

DUKE POWER COMPANY

P.O. BOX 33189  
CHARLOTTE, N.C. 28242

HAL B. TUCKER  
VICE PRESIDENT  
NUCLEAR PRODUCTION

TELEPHONE  
(704) 373-4531

December 9, 1982

Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

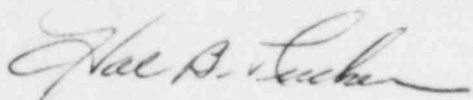
Attention: Ms. E. G. Adensam, Chief  
Licensing Branch No. 4

Re: Catawba Nuclear Station  
Docket Nos. 50-413 and 50-414

Dear Mr. Denton:

On October 13, 1982, representatives from Duke Power Company and the NRC/  
Power Systems Branch met to discuss open items as documented in my letter  
of November 2, 1982. During this meeting the Staff asked a question con-  
cerning diesel generator operation during adverse environmental conditions.  
Duke's response is attached.

Very truly yours,



Hal B. Tucker

ROS/php  
Attachment

cc: Mr. James P. O'Reilly, Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30303

Mr. P. K. Van Doorn  
NRC Resident Inspector  
Catawba Nuclear Station

Mr. Robert Guild, Esq.  
Attorney-at-Law  
P. O. Box 12097  
Charleston, South Carolina 29412

Palmetto Alliance  
2135½ Devine Street  
Columbia, South Carolina 29205

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December 9, 1982  
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cc: Mr. Jesse L. Riley  
Carolina Environmental Study Group  
854 Henley Place  
Charlotte, North Carolina 29207

Mr. Henry A. Presler, Chairman  
Charlotte-Mecklenburg Environmental Coalition  
943 Henley Place  
Charlotte, North Carolina 28207

1. Provide a statement that indicates the ability of the diesel to operate with an intake air temperature of  $-5^{\circ}\text{F}$  and a no load and light load combination.

Answer: The above situation was investigated to determine the effects of cold ambient air ( $-5^{\circ}\text{F}$ ) being drawn directly into the diesels' intake, and to the best of Transamerica Delaval's knowledge, there are no detrimental effects to the diesels, regardless of the diesels' operating load conditions. The diesels could operate with intake air at  $-5^{\circ}\text{F}$  for twenty-four (24) hours with no problems.

2. Provide a statement that indicates the ability of the diesels to operate during a sustained low pressure transient (26 inches of mercury for 12 hours) and also a sudden low pressure transient (a change of 3.0 psi in 1.5 seconds), but not simultaneously.

Per the NRC, this statement may also be based on operating experiences of Delaval diesels in other areas.

Answer: See Attachment 2A and 2B

3. What were the environmental conditions that were outlined in the Catawba Diesel Generator Specification?

Answer: The following paragraphs are quoted from the Catawba Diesel Generator Specification:

#### OPERATING CONDITIONS

The Diesel Electric Generating Sets are to be used as a source of on-site Emergency Standby Power. Each set will furnish standby power to the Class 1E distribution system loads for emergency shutdown of the two 1150 MW Catawba nuclear reactor - turbine-generator units. Each Diesel Engine-Generator set shall be housed in a separate room, a part of the Auxiliary Building, meeting all the requirements of a Class 1 structure for nuclear power plants. The diesel sets are to be operated at an elevation of 556 feet above sea level, indoors,  $55^{\circ}\text{F}$  to  $125^{\circ}\text{F}$  (Dry Bulb) environment ambient temperature range and 10% to 100% environment relative humidity range.

The maximum room ambient temperature of the Diesel Room will be  $125^{\circ}\text{F}$  and all equipment located in this room shall be capable of operating under these conditions for a continuous period. The air supply for the engine shall be taken from outside the diesel rooms and will be a maximum of  $100^{\circ}\text{F}$  during the summer months.

Each engine generator unit is to operate unattended at rated full load, voltage and frequency under the emergency condition for an indefinite period until manually shut down.

4. Would the diesel generator room ambient temperature drop below 55°F? If so, what effect, if any, would the lower room temperature have on the operation of the diesel or the jacket water or lube oil heat exchangers?

Answer: Based on the past 30 years of weather data, the lowest recorded outside air temperature was -5°F.

Conservatively figuring on an outside air temperature of -5°F, and no additional heat input, the resultant diesel generator room temperature would be approximately 51°F.

Considering that heat is emitted from the diesel, generator, lights, transformers, and switchgear, the minimum room temperature would be 55°F. Therefore, there is no significant effect on the diesel, the jacket water heat exchanger, or the lube oil heat exchanger equipment.

ATTACHMENT 2A

ADUKE PWR D ENG

WU INFOMASTER 1-0195551306 11/02/82  
TLX ENTERPRISE OAK  
01 OAKLAND, CA. 11/2/82  
TWX 8106210503 DUKE-PWR-D-E-ENG  
ATTN: MR. MIKE LINES

SUBJECT: CATAWBA NUCLEAR STATIONS  
FILE: CN-1301.00/JML/CAT-7200

PLEASE BE ASSURED THAT THE DIESEL ENGINES SUPPLIED BY TDI FOR THE SUBJECT PROJECT HAS THE ABILITY TO OPERATE DURING A SUSTAINED LOW PRESSURE TRANSIENT (26 INCHES OF MERCURY FOR 12 HOURS) WITH NO DETRIMENTAL EFFECTS ON THE ENGINE. THE ENGINE WILL, HOWEVER, CONSUME SLIGHTLY MORE FUEL TO RECEIVE THE SAME POWER OUTPUT AS COMPARED TO OPERATION AT STD. ATM PRESSURE.

26 INCHES OF HG IS APPROX. 3780 FT ABOVE SEA LEVEL ELEV. WE PRESENTLY HAVE ENGINES OPERATING AROUND THESE ELEVATIONS IS OUR BASIS FOR SAID RESPONSE.

REAGRDS,

J. GEE  
PROJECT ENGINEER  
TRANSAMERICA DELAVAL INC.

CC: B. BAILEY  
B. JOHNSTON

1745 EST

DUKE PWR D ENG

Delaval



Engine and Compressor Division  
550 85th Avenue  
P.O. Box 2161  
Oakland, California 94621  
(415) 577-7400

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ATTACHMENT 2B

October 21, 1982

Duke Power Company  
P.O. Box 33189  
Charlotte, North Carolina 28242

Attention: Mr. Mike Lines

Subject: Catawba Nuclear Station Units 1 & 2  
Diesel Generators (CN1301.00)  
Mill Power No. C-2066D  
Delaval S/N 75017/20

Gentlemen:

Enclosed is Table IV, "Dynamic Performance of Enterprise Diesel Engine - Electric Generator Set", and Figure 6, "Experimental and Computer Predicted Performance", which experementially predicts the effects of an under and over pressure on a typical Transamerica Delaval diesel engine and generator set. The test outcome showed no adverse effects of the over or under pressure; therefore we foresee no problem to the diesel engine generator set we will be furnishing you, should a pressure differential of -3 PSI in 1-1/2 seconds occur, i.e., a tornado. We sincerely hope that the included information is what you requested; however, should you need additional information, please feel free to contact me.

Very truly yours,

TRANSAMERICA DELAVAL INC.  
Engine & Compressor Division

John Gee  
Project Engineer

JG/dd

enclosure

cc: B. Bailey  
J. Mahaney

TABLE IV  
DYNAMIC PERFORMANCE OF ENTERPRISE DIESEL ENGINE - ELECTRIC GENERATOR SET  
 (Test Results)

OVERPRESSURE TESTS

Test Number	$P_{imax}^{(1)}$	$P_{emax}^{(2)}$	$\bar{P}_i^{(3)}$	$\bar{P}_e^{(4)}$	Shock Arrival Sequence	Maximum Speed Deviation (%) <sup>(5)</sup>	Maximum Speed Deviation (Hz) <sup>(8)</sup>	Time of Maximum Speed Deviation After First Shock Arrival (Sec.)
046	0.60 $P_o$	0.60 $P_o$	0.25 $P_o$	0.25 $P_o$	Simultaneous	-0.50	-0.30	1.1
039	1.20 $P_o$	1.30 $P_o$	0.60 $P_o$	0.70 $P_o$	Simultaneous	-0.75	-0.45	1.1
144	1.90 $P_o$	2.25 $P_o$	1.25 $P_o$	1.40 $P_o$	Simultaneous	-0.85	-0.51	1.4
041	1.80 $P_o$	2.30 $P_o$	1.20 $P_o$	1.50 $P_o$	Exhaust before inlet	-0.85	-0.51	1.3
042	1.80 $P_o$	2.30 $P_o$	1.25 $P_o$	1.50 $P_o$	Inlet before exhaust	-0.85	-0.51	1.3
143	2.40 $P_o$	2.85 $P_o$	1.70 $P_o$	1.90 $P_o$	Simultaneous	-0.85	-0.51	1.4
047	2.00 $P_o$	2.40 $P_o$	1.30 $P_o$	1.40 $P_o$	Simultaneous with load step 1170kw to 1560kw	-2.40	-1.44	2.1

(1)  $P_{imax}$  = maximum shock overpressure at inlet.

(2)  $P_{emax}$  = maximum shock overpressure at exhaust.

(3)  $\bar{P}_i$  = average overpressure for 0.4 second period after shock arrival at inlet.

(4)  $\bar{P}_e$  = average overpressure for 0.4 second period after shock arrival at exhaust.

(5) Based on 48 Hz reference.

(8) Scaled to 60 Hz reference.

TABLE IV (Continued)

DYNAMIC PERFORMANCE OF ENTERPRISE DIESEL ENGINE - ELECTRIC GENERATOR SET  
(Test Results)

LOAD CHANGE TESTS

Test Number	Test	Maximum Speed Deviation		Time of Maximum Speed Deviation After Load Change (Sec.)
		(%) <sup>(5)</sup>	(Hz) <sup>(8)</sup>	
134	Load drop from 1560 kw to 1170 kw	+ 0.75	+ 0.45	0.5 <sup>(6)</sup>
135	Load increase from 1170 kw to 1560 kw	- 0.90	- 0.54	0.8
136	Load drop from 1560 kw to 780 kw	+ 1.55	+ 0.93	0.5
137	Load increase from 780 kw to 1560 kw	- 2.40	- 1.44	1.2
048	Load drop from 1560 kw to 1170 kw	+ 0.80	+ 0.48	0.5 <sup>(6)</sup>
049	Load increase from 1170 kw to 1560 kw	- 0.90	- 0.54	0.8 <sup>(6)</sup>
050	Load drop from 1560 kw to 780 kw	+ 1.60	+ 0.96	0.5
051	Load increase from 780 kw to 1560 kw	- 3.10	- 1.86	1.7

<sup>(5)</sup> Based on 48 Hz reference.

<sup>(6)</sup> Frequency deviation within  $\pm 0.15$  Hz band in a time less than 1.5 seconds, but not within .25%.

<sup>(7)</sup> The primary reason for the observed differences in performance between Runs 134 - 137 and Runs 048 - 051 - essentially identical series of load change tests - is the higher intake air temperature for Runs 048 - 051 (99°F for Runs 048 - 051 vs. 69°F for Runs 134 - 137).

<sup>(8)</sup> Scaled to 60 Hz reference.



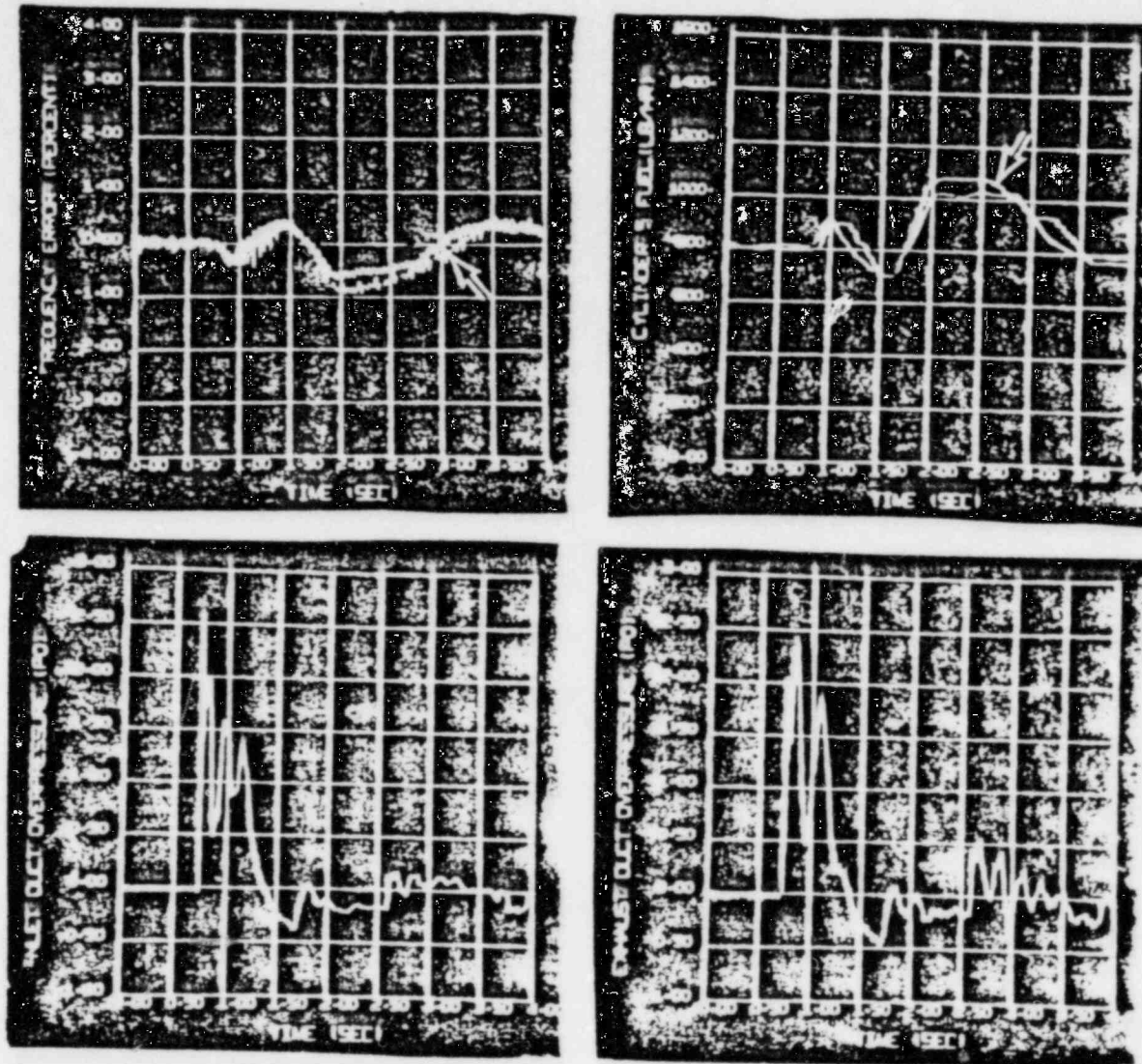


FIGURE 6 EXPERIMENTAL AND COMPUTER PREDICTED PERFORMANCE (Enterprise Test No. 144)