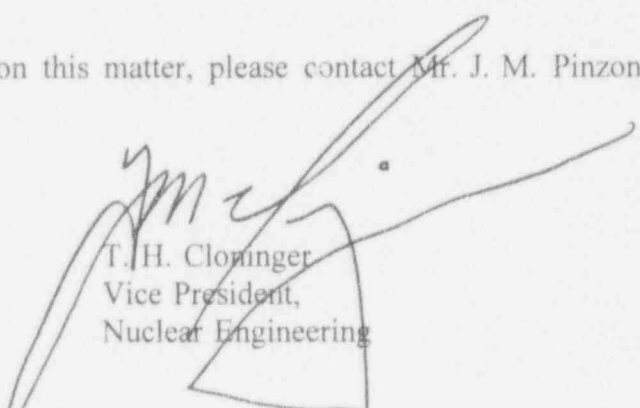
South Texas Project  
Unit 1  
Docket No. STN 50-498  
Voluntary Licensee Event Report 94-013, Revision 1  
Failure to Fully Meet the Requirements of the Station Blackout Rule

Pursuant to 10CFR50.73, Houston Lighting & Power submits the attached Unit 1 Voluntary Licensee Event Report 94-013, Revision 1 regarding failure to fully meet the requirements of the Station Blackout Rule. This event did not have an adverse effect on the health and safety of the public.

This revision provides the cause of the event. Changes are indicated by revision bars.

This letter is being submitted within the extension period established by telephone conversation between Mr. S. Head and Mr. W. Johnson of the Region IV staff on October 3, 1994.

If you should have any questions on this matter, please contact Mr. J. M. Pinzon at (512) 972-8027 or me at (512) 972-8787.

  
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Vice President,  
Nuclear Engineering

LRW/esh

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S PDR

Attachment: Voluntary LER 94-013, Revision 1 (South Texas, Unit 1)

LER-94\94013R1.U1 Project Manager on Behalf of the Participants in the South Texas Project

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Houston Lighting & Power Company  
South Texas Project Electric Generating Station

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## LICENSEE EVENT REPORT (LER)

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

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  
(MNB 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.

FACILITY NAME (1)

South Texas Unit 1

DOCKET NUMBER (2)

05000 498

PAGE (3)

1 OF 6

TITLE (4)

Failure to Fully Meet the Requirements of the Station Blackout Rule

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
08	04	94	94	-- 013 --	01	10	05	94	South Texas Unit 2	05000 499
									FACILITY NAME	DOCKET NUMBER
										05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.402(b)			20.405(c)			50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		100	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)	<input checked="" type="checkbox"/> OTHER
			20.405(a)(1)(iii)			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)			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)	Voluntary

## LICENSEE CONTACT FOR THIS LER (12)

NAME

Jairo Pinzon - Staff Engineer

TELEPHONE NUMBER (Include Area Code)

(512) 972-8027

## 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)

YES(If yes, complete EXPECTED SUBMISSION DATE).

☒ NOEXPECTED  
SUBMISSION  
DATE (15)

MONTH

DAY

YEAR

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

On August 4, 1994, both Unit 1 and Unit 2 were in Mode 1 at 100% power. At approximately 0950 hours, a reportability review was concluded which determined that the Nuclear Regulatory Commission should be informed of a condition where the South Texas Project Units were not fully meeting the requirements of NUMARC 87-00 which implements 10CFR50.63, Station Blackout.

A self-assessment of the South Texas Project Station Blackout commitments identified two cases of the NUMARC 87-00, criterion not being satisfied. The criterion relate to the physical protection and electrical vulnerabilities of Alternate AC (AAC) power sources used for Station Blackout. Although a Standby Diesel Generator (Train B) is used at South Texas Project for providing electric power, the power distribution equipment used to transfer the power to the companion train instrumentation (A or C train) was not protected from likely weather-related events (high winds for the Gulf Coast) and was a single point of vulnerability for preferred, and Station Blackout (AAC) power. A change to the Severe Weather Guidelines was made the same day, to provide for plant shutdown prior to any predicted hurricane landfall, rather than prior to hurricane winds in excess of 120 mph. In addition, a Justification for Continued Operation was developed which shifted the Station Blackout shutdown strategy from reliance on the power transfer equipment in question to reliance on station batteries, consistent with NUMARC 87-00 in the unlikely event of loss of the power transfer capability. Subsequent to the initial findings, three additional issues were identified which were also bounded by the Justification for Continued Operation. As the self-assessment progresses, this report will be revised, if necessary, to ensure the Nuclear Regulatory Commission is fully informed of any additional issues.

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.

FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)		PAGE (3)
South Texas, Unit 1		05000 498		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
				94	-- 013 --	01
						2 OF 6

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

DESCRIPTION OF EVENT

On August 4, 1994, both Unit 1 and Unit 2 were in Mode 1 at 100% power. At approximately 0950 hours, a reportability review was concluded which determined that the Nuclear Regulatory Commission should be informed of a condition where the South Texas Project Units were not fully meeting the requirements of NUMARC 87-00 which implements 10CFR50.63, Station Blackout.

A discrepancy was identified during a Houston Lighting & Power self-assessment of the South Texas Project Station Blackout Design Basis. Two cases of NUMARC 87-00 criterion not being satisfied were identified on July 28, 1994. The NUMARC 87-00, Appendix B criteria relate to the physical protection and electrical vulnerabilities of Alternate AC (AAC) power sources which are credited for coping with a Station Blackout event. Although Standby Diesel Generator Train B is used at the South Texas Project for providing electric power, the power distribution equipment (Auxiliary Engineered Safety Feature[s] Transformer and 13.8 KV Bus 1K [2K]) used to transfer the power to the companion train of instrumentation (A or C train) was not protected from likely weather-related events (high winds for the Gulf Coast) and was a single point of vulnerability for preferred and Station Blackout (AAC) power. The Auxiliary Engineered Safety Feature(s) Transformers and 13.8 KV Bus 1K (2K) relied upon by this Station Blackout shutdown strategy are located in the general yard area and are at risk from winds above 120 MPH and wind driven missiles from hurricanes and tornados. The loss of the Auxiliary Engineered Safety Feature(s) Transformers or 13.8 KV Bus 1K (2K), due to weather conditions, would have precluded the charging of batteries of the other trains (A or C) by a single Diesel Generator (Train B Standby Diesel Generator). In the unlikely event of the loss of this train (A or C) cross-connect to the Alternate AC source (Train B), it would not be possible to supply battery charging to assure two channels of instrumentation to shut down the units and maintain the units in a shutdown condition for the Station Blackout coping duration. One channel of instrumentation (powered by the "B" Standby Diesel Generator) would be available.

The following additional issues were subsequently identified by the ongoing Station Blackout self-assessment:

Additional Issue No. 1: Testing of Station Blackout Alternate AC Power Scenario

10CFR50.63(c)(2), which relates to Alternate AC sources for Station Blackout, requires a demonstration test of the time required to start up and align the Alternate AC source and associated equipment. For Unit 1 and Unit 2, this requires the plant operators to align the "B" Standby Diesel Generator with either the "A" train or the "C" train, via Emergency Bus 1L (2L), by manipulation of the motor operated switches connecting Bus 1L (2L) and the Auxiliary Engineered Safety Feature(s) Transformers. These operator actions must be capable of being completed within ten (10) minutes of recognition that a Station Blackout condition exists. The required test has not been performed.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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South Texas, Unit 1		05000 498		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 6
				94	-- 013 --	01	

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

DESCRIPTION OF EVENT: (Continued)Additional Issue No. 2: Engineering Analysis Regarding Use of High Head Safety Injection Pump During Station Blackout

A review of the Station Blackout Licensing Basis reveals numerous references to the use of a High Head Safety Injection pump for maintenance of Reactor Coolant System inventory during a Station Blackout event. Review of the Houston Lighting & Power Station Blackout letter positions to the Nuclear Regulatory Commission, and the Nuclear Regulatory Commission's Safety Evaluation Report issued for Station Blackout indicate that the use of a High Head Safety Injection pump is limited to the scenario of Reactor Coolant Pump seal leakage of 25 gpm per pump, plus 10 gpm of unidentified Reactor Coolant System leakage, coincident with unavailability of both centrifugal charging pumps. This results in a total leakage of 110 gpm, which exceeds the 35 gpm design capability of the Positive Displacement Charging Pump.

A review of the calculation "Blackout Operation with Train B Diesel Generator" revealed that the contingent use of a High Head Safety Injection pump was not considered as a part of the Station Blackout analysis, rather use of charging pumps powered by the "B" Standby Diesel Generator were included. Page 5 of the calculation states that the "B" Standby Diesel Generator loading considered is steady state Loss of Offsite Power loading. A review of Table T-7 of the Standby Diesel Generator Design Basis Document 5Q159MB1023 shows that the High Head Safety Injection pumps are not utilized during Loss of Offsite Power conditions.

Additional Issue No. 3: Quality Assurance Program

Correspondence to the Nuclear Regulatory Commission, dated August 4, 1992; (page 1 of 3), which formed a portion of the licensing basis for Station Blackout, states "Station Blackout equipment at South Texas Project is covered by a Quality Assurance program consistent with the guidelines of Regulatory Guide 1.155."

The Nuclear Regulatory Commission Safety Evaluation Report for the South Texas Project includes a reference to the Positive Displacement Charging Pump (Page 7), Technical Support Center Diesel Generator (Pages 6 and 7), and Balance-of-Plant Diesel Generator (Page 14 and Houston Lighting & Power letter dated April 17, 1989, Page 25 of 29) as equipment used for Station Blackout.

Specification 7A050GS1006, Rev 4 & Document Change Notice ES0029, "Quality Requirements for Quality Class 7 Systems, Structures, and Components", does not include all the required Station Blackout equipment (such as, the Positive Displacement Charging Pump, Technical Support Center Diesel Generator, and Balance-of-Plant Diesel Generator) in the Quality Assurance program. In addition, the South Texas Project Final Safety Analysis Report (Table 3.2.A-1, Balance of Plant Quality Classification of Structures, Systems, and Components) does not address all the Station Blackout equipment.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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South Texas, Unit 1	05000 498	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 6
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

CAUSE OF EVENT

This event occurred due to the failure to confirm the validity of the proposed Station Blackout Program during the evolutionary process of obtaining Nuclear Regulatory Commission approval. Specifically, there was a failure to address the potential effects of severe weather on the Auxiliary Engineered Safety Feature(s) Transformers, recognize the need for testing of the AAC related equipment, include the High Head Safety Injection Pump in the Standby Diesel Generator Loading Calculation, and include all equipment credited for Station Blackout in a Quality Assurance Program. The root cause of this event has been determined to be the lack of familiarity of the South Texas Project Engineering personnel, at the time of the South Texas Project Station Blackout position finalization (January to April of 1991), to the history of the Station Blackout initiative and nuances of the NUMARC 87-00 guidelines. Two major contributing factors of this event have been determined to be 1) allocation of resources in the Design Engineering-Electrical Group and 2) Turnover of two key personnel in the Support/Design Engineering-Electrical Group, with primary responsibility for the Station Blackout initiative, just prior to the critical time (January to April of 1991) of the South Texas Project Station Blackout position finalization.

ANALYSIS OF EVENT

The equipment that would not be available under severe weather conditions, is the Non-Class 1E on-site distribution system. In particular, the Auxiliary Engineered Safety Feature(s) Transformers and Motor Operated Switches, would not be available during a hurricane or severe weather conditions that generate missiles capable of damaging the transformers and other equipment (Technical Support Center Diesel Generator) not protected. The Auxiliary Engineered Safety Feature(s) Transformers do not perform any design basis accident safe shutdown functions and are in fact nonsafety-related equipment. However, during an Station Blackout event which is defined as a Non-Design Basis Accident event (10CFR50.2), these transformers were to be used to cross feed from Train B Standby Diesel Generator to Safety Trains A or C to power battery chargers (which provide a redundant channel of instrumentation) to cope with a Station Blackout.

A Probabilistic Risk Analysis was performed on the likelihood of a Loss of Offsite Power and a simultaneous event (other than hurricanes) that would affect the operability of the Auxiliary Engineered Safety Feature(s) Transformers during the time they were needed for this purpose. The total event frequency of these events is  $1.2 \times 10^{-6}$  per year.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
South Texas, Unit 1	05000 498	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 6
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

ANALYSIS OF EVENT: (Continued)Additional Issue No. 1: Testing of Station Blackout Alternate AC Power Scenario

The ongoing Preventative Maintenance Program has ensured that Unit 1 and Unit 2 motor operated switches have been cleaned, inspected, lubricated and verified to function both locally and remotely. Operation of the motor operated switches and loading of a Class 1E bus via the Emergency Transformer alignment has been recently demonstrated. The reverse power relay associated with each Engineered Safety Feature(s) Transformer has a 0.5 second time delay, which is sufficient to avoid nuisance tripping due to pump motor inrush effects. This issue was considered in the original plant design coordination studies. Although the time necessary to align the plant in the Station Blackout configuration has not been demonstrated by test, there is reasonable assurance that the equipment would perform as expected and operator action could be completed prior to depletion of existing battery capacity. The existing Auxiliary Engineered Safety Feature(s) Transformer back-feed alignment provides for battery charging.

Additional Issue No. 2: Engineering Analysis Regarding Use of High Head Safety Injection Pump During Station Blackout

Failure to include the High Head Safety Injection loads in the identified calculation has been evaluated. Adequate terminal voltage for safety-related train components during starting and running conditions was assured by the original plant design voltage drop studies. The High Head Safety Injection pump is a design basis load for Standby Diesel Generator Train B for events other than Loss of Offsite Power. Therefore, it has been verified that Train B Standby Diesel Generator has adequate capacity to support Station Blackout.

Additional Issue No. 3: Quality Assurance Program

Failure to formally require the application of a Quality Assurance Program to portions of the Station Blackout equipment has been reviewed. The equipment not included in the Quality Assurance program have performed satisfactorily in daily plant operation, and are considered acceptable until the overall review of Station Blackout at South Texas is completed. In addition, the Technical Support Center Diesel Generator is not required to meet the Station Blackout criteria because High Head Safety Injection can provide for Reactor Coolant System inventory control and valve positions can be verified locally. The Balance-of-Plant Diesel Generators are not required since air operated valves, which are supplied with air from the air compressor powered from the diesels, fail safe and other secondary plant protection features powered by the diesels are not required by the Station Blackout rule.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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South Texas, Unit 1		05000 498		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 6
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

ANALYSIS OF EVENT: (Continued)

A Justification for Continued Operation was written which bounds each of the identified conditions by describing the actions to be taken in the event of the Auxiliary Engineered Safety Feature(s) Transformer being unavailable, providing shutdown criteria for severe weather and removing sole reliance on the cross connect capability. It should be noted that one channel of shutdown instrumentation is powered by the "B" Standby Diesel Generator, so the unlikely loss of the cross connect capability only reduces the level of redundancy in instrumentation, and does not preclude achieving and maintaining safe shutdown. The self-assessment is ongoing, and as any other discrepancies are identified, they will be included as revisions to this report.

CORRECTIVE ACTIONS

1. A change to the Severe Weather Guidelines was initially made to provide for plant shutdown prior to any predicted hurricane landfall, rather than prior to hurricane winds in excess of 120 mph. In addition, a Justification for Continued Operation was developed which provided a Station Blackout shutdown strategy that reduced reliance on the power transfer equipment in question by providing reliance on station batteries, consistent with NUMARC 87-00 in the unlikely event of the loss of power transfer capability. By changing the shutdown criteria for hurricanes, South Texas Project could now be characterized as a "P3\*" plant with a coping duration of four hours (NUMARC 87-00, Table 3-8). The plant will support a coping duration of four hours in the unlikely event of the loss of the power transfer capability. The "LOSS OF ANY 13.8 KV OR 4.16 KV BUSS" procedure is an existing plant procedure that addresses the Station Blackout condition and presently contains the necessary actions required to cope with a four hour Loss of Offsite Power and failure of the Train A and C diesels to start.
2. The "Severe Weather Guidelines" procedure was revised on August 8, 1994, to further define the objective of being in Mode 4 with Reactor Coolant System temperature < 230°F within two hours of a hurricane arrival (i.e., sustained wind speeds > 73 mph).
3. The Design Engineering resource allocation issue has been previously recognized and addressed by management. The present staffing of the Design Engineering - Electrical Group has doubled, to one supervisor and ten engineers, serving both units.
4. Houston Lighting & Power will complete the self-assessment of Station Blackout by December 15, 1994.
5. A revised Station Blackout position will be submitted by March 1, 1995. The Station Blackout position development process will include a validation methodology to ensure Nuclear Regulatory Commission Station Blackout criteria are satisfied.