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 EISENHUT, D.G. Division of Licensing

SUBJECT: Responds to 830702 request for addl info re Generic
 Ltr 84-15, "Proposed Staff Actions to Improve & Maintain
 Diesel Generator Reliability," Info provided re diesel
 generator reliability & data.

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Carolina Power & Light Company

SERIAL: NLS-84-424

OCT 05 1984

Mr. Darrell G. Eisenhut, Director
Division of Licensing
United States Nuclear Regulatory Commission
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
PROPOSED STAFF ACTIONS TO IMPROVE AND MAINTAIN
DIESEL GENERATOR RELIABILITY (GENERIC LETTER NO. 84-15)

Dear Mr. Eisenhut:

In a letter dated July 2, 1983, Carolina Power & Light Company was requested to provide information for the following three areas:

1. Reduction in Number of Cold Fast Start Surveillance Tests for Diesel Generators
2. Diesel Generator Reliability Data
3. Diesel Generator Reliability

Please find enclosed our responses to the above in Enclosures 1, 2, and 3, respectively. Should you have any questions concerning this letter, please contact Mr. Sherwood Zimmerman at 919-836-6242.

Yours very truly,

A. B. Cutter - Vice President
Nuclear Engineering & Licensing

ABC/PPC/pgp (634PPC)
Enclosures

cc: Mr. J. P. O'Reilly (NRC-RII)
Mr. G. Requa (NRC)
NRC Resident Inspector (RNP)

A. B. Cutter, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers; employees, contractors, and agents of Carolina Power & Light Company.

Notary (Seal)

My commission expires:

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PDR ADDCK 05000261
PDR

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ENCLOSURE 1

Reduction in Number of Cold Fast Start Surveillance Tests for Diesel Generators

INTRODUCTION

The H. B. Robinson Unit No. 2 (HBR2) on-site emergency power is available from two Emergency Diesel Generator (EDG) sets. Each diesel generator set consists of a Fairbanks-Morse Model 38TD8-1/8 engine coupled to a Fairbanks-Morse 3125KVA, 0.8 power factor, 900 RPM, 3 phase, 60 cycle, 480 volt generator. The units have a continuous rating of 2500 KW with a 2-hour overload capability of 2750 KW in any 24-hour period.

RESPONSE

The HBR2 EDGs do not undergo the fast cold starts addressed in Generic Letter 84-15 because the surveillance tests take into consideration the manufacturer's recommended preparatory action of pre-lubricating the engine, bearings, pistons, and cylinders to reduce stress and wear. In addition, during the manual synchronization with other power sources, the EDGs have sufficient time to warm up prior to loading.

H. B. Robinson Unit 2 Technical Specifications (TS) require monthly and refueling interval operational surveillance tests to verify the operability of the Emergency Diesel Generators. However, HBR2 performs the monthly surveillance test on a weekly basis per the vendor's recommendation.

The monthly operational surveillance test for the EDGs is performed to verify mechanical performance and assess operational readiness of components to fulfill their required safeguards functions per T.S. requirements 4.6.1.1, 4.6.1.4, and 4.6.2. Each EDG is initiated by manual start, followed by manual synchronization with other power sources and loading of the EDGs up to the continuous rating. During the test, normal plant operation is not affected.

The refueling operational surveillance test ensures that the EDG's automatically start. In addition, restoration to operation of particular vital equipment initiated by a loss of power to the vital busses together with a simulated Safety Injection signal is verified. The test assures that the EDG will start and assume its required load within 50 seconds after the initial starting signal. During this test, the diesel protective bypasses listed in T.S. 3.7.1.d are demonstrated to be bypassed by simulating a trip signal to each of the trip devices that is bypassed and observing that the EDG does not trip. Completion of this surveillance test fulfills the requirement of Technical Specification 4.6.1.2, Table 4.1-1 Item No. 32.a, and Table 3.5-3 Item No. 1.a.

During the refueling surveillance test, the EDGs are started from the stand-by condition in which the lube oil is circulated through a heater to maintain the oil warm to facilitate rapid starting. Although the EDGs are loaded within 50 seconds (design basis for the plant) after initial starting signal, the test takes into consideration the manufacturer's recommendation of pre-lubricating the engine.

HBR2 currently does not perform additional EDG tests while the emergency core cooling equipment is inoperable but the operable EDG is tested daily if one EDG is inoperable to ensure operability (power operation may continue for seven (7) days) as discussed in T.S. Section 3.7.2.

Carolina Power & Light Company agrees with the NRC's goal of reducing unnecessary EDG fast starts and improving the overall EDG reliability. As indicated in Enclosure 2, the HBR2 EDGs are highly reliable and, therefore, a Technical Specification change is not requested at this time.

ENCLOSURE 2

Diesel Generator Reliability Data

CP&L has researched the available plant data to determine the number of failures in the last 20 and 100 valid demands along with a time history of these failures. Our sources of data included surveillance test results, LER's, equipment history files, Nuclear Plant Reliability Data System (NPRDS) files, and consultation with various plant personnel (i.e., Operations Staff, Maintenance, etc.).

HBR2's interpretation of the data, with regard to valid test and failures of the EDGs, were based on Regulatory Guide 1.108, Regulatory Position C.2.e; however, HBR2 is not committed to meeting the guidance of Regulatory Guide 1.108.

The tabulation of results given in Attachment 1 to Enclosure 2 shows a reliability of 0.99 for EDG "A" and 0.99 for EDG "B" based on last 100 valid tests. Review of the last 20 valid tests shows reliability of 1.0 for both EDGs. The review of the last 100 valid tests with Regulatory Position C.2.d shows the current test interval being performed at HBR2 for both D/Gs meets the recommended test interval in the Regulatory Guide.

The reports and records CP&L maintains on the EDGs are discussed below:

- a) EDG starts are recorded in the "Control Operator Log" and in the "Shift Foreman Log".
- b) CP&L participates in the INPO-sponsored Nuclear Plant Reliability Data System (NPRDS). The EDGs are part of the NPRDS reportable scope and, therefore, if either the diesels or their associated generators fail to perform their intended function, a failure report is completed and entered in the NPRDS. NPRDS is actively supported by most U. S. nuclear utilities. As a consequence, an industry wide data base exists from which CP&L can extract additional failure information.
- c) HBR2 documents the results of several maintenance procedures and surveillance tests. Every refueling outage the EDGs undergo an inspection involving the vendor representative present on site to overview and participate in the inspection program. Prior to this inspection, plant personnel review documents concerning previous inspections, number of engine starts, and outstanding trouble tickets.

After this review, areas of concern are given special attention during the inspection. During the post inspection test run, parameters are compared to previous run conditions.

Should an unusual condition occur during the above test run, a trouble ticket is written and the trouble corrected.

In summary, the performance and documentation of various periodic maintenance procedures, the periodic review of diesel generator run data, the review of previous diesel generator work and our participation in the NPRDS provide the necessary documentation and records to assess potential reliability problems.

ATTACHMENT 1 TO ENCLOSURE 2

Diesel Generator Operations DataSeptember 1982 - August 1984

| Reason for EDG Operation & Scheduled Duration of Run | EDG No. | Number of Starts | Number of Failures | Percent Loading of EDG | Identification of Failure |
|--|------------|------------------------|--------------------------|------------------------------|---|
| T.S. Requested | A | 79 | 1 | 100 | 1. 01-31-83 EDG "A" failed to operate properly due to oil accumulated on manifold. 2. 09-06-83 EDG "B" did not run full hour due to leak on lube oil strainer. |
| Test (Weekly) | B | 87 | 1 | 100 | |
| Refueling Outage | A | 2 | 0 | 100 | |
| Test | B | 2 | 0 | 100 | |
| EDG Actual Demand | A | 2 | 0 | 100 | |
| Starts not for Testing (Spurious SI) | B | 2 | 0 | 100 | |
| Miscellaneous | A | 17 | 0 | 100 | |
| Unscheduled Tests | B | 9 | 0 | 100 | |
| <u>Last 20 Valid Demand Data</u> | | | | | |
| T.S. Requested | A | 20 | 0 | 100 | |
| Test (Weekly) | B | 20 | 0 | 100 | |

ENCLOSURE 3

Diesel Generator Reliability

HBR2's existing program for maintaining the Emergency Diesel Generators correctly places emphasis on appropriate preventive maintenance, performance of appropriate surveillance tests, incorporation of vendor recommendations and the performance of appropriate modifications to the EDGs in order to improve reliability and performance. Improvements in the EDG system is an on-going effort at HBR2 and as a result, improvements to procedures, maintenance practices and training are made when potential weaknesses are identified in these areas. In addition to the above, modifications have been implemented to improve the diesel generator performance and reliability.

HBR2's surveillance testing, maintenance procedures, performance tests, and the reports and records maintained on the HBR2 diesel generators and described in Enclosure 2 provide sufficient details to maintain reliable operation of the diesel generators.

With regards to the performance specification in Enclosure 3, CP&L provides the following general comments:

- a) The number of additional starts required in this proposed technical specification will result in wear on the engine which is not justified by the added reliability resulting from the data obtained during these starts. The additional engine wear may in fact reduce the reliability of the diesel generators in the long run. There should be no requirement to subject the diesel generators to additional starts for the purpose of obtaining reliability data.
- b) The example diesel generator performance technical specification indicates that the diesel generator reliability should be based on the number of failures in the last 100 valid demands. Specifically, "p" is defined as the probability of failure per demand per diesel.

NUREG-2989 (Reliability of Emergency AC Power Systems at Nuclear Power Plant) defines a failure on demand as a failure of a system to start when it receives a start signal.

Reg. Guide 1.108 defines "failure" as a failure to start, accelerate, and assume the design-rated load within the time prescribed during an emergency or a valid test.

Since the performance technical specification directs CP&L to the use of Reg. Guide 1.108 to determine valid demands and failures, there appears to be an inconsistency between the definition of failure as defined in Reg. 1.108 and NUREG-2989.