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Bureau of  
Air Regulation

**GE Industrial &  
Power Systems**

General Electric Company  
1 River Road, Bldg. 2-Rm. 647  
Schenectady, New York 12345

February 14, 1994

**SUBJECT: Fuel Bound Nitrogen Content Data From Sites With GE Gas Turbines**

Mr. Preston Lewis  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

As promised at our February 3, 1994 meeting, I am forwarding three copies of a compilation of data on fuel bound nitrogen (FBN) content in No. 2 distillate oil used at various sites with GE gas turbines. This data is representative of the wide range of FBN found in distillate oil today and, as will be seen from the data, is even wider than the band seen by Florida Power Corporation in tests of its fuel oil. The attached letter also discusses the test methods used to determine FBN content.

If I can be of any further help please feel free to contact me to discuss the data.

Sincerely,

Marvin M. Schorr  
Consulting Engineer

bcc: J. Chalfin, 22-237  
K. Hedrick, FPC  
J. Kovacik, 2-637  
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August 23, 1990

cc: EF Reeves - #23-371  
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JE Hopkins - #53-200  
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F Jacocks - Va. Pwr.

Mr. M Grumo  
Building #23 - Room 221

Re: Fuel Bound Nitrogen Data for OSP

I've promised to share our current FBN data with OSP. While we aren't fuel experts, we have been living with FBN as a  $\text{NO}_x$  emission problem for some time.

The attached data list is compiled from our work at various sites, often using different test methods. Our conclusions to date are:

1. ASTM D4629 (combustion/chemiluminescence) is the most desirable method. It reports all types of organic nitrogen including the N-O and N-N linkages omitted by Kjeldahl tests. It does not report free (atmospheric) nitrogen since the temperatures are not high enough for a reaction involving unattached  $\text{N}_2$ . One of the equipment manufacturers (Dohrmann) ran a check of this by processing a sample using nitrogen in lieu of helium as the sample carrier with no change in test results.
2. Data from SGS seem to be outside the range of credible data. Their kerosene tests for Atlantic City Electric were reported as "less than .0075%" (75 ppm) using a method (D4629) which should give results down to 0.3 ppm. Their JCP&L data (4 tests) were initially reported to the nearest 1/100 percent until I called them about it. The scatter in their data both for Iowa and JCP&L is fairly large.

3. If we ignore the SGS data, D4629 data gives higher results than Kjeldahl data. (See Southern Md. and Va. Power)
4. It is absurd to test for our FBN levels using an instrument with a threshold of .19%.

From Virginia Power, I have just learned the details of the barge of distillate intended for the Chesterfield Station and rejected in September, 1989. The lab doing the tests was SGS. Using a Perkin-Elmer 240B instrument, they got .127% FBN. To check this, a test using ASTM D3228 was made, with a report of 0.1% FBN. It is unusual to see D3228 result only to 1/10%. One hundredth or one thousandth of a percent is more common. The test scope says it is for fuel oils from .015% to 2.0% nitrogen.

We are in the process of determining the minimum detection levels for the various Perkin-Elmer instruments. We have data for Dohrmann and will be getting data from Antek on their equipment for the combustion/chemiluminescence (D4629) test.

*B. L. Bailey*

BL Bailey  
Senior Environmental Engineer  
Building #22 - Room 237

/m  
attachment

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FUEL BOUND NITROGEN DATA

- General Notes:
1. #2 Distillate except kerosene if \*
  2. Bracketed data are for tests without any intervening fuel delivery, i.e., same fuel

<u>FBN</u> ppm	<u>SITE</u>	<u>Test Method</u>		<u>Date of Sample</u>	<u>Lab</u>
		<u>Chem/Comb</u> D4629	<u>Other</u>		
2.4*	Atlantic City		?	5/90	?
} <75* (4 samples)	Atlantic City	X		6/90	SGS
	10*	Atlantic City		Kjeldahl	6/28/90
77	Ft. Pierce		E258 Kjeldahl	12/89	Thornton Lab
} 240 410 290 & 360 254 255	Iowa (pretest)	X		4/24/90	Phoenix
	Iowa	X		5/30/90	SGS
	Iowa	X		6/4/90	SGS
	Iowa	X		6/6/90	Core
	Iowa	X		6/7/90	Core
144 (134 on repeat)	JCP&L		351.3	11/29/89	Roy F. Weston
} 82 & 81 110-170- 150-130 (4 samples)	JCP&L		?	5/10/90	Camin Cargo Cont.
	JCP&L	X		6/6/90	SGS
111	JCP&L	X		7/9/90	Core Lab
195	Orlando-Titus.	X		6/21/90 PM	Bionomics
198	Orlando-Titus.	X		6/21/90 AM	Bionomics

<u>FEN</u> ppm	<u>SITE</u>	<u>Test Method</u>		<u>Date of Sample</u>	<u>Lab</u>
		<u>Chem/Comb</u> D4629	<u>Other</u>		
300	S Md Elect Coop		D3228	5/2/90	SGS
48	S Md Elect Coop		AOAC 2.057	6/18/90	Gascoyne Labs
115	S Md Elect Coop	X		6/19/90	Core
80	S Md Elect Coop		D3228	8/17/90	Gascoyne Labs
200	Springfield		D3179	10/6/90	Interpoll
213	Springfield		351.1	10/6/90	Interpoll
216	Springfield		351.1	10/6/90	Interpoll
205	Springfield		351.1	10/6/90	Interpoll
1900 (See note 1)	TBG-Cogen		Perkin-Elmer	10/10/89	Atl. Anal. Lab.
120	Va. Pwr./ Chest. #7		D3228	4/6/90	M&P Lab
177	Va. Pwr./ Chest. #7	X		5/27/90	Core

Notes: 1. Level of detection for this Perkin-Elmer instrment is the reported value of 1900 ppm. (.19%)

2. ASIM D3228, E258, EPA 351.1, 351.3 and AOAC 2.057 are all various modified Kjeldahl tests.

*BL Bailey*

BL Bailey  
8/23/90

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