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904/599-8100

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AUG 6 1991

Division of Air  
Resources Management

August 6, 1991

BY HAND DELIVERY

Hamilton S. Oven, Jr., P.E.  
Administrator  
Siting Coordination Section  
Florida Department of Environmental  
Regulation  
2600 Blair Stone Road, Room 338  
Tallahassee, Florida 32399-2400

Re: City of Tallahassee  
Hopkins CFB Repowering Project  
PA 74-03A  
DOAH Case No. 91-1605EPP

Dear Mr. Oven:

Enclosed please find revised air emission tables regarding the City's Hopkins CFB Repowering Project. These tables, which reflect more stringent emission rates for the CFB unit, should be substituted for the tables contained in the City's "Responses to Agency Sufficiency Comments" dated May 30, 1991, which in turn replaced tables in the Application for Modification of Site Certification. Two new tables (Table A and Table B) are also enclosed.

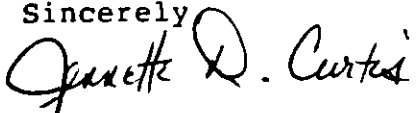
With this submittal, the City proposes a "two-tiered" approach with respect to air emission limits for the CFB unit. As shown in Table A, one set of emission limits (at or below those previously proposed) is identified for the initial two year "demonstration period" to allow the operational flexibility needed to meet the goals of the U. S. Department of Energy demonstration program. A second set of emission limits is proposed for the subsequent "operational period" for the repowered Unit 2. Table B provides data to allow comparison of the "operational period" CFB emissions with both historical and potential emissions for existing Hopkins Unit 2.

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The City believes the emission limits proposed in Table A are consistent with Best Available Control Technology levels for all air pollutants. The City is prepared to accept these as enforceable limits for the CFB unit. The new limits for particulate matter, lead and beryllium reflect the City's decision to use a baghouse filter system with greater removal efficiency than previously proposed in the Application. The new limits for sulfur dioxide and sulfuric acid mist reflect the City's commitment to utilize lower sulfur coal during the operational period, along with greater removal efficiency in the CFB boiler. The City anticipates that the nitrogen oxides emission limit proposed for the operational period can be achieved through the inherent characteristics of the CFB boiler. If experience during the operational period indicates otherwise, the City intends to meet the operational period limits through use of additional emission control. Similarly, the City proposes to evaluate mercury emissions data obtained during the demonstration period to determine whether additional control is necessary to meet the proposed operational period limit.

A copy of this letter and the enclosed tables are being provided to the Hearing Officer, all parties to this modification proceeding and recipients of the initial Application. Please do not hesitate to call me if there are any questions regarding this matter.

Sincerely



Jennette D. Curtis  
Environmental Services  
Administrator  
Electric Department

/gbb

Enclosures

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cc: Diane K. Kiesling  
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Sandra Whitmire  
Marvin Stuckey

CFB BOILER EMISSIONS (Demonstration Period)  
Emission Calculations for Table A

POLLUTANT and (BASIS)	EMISSIONS FACTOR (lb/10 <sup>6</sup> BTU)	HEAT INPUT (10 <sup>6</sup> BTU/hr)	EMISSIONS	
			(lb/hr)	(Tons/Year)
	A	B	C	D
Nitrogen Oxides (Manufacturer)	0.28	2,414	675.9	2,457.2
Sulfur Dioxide (See Note A)	0.76	2,414	1,839.2	6,686.4
Particulate Matter (Manufacturer)	0.015	2,414	36.2	131.6
PM-10 (Manufacturer)	0.015	2,414	36.2	131.6
H <sub>2</sub> SO <sub>4</sub> Mist (See Note B)	0.0233	2,414	56.3	204.8
Carbon Monoxide (Manufacturer)	0.17	2,414	410.4	1,491.9
Volatile Organic Compounds (Manufacturer)	0.01	2,414	24.14	87.8
Fluorides (See Note C)	0.0014	2,414	3.4	12.4
Lead (EPA, 1989, pg 4-174)	0.00004	2,414	0.097	0.35
Mercury (See Note D)	0.000033	2,414	0.08	0.13 (See Note E)
Beryllium	0.00000225	2,414	0.005	0.020

Calculation: C = A x B; D = C x 8,760 hrs/yr x Ton/2000 lb x 0.83 (83 capacity factor)

Notes: A - 90% removal based on 4% sulfur coal at 10,500 BTU/lb  
 $2,414 \times 10^6 \text{ BTU/hr} \times 1 \text{ lb coal}/10,500 \text{ BTU} \times 0.04 \text{ lb S/lb coal} \times 21 \text{ lb SO}_2/\text{lb S} \times 0.10 = 1,839.2 \text{ lb/hr}$

B - 2% of SO<sub>2</sub>;  $1,839.2 \text{ lb SO}_2/\text{hr} \times 0.02 \times 98/64 = 56.3 \text{ lb/hr}$

C - 90% removal of F at 143 ppm in coal and 10 ppm in limestone; F in coal based on EPA 650/2-74-054 maximum for Illinois; F in limestone based on EPA 600/7-78-050.  
 $229,905 \text{ lb coal/hr} \times 143 \text{ lb F}/10^6 \text{ coal} \times 0.1 = 3.29 \text{ lb/hr}$   
Total =  $3.29 + 0.06 = 3.35 \text{ lb/hr}$ .

D - 50% control; Hg in coal based on maximum calculated from EPA 650/2-74-054 of 0.65 ppm; in limestone based on EPA 600/7-78-050 of 0.16 ppm;  $229,905 \text{ lb coal/hr} \times 0.65 \text{ lb Hg}/10^6 \text{ lb coal} \times 0.5 = 0.075 \text{ lb/hr}$ .  
 $60,250 \text{ lb limestone/hr} \times 0.16 \text{ Hg}/10^6 \text{ lb coal} \times 0.5 = 0.005$   
Total =  $0.075 \text{ lb/hr} + 0.005 \text{ lb/hr} = 0.08 \text{ lb/hr}$

E - Same as D except maximum average Hg calculated as 0.2724 ppm; no change in limestone  
 $229,905 \times 0.2724/10^6 \times 0.5 = 0.0313 \text{ lb/hr}$   
Average =  $0.0313 \text{ lb/hr} + 0.005 \text{ lb/hr} = 0.0363 \text{ lb/hr}$ ;  
 $0.16 \text{ TPY} \times .83 = .13 \text{ TPY}$

## CFB BOILER EMISSIONS (Operational Period)

Emission Calculations for Tables 3.4.2-1 and A.1-1 and A

POLLUTANT and (BASIS)	EMISSION FACTOR	HEAT INPUT	EMISSIONS	
	(lb/10 <sup>6</sup> BTU) A	(10 <sup>6</sup> BTU/hr) B	(lb/hr) C	(Tons/year) D
Nitrogen Oxides	0.20	2,414	482.8	2,114.7
Sulfur Dioxide (See Note A)	0.30	2,414	724.2	3,172.0
Particulate Matter (Manufacturer)	0.015	2,414	36.2	158.6
PM-10 (Manufacturer)	0.015	2,414	36.2	158.6
H <sub>2</sub> SO <sub>4</sub> Mist (See Note B)	0.0092	2,414	22.2	97.1
Carbon Monoxide (Manufacturer)	0.17	2,414	410.4	1,797.5
Volatile Organic Compounds (Manufacturer)	0.01	2,414	24.14	105.7
Fluorides (See Note C)	0.0014	2,414	3.4	14.9
Lead (See Note D)	0.00004	2,414	0.097	0.42
Mercury (See Notes E and F)	0.000017	2,414	0.04	0.073
Beryllium	0.00000225	2,414	0.005	0.024

Calculations:  $C = A \times B$ ;  $D = C \times 8,760 \text{ hrs/yr} \times \text{Ton}/2000 \text{ lb}$ 

Notes: A - Maximum hourly emission based on 92% removal of 2% sulfur coal at 10,500 BTU/lb  $2,414 \times 10^6 \text{ BTU/hr} \times \text{lb coal}/10,500 \text{ BTU} \times 0.02 \text{ lb S/lb coal} \times 2 \text{ lb SO}_2/\text{lb S} \times 0.10 = 724.2 \text{ lb/hr}$

B - 2% of SO<sub>2</sub>; maximum  $724.2 \text{ lb SO}_2/\text{hr} \times 0.02 \times 98/64 = 22.2 \text{ lb/hr}$

C - 90% removal of F at 143 ppm in coal and 10 ppm in limestone; F in coal based on EPA 650/2-74-054 maximum for Illinois; F in limestone based on EPA 600/7-78-050.  $229,905 \text{ lb coal/hr} \times 143 \text{ lb F}/10^6 \text{ coal} \times 0.1 = 3.29 \text{ lb/hr}$   
Total =  $3.29 + 0.06 = 3.35 \text{ lb/hr}$ .

D - Lead emission based on EPA, 1989, pg. 4-174 and reduced to  $0.00004 \text{ lb}/10^6 \text{ BTU}$  with greater particulate matter control, i.e., reduction from  $0.02 \text{ lb PM}/10^6 \text{ BTU}$  to  $0.015 \text{ lb PM}/10^6 \text{ BTU}$ .

E - 74% control of Hg; Hg in coal based on maximum calculated from EPA 650/2-74-054 of 0.65 ppm; in limestone based on EPA 600/7-78-050 of 0.16 ppm;  $229,905 \text{ lb coal/hr} \times 0.65 \text{ lb Hg}/10^6 \text{ lb coal} = 0.15 \text{ lb/hr}$ .  $60,250 \text{ lb limestone/hr} \times 0.16 \text{ Hg}/10^6 \text{ lb coal} = 0.01 \text{ lb/hr}$   
Total =  $(0.15 \text{ lb/hr} + 0.01 \text{ lb/hr}) \times (1-0.74) = 0.042 \text{ lb/hr}$

F - Annual average Hg emissions - Same as E except maximum average Hg calculated as 0.2724 ppm; no change in limestone  $229,905 \times 0.2724/10^6 \times 0.063 \text{ lb/hr}$   
Average =  $(0.063 \text{ lb/hr} + 0.01) \text{ lb/hr} (1-0.74) = 0.017 \text{ lb/hr}$ ; 0.073 TPY

**Table A. Proposed Emission Limits for Hopkins CFB Unit 2**

Pollutant	Proposed Compliance Period	Emission Limit		Basis <sup>a</sup>
		lb/hr	TPY	
Nitrogen Oxides	Demonstration <sup>b</sup> Operation <sup>c</sup>	675.9	2,457.2	0.28 lb/MM Btu
		482.8 <sup>d</sup>	2,114.7	0.20 lb/MM Btu
Sulfur Dioxide	Demonstration <sup>b</sup> Operation <sup>c</sup>	1839.2	6,686.4	0.76 lb/MM Btu <sup>e</sup>
		724.2 <sup>d</sup>	3,172.0	0.30 lb/MM Btu <sup>f</sup>
Particulate Matter/PM10	Demonstration <sup>b</sup> Operation <sup>c</sup>	36.2	131.6	0.015 lb/MM Btu
		36.2	158.6	0.015 lb/MM Btu
Sulfuric Acid Mist	Demonstration <sup>b</sup> Operation <sup>c</sup>	56.3	204.8	0.0233 lb/MM Btu
		22.2	97.1	0.0092 lb/MM Btu
Carbon Monoxide	Demonstration <sup>b</sup> Operation <sup>c</sup>	410.4	1,491.9	0.17 lb/MM Btu
		410.4	1,797.5	0.17 lb/MM Btu
Volatile Organic Compounds	Demonstration <sup>b</sup> Operation <sup>c</sup>	24.1	87.8	0.01 lb/MM Btu
		24.1	105.7	0.01 lb/MM Btu
Fluorides	Demonstration <sup>b</sup> Operation <sup>c</sup>	3.4	12.4	0.0014 lb/MM Btu
		3.4	14.9	0.0014 lb/MM Btu
Lead	Demonstration <sup>b</sup> Operation <sup>c</sup>	0.097	0.35	0.00004 lb/MM Btu
		0.097	0.42	0.00004 lb/MM Btu
Mercury	Demonstration <sup>b</sup> Operation <sup>c</sup>	0.080	0.13 <sup>g</sup>	0.000033 lb/MM Btu
		0.042	0.07 <sup>g</sup>	0.000017 lb/MM Btu
Beryllium	Demonstration <sup>b</sup> Operation <sup>c</sup>	0.005	0.020	0.00000225 lb/MM Btu
		0.005	0.024	0.00000225 lb/MM Btu

<sup>a</sup> maximum heat input is 2414 MM Btu/hr

<sup>b</sup> 2 year DOE demonstration period; annual tons per year based on 83% capacity factor

<sup>c</sup> after DOE demonstration period; annual tons per year based on 100% capacity factor

<sup>d</sup> 30-day rolling average for determining compliance

<sup>e</sup> 0.76 lb/MM Btu is achieved with 4% sulfur coal at 10,500 Btu/lb and 90% SO<sub>2</sub> removal

<sup>f</sup> 0.3 lb/MM Btu is achieved with 2% sulfur coal at 10,500 Btu/lb and 92% SO<sub>2</sub> removal

<sup>g</sup> Based on annual average Mercury content of coal of 0.2724 ppm

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Table B. Emissions Comparisons for Hopkins Unit 2 and CFB Unit

Pollutant	Unit 2	Unit 2	Unit 2		CFB Unit
	Actual Emissions <sup>a</sup> 1989-90	Actual Emissions <sup>b</sup> 1980-90	Potential Historical Fuel Mix <sup>c</sup>	Emissions Permitted	Potential Emissions <sup>d</sup>
Particulate Matter	48.3	83.7	163.6	1,018.4	158.6
Sulfur Dioxide	337.4	1,371.5	3,248.3	19,043.1	3,172.0
Nitrogen Oxides	1,324.4	1,612.2	3,055.0	3,055.1	2,114.7
Carbon Monoxide	194.2	195.7	383.7	339.5	1,797.5
Volatile Organic Cpd.s.	7.5	9.7	19.0	51.6	105.7
Lead	.005	0.020	0.040	0.285	0.423
Sulfuric Acid Mist	8.0	32.5	63.5	451.0	97.1
Fluoride	0.001	0.005	0.009	0.064	14.9
Mercury <sup>e</sup>	0.001	0.002	0.005	0.033	0.073
Beryllium	0.001	0.003	0.006	0.043	0.024
<b>TOTAL:</b>	<b>1,919.8</b>	<b>3,305.3</b>	<b>6,933.2</b>	<b>23,959.0</b>	<b>7,461.0</b>

PERCENT INCREASE OVER  
HISTORICAL FUEL MIX : 7.6%

All columns represent tons per year.

- a Based on 1989-90 historical fuel mix of 96% gas and 4% oil with oil at 1.7% sulfur at a 49% capacity factor.
- b Based on 1980-90 historical fuel mix of 86% gas and 14% oil with oil at 2.1% sulfur at a 51% capacity factor.
- c Based on 1980-90 historical fuel mix of 86% gas and 14% oil with oil at 2.1% sulfur (i.e. 2.27 lb/MM Btu) at 100% capacity factor.
- d CFB operational period at 100% capacity factor with 2% sulfur coal.
- e Figures for Unit 2 assume zero for mercury emissions for gas firing.

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Table 3.4.1-1  
CFB Unit Emissions

<u>Pollutant</u>	<u>Emission Rate (lb/MMBtu)</u>	<u>Potential Emissions* (TPY)</u>
Carbon Monoxide	0.17	1797.5
Nitrogen Oxides	0.20	2114.7
Sulfur Dioxide	0.30 (1)	3172.0
Volatile Organic Compounds	0.01	105.7
Particulate Matter	0.015	158.6
PM-10	0.015	158.6
Sulfuric Acid Mist	0.0092	97.1
Fluorides	0.0014	14.9
Lead	0.000040	0.42
Mercury	0.000017	0.073
Beryllium	0.00000225	0.024

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\* Based on Design Coal

(1) 30-day rolling average.

Table 3.4.2-1

Hopkins CFB Repowering Project  
Potential Emission Comparison

<u>Pollutant</u>	<u>Unit 2 (1)</u> <u>Potential</u> (TPY)	<u>CFB (2,3)</u> <u>Emissions</u> (TPY)	<u>P to P</u> <u>Net Change</u> (TPY)
<u>Category A (4)</u>			
Nitrogen Oxides	3055.1	2120.0	-935.1
Sulfur Dioxide	19043.2	3172.0	-15871.2
Particulate Matter	1018.4	160.8	-857.6
PM-10	1018.4	160.8	-857.6
<u>Category B (5)</u>			
Sulfuric Acid Mist	451.0	97.1	-353.9
Beryllium	0.0428	0.024	-0.019
<u>Category C (6)</u>			
Carbon Monoxide	339.5	1802.7	1463.2
Volatile Organic Compounds	51.6	106.6	55.0
Fluorides	0.0639	14.9	14.8
Lead	0.285	0.423	0.14
Mercury	0.0326	0.073	0.04

- 
- (1) Potential emissions based on 100% oil firing at permitted operating rates and emission limits, AP-42 emission factors, Estimating Air Toxics Emissions From Coal and Oil Combustion Sources (EPA, 1989) and Emissions Assessment of Conventional Stationary Systems, Volume III, External Combustion Sources for Electricity Generation (EPA, 1981). The emissions conform with the definition of potential emissions found in F.A.C. 17-2.100(157).
- (2) CFB boiler emissions reflect proposed emission limits for operational period and are based on Ruch study of Illinois Basin coals (1974), EPA study of trace element release from CFB boilers (1978), and Estimating Air Toxics Emissions from Coal and Oil Combustion Sources (EPA, 1989).
- (3) CFB boiler heat input: 2414 MMBtu/hr  
 Coal Quality: 10,500 Btu/lb, 2% sulfur, 92% SO<sub>2</sub> removal  
 Coal Feed - 229,905 lb/hr      Limestone Feed - 60,250 lb/hr  
 CFB Emissions (lb/MMBtu) NO<sub>x</sub>: 0.20; CO: 0.17; PM: 0.015; VOC: 0.01  
 Particulate includes materials handling (1.78 TPY) and limestone dryer (0.44 TPY); Nitrogen oxides and carbon monoxide includes emissions from limestone dryer (5.26 TPY). Volatile organic compounds includes emissions from limestone dryer (0.88 TPY).
- (4) Pollutants for which there is no increase in potential emissions and for which Unit 2 is subject to source specific, federally enforceable emission limits.
- (5) Pollutants for which there is no increase in potential emissions, but for which Unit 2 is not subject to a source specific, federally enforceable emission limit.
- (6) Pollutants for which there is an increase in potential emissions.

Table III.C

Airborne Contaminants (Operational Period)

<u>Contaminant</u>	<u>----Emissions----</u>		<u>Allowable Emission Rate</u>	<u>Allowable Emissions (lb/hr )</u>
	<u>Maximum (lb/hr)</u>	<u>Actual (TPY)</u>		
CFB Boiler Stack				
Carbon Monoxide	410.4	1797.5	n/a	n/a
Nitrogen Oxides	482.8	2114.7	0.6*	1448.4*
Sulfur Dioxide	724.2	3172.0	1.2*	2896.8*
Volatile Organics	24.1	105.7	n/a	n/a
Particulate	36.2	158.6	0.02*	48.3*
Sulfuric Acid Mist	22.2	97.1	n/a	n/a
Fluorides	3.40	14.9	n/a	n/a
Lead	0.097	0.42	n/a	n/a
Mercury	0.042	0.073	n/a	n/a
Beryllium	0.005	0.024	n/a	n/a
Limestone Dryer				
Carbon Monoxide	1.2	5.2	n/a	n/a
Nitrogen Oxides	1.2	5.2	n/a	n/a
Volatile Organics	0.2	0.88	n/a	n/a
Particulate	0.1	0.44	n/a	n/a
Materials Handling Particulates				
Coal Unloading Area	0.0015	5.5e-04	4.9	1.8
Coal Storage Area	0.1060	4.6e-02	112.5	66.4
Crusher Feed Conveyor	0.0420	3.0e-02	21.0	15.2
Crusher Tower Area	0.3780	2.8e-01	189.0	137.6
CFB Boiler Building	0.0840	6.1e-02	42.0	30.6
Limestone Unloading Area	0.0015	1.5e-04	4.9	0.5
Limestone Storage Area	0.0206	3.2e-03	40.0	7.8
Crusher Feed Conveyor	0.0048	9.9e-04	2.4	0.5
Crusher Tower Area	0.0048	9.9e-04	2.4	0.5
Limestone Prep Bldg.	0.0588	8.2e-02	29.4	41.2
Fly Ash Silo	0.7550	6.3e-01	7.5	8.2
Bottom Ash Silo	0.7550	6.3e-01	7.5	8.2
Ash Pile (Active)	0.0031	1.4e-02	0.0031	0.014

\* Emission rates shown are from 40 CFR 60 Subpart Da. As discussed in Attachment A, Section 415(b)(3) of the 1990 CAA Amendments exempts the project from NSPS requirements.

NOTE: Limestone contaminants have been included in the calculations for trace metal emissions.

Table A.1-1

Hopkins CFB Repowering Project  
Potential Emission Comparison

<u>Pollutant</u>	<u>Unit 2 (1) Potential (TPY)</u>	<u>CFB (2,3) Emissions (TPY)</u>	<u>P to P Net Change (TPY)</u>
<u>Category A (4)</u>			
Nitrogen Oxides	3055.1	2120.0	-935.1
Sulfur Dioxide	19043.2	3172.0	-15871.2
Particulate Matter	1018.4	160.8	-857.6
PM-10	1018.4	160.8	-857.6
<u>Category B (5)</u>			
Sulfuric Acid Mist	451.0	97.1	-353.9
Beryllium	0.0428	0.024	-0.019
<u>Category C (6)</u>			
Carbon Monoxide	339.5	1802.7	1463.2
Volatile Organic Compounds	51.6	106.6	55.0
Fluorides	0.0639	14.9	14.8
Lead	0.285	0.423	0.14
Mercury	0.0326	0.073	0.04

- (1) Potential emissions based on 100% oil firing at permitted operating rates and emission limits, AP-42 emission factors, Estimating Air Toxics Emissions From Coal and Oil Combustion Sources (EPA, 1989) and Emissions Assessment of Conventional Stationary Systems, Volume III, External Combustion Sources for Electricity Generation (EPA, 1981). The emissions conform with the definition of potential emissions found in F.A.C. 17-2.100(157).
- (2) CFB boiler emissions reflect proposed emission limits for operational period and are based on Ruch study of Illinois Basin coals (1974), EPA study of trace element release from CFB boilers (1978), and Estimating Air Toxics Emissions from Coal and Oil Combustion Sources (EPA, 1989).
- (3) CFB boiler heat input: 2414 MMBtu/hr  
Coal Quality: 10,500 Btu/lb, 2% sulfur, 92% SO<sub>2</sub> removal  
Coal Feed - 229,905 lb/hr Limestone Feed - 60,250 lb/hr  
CFB Emissions (lb/MMBtu) NO<sub>x</sub>: 0.20; CO: 0.17; PM: 0.015; VOC: 0.01  
Particulate includes materials handling (1.78 TPY) and limestone dryer (0.44 TPY); Nitrogen oxides and carbon monoxide includes emissions from limestone dryer (5.26 TPY). Volatile organic compounds includes emissions from limestone dryer (0.88 TPY).
- (4) Pollutants for which there is no increase in potential emissions and for which Unit 2 is subject to source specific, federally enforceable emission limits.
- (5) Pollutants for which there is no increase in potential emissions, but for which Unit 2 is not subject to a source specific, federally enforceable emission limit.
- (6) Pollutants for which there is an increase in potential emissions.