



Carolina Power & Light Company

JUL 28 1992

SERIAL: NLS-92-192

United States Nuclear Regulatory Commission  
ATTENTION: Document Control Desk  
Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2  
DOCKET NOS. 50-325 & 50-324/LICENSE NOS. DPR 71 & DPR-62  
EMERGENCY DIESEL GENERATOR OPERABILITY  
(NRC TAC NO. M81881)

Gentlemen:

The purpose of this letter is to respond to issues raised by the NRC Staff with regard to the operational readiness of Emergency Diesel Generator Number 3. In a letter dated April 21, 1992, the Nuclear Regulatory Commission staff provided the results of their review and evaluation of information concerning the adjustment of intake valves for emergency diesel generator number 3. In the letter, the staff concluded that EDG-3 is currently operational and capable of performing its design function. However, the staff raised several issues and recommended certain inspection actions. The purpose of this letter is to provide information concerning measures taken to address the NRC staff issues raised in the April 21, 1992 letter. Based on the information provided herein, CP&L considers this issue to be closed.

Please refer any questions regarding this submittal to Mr. W. R. Murray at (919) 546-4661.

Yours very truly,

D. C. McCarthy  
Manager  
Nuclear Licensing Section

WRM/wrm (edg-3ltr.002)

Enclosure

cc: Mr. S. D. Ebnater  
Mr. R. H. Lo  
Mr. R. L. Prevatte

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*File*

## ENCLOSURE 1

### BUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 NRC DOCKET NOS. 50-325 & 50-324 OPERATING LICENSE NOS. DPR-71 & DPR-62 EMERGENCY DIESEL GENERATOR OPERABILITY (NRC TAC NO. 81881)

#### INTRODUCTION

This information documents Carolina Power & Light Company's response to the NRC letter dated April 21, 1992 concerning the operability of emergency diesel generator number 3 at Brunswick Steam Electric Plant. In the April 21, 1992 letter, the NRC staff indicated that the information presented by CP&L had not justified operating the diesel engines above an originally recommended vendor temperature limit of 775°F for cylinder exhaust. The NRC further indicated that if no other justifiable documentation is available, then CP&L should pursue the four actions listed below or propose alternatives to ensure that no damage has occurred to EDG-3 and to ensure the long-term operability of the remaining EDGs:

1. Calibrate all EDG pyrometers.
2. Review operating logs on all DG's installed at BSEP and identify all cylinders with readings in excess of 775°F.
3. Select the cylinder that was subjected to the highest temperature exceeding the 775°F limit in each EDG and conduct an inspection on this cylinder using a baroscope or, preferably, a video probe to detect the possibility of valve damage. Access should be through the injector opening if possible; however, in the event a clear view is not attainable, it is recommended that the exhaust header be removed to inspect the valves through the exhaust port. These inspections should be completed on EDG-3 and three remaining EDGs at the earliest opportunity, but no later than the next refueling outage. Any unusual findings should be reported to NRC.
4. Balance all engines to meet as closely as feasible, temperature and firing pressure limits established in the Technical Manual at 100% load. Test data, including the cylinder exhaust temperatures, taken during the operability surveillance test after balancing of engines should be submitted to NRC for review.

#### RESPONSE

As discussed with the NRC Staff on June 11, 1992, Carolina Power & Light Company has obtained from the current Nordberg vendor, Hatch and Kirk, additional information justifying an operating temperature of 940°F for the diesels. In preparation of CP&L's November 27, 1991 letter to the NRC Staff, the Assistant Chief Engineer for Nordberg was consulted. He reviewed the components utilized in the original design of the diesel engines and concluded that the limit of 940°F was acceptable. Additionally, the fact that the diesels were delivered from the factory as acceptable with temperatures above 800°F during factory testing was noted. The Nordberg engineer was questioned as to why the technical manual stated a limit of 775°F if the design limit was higher.

He stated that the values shown in the technical manual were expected operating ranges for our diesels, not design limits. The safety evaluation enclosed with the April 21, 1992 NRC staff letter also expressed concern over an additional temperature, the turbocharger inlet temperature limit. On the same list of expected operating ranges, this temperature is listed as expected from 940°F to 1020°F. Later in the technical manual, the design limit is given as 670°C (1238°F). This is provided in the BBC VTR 500 Turbocharger technical manual enclosed as a portion of the Nordberg manual.

In order to further the position that 940°F was acceptable as a design limit for diesel cylinder exhaust, the current Nordberg vendor, Hatch and Kirk, was consulted. Mr. Bill Steele of the engineering group of that company provided the attached response dated April 22, 1992 (Attachment 1). With Hatch and Kirk's concurrence, CP&L will update the Nordberg technical manual to reflect a cylinder exhaust limit of 940 °F.

#### ADDITIONAL ACTIONS

In addition to justifying the increased operating temperature for the diesels, Carolina Power & Light Company has implemented or is in the process of implementing the actions outlined by the NRC in the April 21, 1992 letter. These are summarized below:

Action 1: Calibrate all EDG pyrometers.

Carolina Power & Light Company has completed calibration of the cylinder exhaust pyrometers and some data has been taken in preparation for balancing the diesels.

Action 2: Review operating logs on all DG's installed at BSEP and identify all cylinders with readings in excess of 775°F.

Based on the Hatch and Kirk documentation justifying an operating temperature of 940°F for the diesels, CP&L reviewed the operating logs on the four diesels and identified those cylinders that had experienced operating temperatures in excess of the 940°F limit.

Action 3: Select the cylinder that was subjected to the highest temperature exceeding the 775°F limit in each EDG and conduct an inspection on this cylinder using a baroscope or, preferably, a video probe to detect the possibility of valve damage. Access should be through the injector opening if possible; however, in the event a clear view is not attainable, it is recommended that the exhaust header be removed to inspect the valves through the exhaust port. These inspections should be completed on EDG-3 and three remaining EDGs at the earliest opportunity, but no later than the next refueling outage. Any unusual findings should be reported to NRC.

Despite this assurance from Hatch and Kirk that exhaust temperatures in excess of 775°F would not damage the Brunswick Plant diesel engines, a review of the past cylinder exhaust temperatures was conducted. Following that review the cylinders which had experienced the highest temperatures in excess of 940°F were inspected. These cylinders were identified on emergency diesel generators number 2 and 3. The cylinders inspected had experienced the highest temperatures recorded for all site diesels for any single diesel run as well as the highest routine temperatures. Mr. Chuck Reynolds, Field Service Manager for Hatch and Kirk was

present for these inspections. The investigation consisted of borescopic and video probe inspections of the valve seats, cylinder liner, and visible internal head areas. No damage associated with high temperature operation was noted. A recording of the video probe inspection was made.

Action 4: Balance all engines to meet as closely as feasible, temperature and firing pressure limits established in the Technical Manual at 100% load. Test data, including the cylinder exhaust temperatures, taken during the operability surveillance test after balancing of engines should be submitted to NRC for review.

Attachment 2 is a copy of the cylinder exhaust temperatures requested by the NRC staff for diesels number 1 and 4.

Based on the anticipated receipt of necessary parts, CP&L plans to replace the cylinder fuel pumps and injectors on diesels number 1 and 2 during the current Brunswick Plant outage. The Company intends to replace the cylinder fuel pumps and fuel injectors for diesels number 3 and 4 as soon as parts are available and plant operating conditions allow (this work is anticipated to be completed during the Unit 2 Reload 10 outage, currently scheduled for Fall 1993). A balancing of each diesel will be performed when the new components are installed. Balancing that can be performed prior to obtaining and installing the replacement components will be accomplished in conjunction with other planned diesel maintenance and testing.

#### CONCLUSIONS

The content of the plans and actions described above were discussed with the NRC staff during a telephone call on June 11, 1992. During that conversation, CP&L's understanding was that the NRC staff agreed with our conclusion that the 940 °F limit is acceptable considering the additional input from Hatch and Kirk. Additionally, the scheduling for additional action was also acceptable. The Company will provide the temperature data from diesel generators number 2 and 3 to the NRR Project Manager after completion of a thorough balancing. Therefore, based on the information provided above, CP&L considers this issue to be closed.

ATTACHMENT 1

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

Hatch and Kirk Response dated April 22, 1992

HHHH HHHH KKKK HATCH AND KIRK INC.  
 HHHH HHHH YXXX ENGINE PARTS SPECIALISTS  
 HHHH HHHH KKKK  
 HHHHHHHHKKKKKKK DATE: APR. 22, 1992  
 HHHHHHHHKKKKKKK  
 HHHH HHHH KKKK TO: BILL STACKHOUSE  
 HHHH HHHH KKKK  
 HHHH HHHH KKKK COMPANY: CP&L  
 FAX NUMBER: (919)457-2155  
 FROM: BILL STEELE

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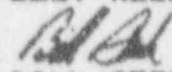
MESSAGE

BILL,

IN REVIEW OF YOUR ANSWERS TO THE NRC QUESTIONS CONCERNING  
 THE CYLINDER EXHAUST TEMPERATURES OF THE DIESEL GENERATOR  
 UNITS, I AGREE WITH CHANGING THE MAXIMUM TEMPERATURE FROM  
 775 DEGREES FARENHEIT TO 940 DEGREES FARENHEIT.

CHANGING THE MAXIMUM CYLINDER EXHAUST TEMPERATURE WILL NOT  
 AFFECT THE PERFORMANCE OF THE DIESEL GENERATOR UNIT.

BEST REGARDS,

  
 BILL STEELE  
 ENGR. /MFG.

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APR 22 1992

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ATTACHMENT 2

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

Diesel Generator Number 1  
3500 kW Test Run May 16, 1992

<u>Cylinder</u>	<u>Temperature °F</u>
1R	750
2R	745
3R	745
4R	770
5R	730
6R	730
7R	705
8R	750
1L	700
2L	730
3L	765
4L	695
5L	745
6L	740
7L	730
8L	760

Diesel Generator Number 4  
3500 kW Test Run May 22, 1992

<u>Cylinder</u>	<u>Temperature °F</u>
1R	780
2R	730
3R	780
4R	770
5R	760
6R	750
7R	770
8R	800
1L	760
2L	750
3L	740
4L	750
5L	740
6L	780
7L	760
8L	760