The Light company
Houston Lighting & Power

P.O. Box 1700 Houston, Texas 77001 (713) 228-9211

August 30, 1988
ST-HL-AE-2767
File No.. G12.440
10CFR50.55(e)

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

South Texas Project Electric Generating Station
Unit 2
Docket No. STN 50-499
Final Report Concerning
Cracking of ESF Diesel Generator Heads

On August 1, 1988, Houston Lighting and Power Company notified your office pursuant to 10CFR50.55(e), of an item concerning Cracking of ESF Diesel Generator Heads. Enclosed is our Final Report concerning this subject. We have determined that this item is reportable pursuant to 10CFR50.55(e).

If you should have any questions on this matter, please contact Mr. M. F. Polishak at (512) 972-7071.

J. H. Goldberg
Group Vice President, Nuclear

SDP/RHT/hg

Attachment: Final Report Concerning
Cracking of ESF Diesel Generator Heads

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cc:

Regional Administrator, Region IV
Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

George Dick, Project Manager
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Jack E. Bess
Resident Inspector/Operations
c/o U.S. Nuclear Regulatory
Commission
P. O. Box 910
Bay City, TX 77414

Don L. Garrison
Resident Inspector/Construction
c/o U.S. Nuclear Regulatory
Commission
P. O. Box 910
Bay City, TX 77414

J. R. Newman, Esquire
Newman & Holtzinger, P.C.
1615 L Street, N.W.
Washington, DC 20036

R. L. Range/R. P. Verret
Central Power & Light Company
P. O. Box 2121
Corpus Christi, TX 78403

R. John Miner (2 copies)
Chief Operating Officer
City of Austin Electric Utility
721 Barton Springs Road
Austin, TX 78704

R. J. Costello/M. T. Hardt
City Public Service Board
P. O. Box 1771
San Antonio, TX 78296

Rufus S. Scott
Associate General Counsel
Houston Lighting & Power Company
P. O. Box 1700
Houston, TX 77001

INPO
Records Center
1100 Circle 75 Parkway
Atlanta, GA 30339-3064

Dr. Joseph M. Hendrie
50 Bellport Lane
Bellport, NY 11713

Revised 06/15/88

LA/NRC/by

Final Report Concerning
Cracking of ESF Diesel Generator Heads

I. Summary

On August 1, 1988, HL&P notified the NRC concerning cracking in Unit 2 ESF diesel generator cylinder heads that had been determined to be reportable pursuant to 10CFR50.55(e). The cracked diesel generator cylinder heads resulted from engine operation with advanced timing. The ESF diesel generators provide emergency power to the ESF buses in the event of a Design Basis Accident. If this out of time condition had remained uncorrected, continued operation of the ESF diesel generator could have resulted in a failure that would render the diesel generator's ESF function inoperable.

II. Description of Deficiency

During start-up testing of the Unit 2 Train "C" Standby Diesel Generator (DG), jacket water was discovered in the combustion chamber of two cylinders. Subsequent removal and inspection of the twenty (20) cylinder heads showed eighteen (18) to be cracked.

Further field investigation revealed that the timing for the DG was advanced approximately twenty-five degrees, allowing the engine to fire at approximately fifty-five degrees before top dead center. The timing advancement most likely occurred when the chain tightener oil supply hose was replaced. Apparently, during replacement of the hoses the timing chain was loosened. Later, during reinstallation of the chain tensioner, the slack in the timing chain was taken up, unknowingly advancing the timing chain by two links on the crank shaft gear.

III. Corrective Action

1) The timing chains on the Train "A" and Train "B" Unit 2 ESF diesel generators were inspected to ensure they were properly adjusted. The timing of "A" DG was found to be slightly retarded. Although the reason for the retarded condition can not be conclusively determined, it was not attributable to unknowingly rotating the timing chain on the crank shaft gear. The retarded timing condition of "A" DG was corrected prior to its initial operation. The timing on the Train "B" DG was found to be properly adjusted.

2) Pistons, connecting rods, bushings, pins, and bearings for cylinders 6 and 7 of the Train "C" diesel generator were inspected to identify areas which exhibited evidence of thermal damage. In addition, one cylinder liner was removed and inspected for thermal damage. The inspected components are acceptable with the exception of the pistons, which exhibited cracks and erosion in the crown area. From

these inspections, HL&P has concluded that the areas subject to thermal damage are limited to the cylinder heads and pistons. All twenty (20) cylinder heads will be replaced. The pistons will be removed, inspected, and rework completed prior to engine restart.

3) The timing of the repaired engine will be properly adjusted prior to restart.

IV. Recurrence Control

1) Precautions have been added to the ESF Diesel Generator Instruction Manual to ensure that the engine timing is checked prior to operation following maintenance in the timing chain area.

2) In addition, plant maintenance procedures are being reviewed to ensure that adequate precautions are taken when maintenance is performed in the timing chain area. Revisions to the appropriate procedures will be completed by November 15, 1988.

V. Safety Analysis

The ESF diesel generators provide emergency power to the ESF buses in the event of a Design Basis Accident. Had this deficiency remained uncorrected and a loss of offsite power (LOOP), or other design basis accident occurred, in combination with a single failure of either the Train "A" or "B" DGs to start, a safety hazard could result. Therefore, the deficiency has been determined to be reportable pursuant to 10CFR50.55(e).