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June 9, 1986

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Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Re: North Broward Resource Recovery Project; PA86-22, OGC File 86-216, DOAH Case No. 86-0674

Dear Buck,

This letter is in response to your letters of May 2 and 6, 1986 requesting additional information on various aspects of the subject project certification application.

To assist in your review and that of the other agencies, I will repeat the questions asked in your letters and then provide our response. For those questions asked of the South Florida Water Management District (SFWMD) which involved the need to develop extensive exhibits, we are forwarding copies of those exhibits, as specifically noted, directly to SFWMD in an effort to expedite its review.

LETTER OF MAY 2, 1986

SOUTH FLORIDA WATER MANAGEMENT DISTRICT QUESTIONS

1. In those areas identified by the South Florida Water Management District as transmitted to you by my letter of April 29, 1986, and by SFWMD's letter of April 24, 1986.

Water Use and Supply and Development

1) The applicant should state specifically what potable and non-potable demands will need to be met. Applicant should state specifically how much water will be used for drinking,

The land use history of the site (Question 2c) is not well documented. The entire area has been used as a landfill during the past 25 years. The comprehensive geotechnical investigation referred to in the response to FDER Question 5c ,below, does provide considerable insight into past landfilling and closeout activity on the site. See specifically Figure 4, Waste Disposal History Location Plan.

Questions relating to monitoring (Questions 2g, h and i) were answered under SFWMD Hazardous Materials Management Question 2, above. No monitoring, in addition to that already required of others, is proposed or necessary.

Clean fill material from off site sources will be used to fill the existing drainage ditch after the new concrete lined ditch is put in service (Question 2j). The type of material will be determined by structural requirements of the proposed Project improvements as determined by final design.

3. To satisfy section 3.4 of the application form the following is needed:

   a) **The particle size distribution of the pollutants and the collection efficiency of the proposed particulate control device for these particle sizes were not addressed.**

RESPONSE

The preliminary design features of the Electrostatic Precipitation (ESP) for the north facility are presented in Table 1. These design features are based on a particulate emission limitation of 0.02 gr/dscf corrected to 12-percent CO_2. Since final design or procurement have not been accomplished, some design features may change slightly.

Table 2 presents the estimated uncontrolled particle size distribution from the combustion of municipal solid waste (MSW) at the north facility. Estimated mass fraction efficiency of the proposed control equipment, which is also shown in Table 2, was based on the Specific Collection Area (SCA) of 516.7 ft_2/1,000 acfm and a spatial current density of 800 mA/17,050 ft_2. Calculated particulate removal efficiency, based on the estimated particle size distribution, is greater than 99 percent. Particulate removal efficiency, calculated using Deutsch-Anderson equation, is estimated to range from 99.8 to 99.99 percent.

b) The efficiency of the proposed particulate control device did not address particulate matter, lead, beryllium, and inorganic arsenic.

RESPONSE

The particulate matter control efficiency of the proposed air pollution control equipment, i.e., ESP, is 99.68 percent (see Table 1). The estimated control efficiencies for

inorganic arsenic (As), beryllium (Be), and lead (Pb) are 98.4+ percent, 99+ percent, and 97+ percent, respectively (see Table 3).

c) The emission factors used in the application for sulfur dioxide, lead, fluorides, and mercury differ from the emission factors used in the South Broward County application. The same fuel analysis used in the South Broward County is presented in this application. In light of this fact, a justification for different emission factors is needed.

RESPONSE

The emission factors initially developed and submitted for the South Broward County resource recovery facility underwent review and modification during the application review and certification hearing process. Currently, the proposed emission factors for the North Broward facility are consistent with those ultimately supported during the hearing process for the southern facility. The emissions factors for sulfur dioxide, lead, fluoride, and mercury are, therefore, the same for both facilities. These factors are very conservative since they represent at least a 95% level of confidence.

d. A copy of all test results used in determining the emission factors of all pollutants for this facility is needed.

RESPONSE

The data used to develop emission factors for the North Broward County resource recovery facility are referenced in

the Site Certification Application. Additional information contained in this letter is also referenced. Because the volume of this material is too large to transmit easily and may duplicate data already on file at DER, only references have been provided. However, copies of referenced material can be supplied upon request.

4. To satisfy section 5.6 of the application the following information is needed:

a) Modeling outputs used in the analysis of this application.

RESPONSE

Copies of the air dispersion modeling outputs in computer format that support the air quality impact analysis of the application are presented as exhibits. Because of the volume of output, these exhibits are being forwarded in a separate package.

b. The significant impact areas for SO_2, PM, NO_2, and CO were not shown.

RESPONSE

A summary of the maximum predicted concentrations due to the proposed source, as presented in the application, and applicable PSD significance levels used to define the significant impact area per pollutant are as follows:

Pollutant	Averaging Period	Concentration ($\mu g/m^3$) Maximum Predicted	Significance Level
SO_2	3-hour	34.4	25
	24-hour	8.1	5
	Annual	0.73	1
TSP	24-hour	0.68	5
	Annual	0.061	1
NO_2	Annual	0.73	1
CO	1-hour	9.8	2,000
	8-hour	3.6	500

Based on these results, the maximum predicted concentrations due to the proposed source are less than the significance levels for those pollutants for which significance levels have been promulgated, except for SO_2 for the 3- and 24-hour averaging periods. From the computer printouts provided in response to FDER Question 4a, above, the significant impact areas for SO_2 concentrations are as follows:

Averaging Period	Location with Respect to Proposed Plant Direction (°)	Distance (m)
3-Hour	20	1,500-1,900
	140	1,900-2,700
	240	1,500
	260	1,500-2,700
	270	1,500-2,300
	280	1,500-3,100
	290	1,500-2,700
	300	1,500-3,100
	310	1,100-3,100
	320	1,500-2,700
	330	1,100-2,300
	340	1,100-2,700
24-Hour	60	1,900-4,300
	140	1,900-4,300
	160	4,300
	220	3,500-4,300
	230	2,200-4,300
	240	3,100-4,300
	250	3,100-6,000

260	1,500-6,000
270-300	1,500-10,000
320	1,500-3,500
330	1,900-2,300
340	1,900
360	1,900

c. The impact of all minor sources within 10 kilometers of the significant impact area for each of the above state pollutants was not evaluated.

RESPONSE

A review of available emission inventory information was conducted for minor sources of SO_2 emissions within 10 km of the significant impact area. The only pollutant reviewed was SO_2 since the maximum predicted concentrations due to the proposed source for the other pollutants were less than the significant levels.

The review for evaluating the impact of minor SO_2 sources consisted of the following steps:

1. A listing of all sources within 10 km of the proposed source was obtained from DER in Tallahassee. This listing identified 39 plant names and source code numbers, but did not include any pollutant emission data and was not specific for SO_2 only.

2. Since the listing from Step 1 only identified sources, specific information regarding these sources was obtained by a visit to the DER district office in West Palm Beach.

3. From the specific source information obtained in Step 2, four plants were identified that had the potential to emit SO_2. For three of the four plants, specific SO_2 emissions were neither listed by permit conditions which specify maximum allowable amounts nor by any estimating methods. These sources potentially emitted SO_2 because fuel oil was identified as being burned at each source. Therefore, for these sources, SO_2 emissions were calculated based on the sulfur content of the fuel and the emission factor from the September 1985 U.S. EPA document entitled "Compilation of Air Pollutant Emission Factors" (commonly referred to as AP-42).

   The maximum SO_2 emissions estimated for these sources are as follows:

Plant (Identification No.)	Maximum Emissions (lb/hr)	Location With Respect to Proposed NBCRR Facility	
		Direction (°)	Distance (km)
Asphalt Pavemix (50060001)	7.2	175	9.1
East Coast Asphalt (50060015)	26.8	168	5.5
Hardrives Asphalt (50060045)	53.2	23	2.6
South Florida Materials (5006005)	24.3	72	0.6

4. The evaluation of the impact of the minor sources consisted of three air dispersion modeling cases:

a. Case 1--Concentrations were predicted for the periods and receptors that produced the maximum 3- and 24-hour average impact from the proposed NBCRR facility only.

b. Case 2--Concentrations were predicted for 5 years of meteorological data from the NWS station in Miami (the same data as used in the PSD report) for directions that aligned all the minor sources with the proposed NBCRR facility. Receptors were located along radials of 10o, 20o, and 30o extending from the proposed facility and at downwind distances 500, 1,000, 1,500, 2,500, and 3,000 meters along each radial.

c. Case 3--Concentrations were predicted for the same 5 years of meteorological data for the directions that aligned the two nearest minor sources (i.e., Hardrives Asphalt and South Florida Materials) to the proposed facility. These sources have the highest potential for any of the considered minor sources to interact with emissions from the proposed facility.

In all of these cases, the emissions from the FPL Port Everglades and Fort Lauderdale facilities were included.

The results of the trace modeling cases are presented in Tables 4 through 6, respectively. In all cases, the maximum predicted 3- and 24-hour average SO_2 concentrations are substantially less than the Florida AAQS of 1,300 and 260 ug/m_3, respectively. These results are similar to those presented in the PSD permit application and indicate that the maximum predicted SO_2 concentrations are well below AAQS.

d. Additional pollutants of concern to citizens living near the facility (hydrogen chloride, dioxins, furans, and other heavy metals) were not addressed in the application.

RESPONSE

The emissions estimates of nonregulated pollutants were developed and are presented below for hydrogen chloride, dioxins, furans, and several metals.

Hydrogen chloride will be emitted from the facility by the combustion of chlorine containing materials in MSW. Ultimate analysis of 23 MSW samples taken in 1983 indicate an average chlorine content of 0.145 percent. Based on this percentage of chlorine in the MSW, an average emission of 0.33 lb $HCl/10_6$ BTU is estimated. This HCl emissions estimate is considered conservative since it does not account for any retainage of chlorine in bottom or fly ash. Indeed, CARB (1984) indicates that from 15 to 35 percent of the chlorine entering the combustion zone of MSW-fired facilities is retained in the bottom and fly ash.

Emissions of dioxins, furans, and metal species from the combustion of MSW have been determined by several investigators. Estimated emission factors from a broad range of studies and types of facilities are presented in Table 7. As seen from this table, however, the range of emission factors is quite large and is influenced by the specific facility's design. For example, data from CARB (1984) and Cooper Engineers (1985) are generally uncontrolled emission factors as evidenced by the much higher metal emissions. Conversely, data from A.D. Little (1981), Nielson et al. (1985), Signal (1985), and the New York State Department of Environmental Conservation (DEC) (1985, 1986) reflect various levels of control.

The DEC tests are part of a comprehensive testing program evaluating dioxin, furan, trace organic, and metals emissions from MSW/RDF-fired facilities. This program, although implemented by DEC, is a joint effort funded by DEC, EPA, and the New York State Energy Research and Development Agency. Results from the DEC Westchester County Facility testing represents the latest available information on dioxin, furan, and metal emissions applicable in estimating such emissions for the North Broward facility.

Actual emissions from the North Broward facility are expected to be lower than those for Westchester because of

the greater level of particulate matter control proposed for the North Broward facility (i.e., 0.02 gr/dscf corrected to 12-percent CO_2) compared to the level of emissions observed during the emissions tests (i.e., >0.04 gr/dscf corrected to 12-percent CO_2).

e. The South Broward facility was restricted to a stack height of 195 feet above grade to ensure compliance with FAA regulations. Justification is needed for the proposed 200 feet stack height at the North Broward facility.

RESPONSE

The proposed stack height at the North Broward facility is not restricted by FAA regulations. Based on the proposed building dimensions (i.e., building height of 98 feet and maximum projected width of 329 feet), the Good Engineering Practice (GEP) stack for this facility is calculated to be 245 feet (i.e., 2.5 x 98 feet). This calculation is based on the GEP formula for a building whose height is less than the width. With a proposed height of 200 feet, the proposed stack will comply with GEP stack height regulations. Greater height would not significantly reduce maximum predicted concentrations.

f. The application addressed the projected population of Broward County when the proposed facility comes on line. An estimate is needed of the population that the proposed facility will serve.

RESPONSE:

The proposed project is intended to serve a population of approximately 600,000 persons.

5. Sections 2.3, 3.7 and 5.3 inadequately address the following:

a) This facility is proposed to be located over an existing landfill known as the Hyatt Landfill. This landfill was closed down in the mid-1960's and as such was not permitted by DER. Therefore, no groundwater monitoring has ever been done at the site. The applicant states that the proposed building construction and associated surface water management plan will not affect the groundwaters and/or surface waters at this site. It should be noted that the applicant proposes two retention ponds totaling approximately 4 acres directly over the landfill recharging the Biscayne Aquifer. In addition, the existing drainage of surface waters can discharge to the north into the existing dredge lake towards the Hillsboro Canal during the dry seasonal water table and to the south into the Pompano Canal in the wet seasonal water table.

RESPONSE:

In response to SFWMD Stormwater Management Question 1, above, we have submitted plans and supporting caculations regarding the required retention areas. Although most of the material landfilled on the site appears to have been construction debris placed below the water table (See Geotechnical Study referred to in response to FDER Question 5c, below), we have chosen to provide a liner under the retention pond. Along with the removal of a great deal of deposited waste during construction and the addition of impervious surfaces at the Project site, the amount of recharge of the aquifer through deposited waste should be greatly decreased not increased.

LIST OF TABLES*

* All tables prepared by Environmental Science and Engineering, Inc.

Table 1. Preliminary Design Features of ESP for North Broward County Resource Recovery Facility (One ESP Per Unit)

Air Pollution Control System	
a. Type	F.L. Smidth; F/300/W4S/ 4x30-1x72110/1C/1C/L1S
b. Number of Units per Furnace Boiler	1
c. Design Efficiency in Particulate Removal	99.68 percent
d. Guaranteed Particulate Discharge Rate	0.02 gr/dscf corrected to 12-percent CO_2
e. Numbers of Fields per Unit	4
f. Gas Flow:	
Flow (Max)	132,000 acfm/400°F
Velocity (Max)	2.58 ft/sec
g. Total KVA Rating per Unit (T/R SETS)	59 kVA
h. Gas Temperature (Max) at inlet	600 °F
i. Design Inlet Loadings	1.4 gr/acf (3.2 g/m^3)
ESP Design Details	
a. Electrical Length Per Plate	500 mm nominal
b. Wire to Plate Spacing	134 mm
c. Wire to Wire Spacing	180/320 mm
d. Wire Diameters	0.07 mm
e. Wires per Section	288
f. Wire Length per Buss Section	9,449 ft
g. Plate Area per Section	17,050 ft^2
h. Number of Electrical Sections	4
i. Duct Width	300 mm
j. SCA	516.7 ft^2/1,000 acfm
Electrical Design	
a. Applied Voltage Each Section	60,000 V
b. Total Current in Electrical Sections	77 kV peak/800 mA
c. Roughness of Wire	0.7

Source: M.K. Ferguson Company, 1986.

Table 2. Estimated Particle Size Distribution and Removal Efficiency for Proposed North Broward Facility

Particle Size (μm)		Estimated Mass Fraction of Uncontrolled Emissions (%) (References 1-4)	Estimated Removal Efficiency (%) (References 5-7)	Mass Fraction Removed (%)
Less than or Equal to	Greater than			
--	7	64	99.95+	63.97+
7	4	6	99.9+	5.99+
4	2	7	99.8+	6.99+
2	1	6	99.4+	5.96+
1	0.7	10.5	96.5+	10.13+
0.5	--	6.5	93.0+	6.05+
		100		99.1+

Source: KBN, 1986.

References:

1. California Air Resources Board. 1984. Air Pollution Control at Resource Recovery Facilities.
2. U.S. Environmental Protection Agency. 1982. Non-Fossil Fuel Fired Industrial Boilers--Background Information. EPA-450/3-82-007.
3. Cooper Engineers. 1985. Air Emissions and Performance Testing of a Dry Scrubber (Quench Reactor), Dry Venturi and Fabric Filter System Operating on Flue Gas Combustion of Municipal Solid Waste in Japan.
4. Hahn, J.L., VonDem Fonge, H.P., Jordan, R.J., and Finney, J.A., Jr. 1985. An Emissions Test of a Deutsche Babcock Anlagen Dry Scrubber System at the Munich North Refuse-Fired Power Plant. Presented at the 78th Annual Meeting of the Air Pollution Control Association.
5. McDonald, J.R. 1981. Computer Simulation of the Electrostatic Precipitation Process. Proceeding for the International Conference on Electrostatic Precipitation.
6. U.S. Environmental Protection Agency. 1985. Operation and Maintenance Manual for Electrostatic Precipitators. EPA/625/1-85/017.
7. Oglesby, S., Jr., and Craig, A.B. 1975. Fine Particulate Electrostatic Precipitation. Proceeding from Symposium on the Use of Electrostatic Precipitators for the Control of Fine Particulates.

Table 3. Estim[illegible]e Distribution and Removal Efficiency for Inorganic Arsenic (As), Beryllium (Be), and Lead (Pb)

Particle Size (μm)		Estimated	As		Be		Pb	
Less Than or Equal to	Greater Than	Collection Efficiency (%)	Uncontrolled Mass Fraction (%)	Mass Fraction Removed (%)	Uncontrolled Mass Fraction (%)	Mass Fraction Removed (%)	Uncontrolled Mass Fraction (%)	Mass Fraction Removed (%)
—	7	99.95+	66	65.97+	58	57.97+	25	24.99+
7	4	99.9+	3	2.99+	11	10.99+	7	6.99+
4	2	99.8+	3	2.99+	11	10.98+	10	9.98+
2	1	99.4+	3	2.98+	8.5	8.45+	10	9.94+
1	—	94+	25	23.5+	11.5	10.81+	48	45.12+
				98.43+		99+		97.02+

Source: KBN, 1986.

Reference: California Air Resource Board. 1984. Air Pollution Control at Resource Recovery Facilities.

Table 4. Case 1—Maximum Predicted Total SO_2 Concentrations, Including FPL and Minor Sources, for Periods that Produced Maximum Concentrations Due to NBCRR Facility Only

Averaging Period	Analysis	Highest, Second-Highest Concentration ($\mu g/m^3$)					Receptor Location*		Period		
			Total Due to								
		Total	NBCRR	FPL	Minor Sources†	Background**	Direction (°)	Distance (km)	Julian Calendar Day	Hour Ending	Year
3-hour	Screening††	—	34.4	—	—	—	300	1.9	126	12	1971
	Refined	62.0	34.6	0.0	0.4	27	300	2.0	126	12	1971
24-hour	Screening†	—	8.1	—	—	—	270	2.3	169	24	1970
							310	1.9	111	24	1972
	Refined	30.1	9.5	7.2	1.4	12	316	2.2	111	24	1972

*With respect to NBCRR facility.
†Asphalt Pavemix, East Coast Asphalt, Hardrives Asphalt, and South Florida Materials.
**Based on monitoring data; since 3-hour concentrations are not obtained by monitoring method, 3-hour concentration was assumed to equal 2.25 times the 24-hour concentration.
††Screening analysis considered only NBCRR facility.

NOTE: The 3- and 24-hour AAQS applicable for the project are 1,300 and 260 $\mu g/m^3$, respectively.

Source: ESE, 1986.

Table 5. Case 2—Maximum Predicted Total SO_2 Concentrations Due to Proposed NBCRR Facility, FPL, and Minor Sources for Interaction Directions*

Averaging Period	Year	Highest, Second-Highest Concentration ($\mu g/m^3$) Total	Total Due to Modeled Sources	Total Due to Background	Receptor Location† Direction (°)	Receptor Location† Distance (km)	Period Julian Calendar Day	Period Hour Ending
3-hour	1970	359	332	27	30	500	47	21
	1971	294	262	27	10	2,000	38	18
	1972	251	224	27	10	3,000	78	6
	1973	280	253	27	30	3,000	180	6
	1974	284	257	27	30	3,000	7	18
24-hour	1970	104.4	92.4	12	30	1,000	318	24
	1971	78.9	66.9	12	10	500	73	24
	1972	81.4	69.4	12	30	3,000	330	24
	1973	92.7	80.7	12	20	3,000	180	24
	1974	83.5	71.5	12	20	3,000	176	24

*Directions of 10°, 20°, and 30° with respect to proposed NBCRR facility.
†With respect to proposed NBCRR facility.

NOTE: The 3- and 24-hour AAQS applicable for the project are 1,300 and 260 $\mu g/m^3$, respectively.

Source: ESE, 1986.

Table 6. Case 3—Maximum Predicted Total SO_2 Concentrations Due to Proposed NBCRR Facility, FPL, and Minor Sources for Interaction Directions of Two Nearest Minor Sources

Averaging Period	Year	Highest, Second-Highest Concentration ($\mu g/m^3$)			Receptor Location		Period	
			Total Due To				Julian	
		Total	Modeled Sources	Background	Direction (°)	Distance (km)	Calendar Day	Hour Ending
3-hour	1970	299	272	27	252	4.3	318	12
	1971	348	321	27	252	1.5	69	21
	1972	287	260	27	252	3.9	33	3
	1973	340	313	27	252	1.9	79	24
	1974	297	270	27	252	4.3	106	21
24-hour	1970	113.2	101.2	12	252	4.3	307	24
	1971	93.8	81.8	12	252	4.3	53	24
	1972	78.7	66.7	12	203	2.3	171	24
	1973	85.5	73.5	12	252	1.9	116	24
	1974	83.8	71.8	12	203	1.5	50	24

NOTES: 1. Directions of 203° and 252° are due to Hardrives Asphalt and South Florida Materials, respectively.

2. The 3- and 24-hour AAQS applicable for the project are 1,300 and 260 $\mu g/m^3$, respectively.

Source: ESE, 1986.