Signal Environmental Systems Inc.

VIA FEDERAL EXPRESS

August 30, 1985

Mr. Thomas Henderson, Director
Resource Recovery Office
Room 521/114 South Andrews Avenue
Ft. Lauderdale, FL 33301

RE: South Broward Project
PCDD/PCDF Emission Estimates

Dear Mr. Henderson:

Per your request, we have attached in Table 1-1 our emission rates estimate for PCDD and PCDF compounds. We have enclosed in a separate table a breakdown based on the Chicago NW results for informational purposes only.

We have also attached a paper which summarizes and reviews recent PCDD/PCDF Emission Data and further supports the selected values.

If you have any questions or require further information, please call me.

Sincerely,

James P. Burnette

JPB/mb
cc: E.S. Conner
D. Germanas
A.T. Jennings
J.A. Ristau
T.A. Smith
A.M. Szurgot

PROPOSED NONREGULATED EMISSION RATES
TRACE ORGANIC COMPOUNDS
SOUTH BROWARD PROJECT

Pollutant	Pounds Per Million Btu (E-8)	grams/sec 2250 tpd (100% Case)	grams/sec 2588 tpd (115% Case)
Chlorinated Dibenzo-P-Dioxins (CDD)			
Tri-CDD	1.6	1.7E-6	2.0E-6
Tetra-CDD	0.79	8.4E-7	9.7E-7
Penta-CDD	-	-	-
Hexa-CDD	2.0	2.1E-6	2.5E-6
Hepta-CDD	0.95	1.0E-6	1.2E-6
Octa-CDD	0.32	3.4E-7	3.9E-7
Total Poly-CDD	5.7	6.1E-6	7.0E-6
Adjusted Total Poly-CDD	6.4	6.8E-6	7.9E-6
Chlorinated Dibenzo-P-Furans (CDF)			
Tri-CDF	37	3.9E-5	4.5E-5
Tetra-CDF	11	1.2E-5	1.4E-5
Penta-CDF	-	-	-
Hexa-CDF	7.7	8.2E-6	9.5E-6
Hepta-CDF	0.94	1.0E-6	1.2E-6
Octa-CDF	0.080	8.5E-8	9.8E-8
Total Poly-CDF	57	6.1E-5	7.0E-5
Adjusted Total Poly-CDF	65	6.9E-5	8.0E-5

TABLE 1-1
ESTIMATED EMISSION FACTORS FOR DIOXINS AND FURANS
THE PROPOSED SOLID WASTE FACILITY
BROWARD COUNTY - SOUTH, FLORIDA

	Pounds Per Million Btu (1)	Grams per Second (1)	Pound Per Hour (1)	Tons per Year (1) (2)
Tetrachlorinated Dibenzo-p-dioxins (TCDD)	7.9E-9	9.7E-7	7.7E-6	3.4E-5
Total Polychlorinated dibenzo-p-dioxins (PCDD) (Tetra thru Octa)	4.1E-8	5.0E-6	4.0E-5	1.8E-4
Tetrachlorinated dibenzo-p-furans (TCDF)	1.1E-7	1.4E-5	1.1E-4	4.7E-4
Total polychlorinated dibenxo-p-furans (PCDF) (Tetra thru Octa)	2.0E-7	2.5E-5	2.0E-4	8.5E-4

NOTES:

(1) Total facility wide stack emission at maximum operating conditions.
(2) At 100 percent availability.

EMISSION FACTORS

Dioxin and furans, a collection of many compounds, are also know as polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzo-p-furans (PCDF). Like other organic compounds, PCDD's and PCDF's are believed to be products of incomplete combustion. Their production is promoted by inadequate oxygen in the high temperatures of the flame. The mechanism for formation is suspected to be the combustion of aromatic precursors in the presence of chlorinated compounds. It has also been suggested that lignin or lignin-like substances may combine with a chlorine donor under sufficient heat to form PCDD's and PCDF's.

Based on performance data at the Hamilton, Ontario and Issy, France incinerators, there is an apparent coorelation between combustion conditions and trace organic emissions (1). The primary factors affecting PCDD and PCDF formation are air distribution, excess air, and combustion temperatures. As evidenced in this study, PCDD and PCDF emissions were virtually extinguished at operating temperatures above 1,400°F.

These pollutants have not been tested at any of Signal's facilities. A literature review of emission rates for these pollutants reveals that EPA has conducted a comprehensive assessment (2) at the Chicago Northwest Facility listed as the

lower value of two American facilities in the CARB report (3). Table 2-1 contains the average of reported concentrations at the Chicago test for tetrachlorinated dibenzo-p-dicxins, polychlor-inated dibenzo-p-dioxins (tetra thru octa), tetrachlorinated dibenzo-p-furans, and polychlorinated dibenzo-p-furans (tetra thru octa). Considering the combustion efficiency proposed in the project furnace design, these emissions appear appropriate for solid waste firing.

TABLE 2-1
CHICAGO NORTHWEST STACK TEST RESULTS
THE PROPOSED SOLID WASTE FACILITY
BROWARD COUNTY - SOUTH, FLORIDA

	Nanogram per dry standard cubic meter corrected to 12% Carbon Dioxide	Pounds per million Btu (E-8)
Tetrachlorinated dibenzo-p-dioxins (TCDD)	8.0	0.79
Total polychlorinated dibenzo-p-dioxins (PCDD) (Tetra thru Octa)	41.3	4.1
Tetrachlorinated dibenzo-p-furans (TCDF)	114	11
Total polychlorinated dibenzo-p-furans (PCDF) (Tetra thru Octa)	201.2	20

REFERENCES

1. Hasselriis, F., "Relationship Between Combustion Conditions and Emissions of Trace Pollutants." Presented at Northeast Regional APCA Conference, Albany, May 1984.

2. U. S. Environmental Protection Agency, Research Triangle Park. June 1983. Comprehensive Assessment of Specific Compounds Present in Combustion Emissions Variability. EPA-560/5-83-004.

3. State of California-Air Resources Board, Air Pollution Control at Resource Facilities - Preliminary Draft. April 1984.

Signal Research Center Inc.
50 East Algonquin Road
Box 5016
Des Plaines, Illinois 60017-5016
Telephone 312-391-3500

August 23, 1985

Summary and Review of Recent PCDD/PCDF Emission Data

Within the last year a number of official reports and technical publications have been issued about PCDD/PCDF emissions from various waste-to-energy facilities around the world, which should be useful in predicting emissions from new plants. The new data comes from the following facilities:

MVA I, Hamburg, Borsigstrasse, W. Germany[1]

MVA II, Hamburg, Stellinger Moor, W. Germany[1]

MVA III, Hamburg, Stapelfeld, W. Germany[1]

Malmö, Sweden[2,3]

Linköping, Sweden[2,4]

Des Carrieres, Montreal, Canada[5]

The results are summarized in Table I. Earlier data from Chicago N. W.[6] and Zürich, Josefstrasse[7] are also included, to complete the data base of emissions from facilities that use equivalent technologies to recover energy by mass burning refuse. Results from an incinerator in Toronto,[15,16,17] without energy recovery, are summarized in Table II.

To make sure that the data are comparable, the efficiency of the sampling procedures was reviewed, as well as the qualifications of the laboratories performing the analyses.

Chicago, N.W.

The Chicago N. W. is a Martin technology plant,[8] comprised of four units each capable of burning 363 t (metric ton)/day. It started operation in October of 1970. Pollution control is by ESP's. Energy is recovered as steam.

Sampling was performed at the outlet of the ESP with Modified Method V trains consisting of a heated filter, condenser, XAD-2 resin trap and 4 ice-cooled impingers. The last impinger contained silica-gel. Nine tests were made with two simultaneous trains for 8 hrs totaling about $10m^3$ per train. The analyses were performed on composites of 3 tests, containing the combined extracts of all the train components.[6] Because everything was combined for analysis, the efficiency of sampling cannot be estimated. However, the same procedures were used in the testing of Hampton, VA. There, the emissions were about 50 times higher than Chicago, N. W., yet no breakthrough of anylate was observed in the first impinger solutions.[9] Therefore, it appears that the sampling efficiency at Chicago, N.W. must have been more than adequate to catch most of the PCDD and PCDF emissions.

Analyses were done by Midwest Research Institute (MRI). Analytical

protocols met EPA requirements. Furthermore, MRI has been and is being used extensively by the EPA in the National Dioxin Study program. Therefore, it must be considered a highly qualified and experienced laboratory for such analyses.

Zürich Josefstrasse

According to the Martin literature[8], this plant is a single unit burning about 510 t/d. It began operation in 1978. Pollution control is by ESP. The plant produces 44.7 t/hr steam.

Sampling was done in the stack at the 38.5m (126 ft) level. The probe consisted of a teflon filter sack in the stack, condenser cooled to 14-19°C, condensate flask, two adsorption impingers filled with ethyleneglycol and a quartz wool filter. A total of 314 m^3 of flue gas were withdrawn over a period of 5 days, 132 hrs. The impingers were not chilled. However, since the sampling was done in December, it may not have been necessary. Totals collected were 3g of particulates, 24.5 l of condensate and 290 ml impinger solution. Separate analyses of the probe components indicate that only 3% of the total PCDDs were found in the impingers and about 20% of the PCDFs.[10,11] Results indicate that the sampling efficiency for PCDDs was good. However, there may have been some breakthrough of PCDFs, particularly the lower molecular weight congeners.

Analyses were performed by EMPA in Dübendorf, the Swiss Federal Laboratory for Materials Testing and Research. The analytical protocols were developed in collaboration with Dr. Buser's laboratory.[7,11] Dr. Buser has published a number of scientific articles together with Prof. Rappe and can be considered a pioneer in the analysis of trace levels of dioxins and furans.

Hamburg Plants

Martin literature[8] lists one, 288 t/d unit at Borsigstrasse and two, 592 t/d units at Stellinger Moor. They started operation in 1967 and 1972, respectively. Von Roll literature[12] lists three, 200 t/d units as Hamburg II, which started up in 1963. Reference 1 did not identify which units were tested. Stapelfeld is based on Steinmüller technology.[13] Therefore, either Borsigstrasse or Stellinger Moor must have both Von Roll and Martin units. All plants recover energy and have ESP's. Stapelfeld has wet scrubbers after the ESPs. At this time we do not know if the other two facilities have scrubbers.

Emissions were sampled at the outlet of pollution control devices before the stack.[1] The sampling train consisted of a fiber glass filter heated to 230°C and a condenser with condensate flask. After the condenser the flue gas stream at 14-18°C was split in half. Each half went through a series of three impingers. The first two were filled with methoxyethanol, the third was a droplet separator. After the impingers the flows were recombined, dried and flow rates measured. The impingers were cooled to 0°C. The test duration was 24 hrs at 4m^3/hr. The condensate flask was drained every 3 hrs and the methoxyethanol impingers were exchanged every 8 hrs. The fraction of total PCDD and PCDF collected by the impingers was 12 to 26% and 28 to 67%, respectively. The authors state that "further experiments will clarify

whether the total sampling efficiency is better than 95%."[14]

The analyses were performed by Prof. Ballschmiter's laboratory at the University of Ulm. He has been involved in dioxin research for a number of years and has published several articles in peer reviewed journals on dioxin analysis.

Swedish Plants

The Malmö plant has two Martin units, 204 t/d each. Pollution control today consists of powdered, hydrated lime scrubbers, ESPs and baghouse. The plant began operation in 1973. The scrubbers and baghouse were installed in 1981 with the aid of a Swedish Government grant, because this was new technology for refuse incinerators. Energy is recovered as hot water for district heating.[3]

The Linköping plant had two Von Roll units, 165 t/d and 288 t/d, at the time it was tested. A third, 288 t/d was due to start up in 1984. The first two began operation in 1982. Pollution control is by ESPs and energy is recovered as hot water.[4]

The Swedish sampling train consists of a glass cyclone (cut off, 2μm) and an absolute quartz-fiber filter sleeve, thermostated at 160°C. A condenser, condensate flask and a XAD-2 resin trap follows. 10 to 20 m^3 of sample were taken per test at a rate of 4 m^3/hr. The flow diagram does not indicate that the resin trap was cooled. The condensate and resin trap were analyzed together. The data as reported do not permit an evaluation of sampling efficiency. However, a similar configuration was used in emission tests at the Toronto incinerator, i.e. condensation before adsorption on Florisil traps. There, less than 1% of the PCDDs and PCDFs were found on the resin.[15] By analogy then, the efficiency of the Swedish sampling train should be more than adequate. Emissions at Malmö were sampled in the stack.[3] At Linköping, the smaller unit was sampled at the outlet of the ESP.[4]

Analyses were performed by the Studsvik Air Laboratory. We have no information about their analytical capabilities. The original reports state that no TCDD or TCDF was detected (detection limit 0.25 ng/m^3) at Malmo[3] and traces of PCDDs and PCDFs were found at Linköping.[4] The data in Table I are from a recent Swedish EPA report.[2] It appears that the samples were re-analyzed. From personal conversation with Prof. Rappe in Miami, we know that his laboratory did the second analysis on Malmö.

Montreal Plant

The Montreal plant consists of four Von Roll units, each capable of burning 360 t/d.[12] It started operation in 1970. Originally each unit was equipped with two-field ESPs. In 1982 they were replaced with multicyclones and three-field ESPs. Energy is recovered as steam.

Emissions were sampled in the stack about 47 m (153 ft) above ground level. About 2 scm were withdrawn per test. The sampling train consisted of a heated, particulate filter, condenser, XAD-2 resin trap, condensate trap, second XAD-2 resin column, ethylene glycol impinger, empty impinger and silica

gel impinger. The condenser cooled the gas to <20°C and the impingers were cooled in an icebath. When the train components were analyzed separately, the amounts of PCDD and PCDF captured in the second resin trap were most often not detectable (detection limit 2 pg/sample) or very low.

Analyses were performed by the Analytical Services Division Laboratory of Environment Canada. Based on their publications, this laboratory is extensively involved in Canada's Federal Program for assessing dioxin emissions from various combustion sources.

Toronto Incinerator[15,16]

The Toronto incinerator consists of three units, each 192 t/d, without energy recovery. The furnaces have hydraulic rocker grates and air cooled refractory walls. The flue gases are cooled in a water spray tower, followed by particulate removal in ESPs. All units exhaust to a common stack. The furnaces are one-chamber type. Gas temperature is maintained above 870°C with natural gas burners located at the combustion gas exit. The gas residence time along the shortest path is about 1 second.[16] A flow diagram of the incinerator is shown in Figure 1.[15]

Emissions were sampled in the stack at the 30 m (98 ft) level. The sampling was with a Modified Method V train. The filter was heated to 120°C. Two Florisil traps were placed between the third and the final silica gel impinger. Impingers and traps were cooled in an ice bath. About 16 m^3 (dry basis) of sample was collected for each 24 hr test. The train components were analyzed separately. The Florisil traps contained less than 1% of the PCDD/PCDF captured by the train.

Analyses were performed by the Ontario Ministry of the Environment, Laboratory Services Branch. As far as we know, references 15 and 16 represent the first mention in the scientific literature of this laboratory's activities in dioxin analysis. The official report on these tests has not been released yet. Prof. Rappe is acknowledged as a consultant in the early stages of the project.[16] Implications are that this laboratory was just developing its capabilities to do analysis during these tests.

SUMMARY AND CONCLUSIONS

The data base of PCDD/PCDF emissions from facilities using well established, mass-burn, waste-to-energy technology consists of tests at eight plants around the world. All but one are based on the Martin or Von Roll technology.

The data cannot be compared in absolute terms because of the differences in sampling methodology and possible differences in analytical accuracy. It is a well know fact that the precision within a laboratory is only ±20%, at best. Results from two laboratories, analyzing the same sample, can vary by as much as a factor of three.

Until better information becomes available, the data from these plants could be considered equivalent, for the following reasons:

1. Tests were conducted under the direction of federal or state regulatory agencies, whose objectives to obtain complete and accurate data cannot be questioned.

2. All sampling trains contained the three essential elements, i.e. particulate filtration, flue gas condensation and adsorption. Data from Hamilton show that flue gas condensation followed by condensate adsorption on XAD-2 is quantitative.[9] On the other hand, Toronto data indicate that efficient condensation in impingers, before vapor phase, resin traps, captured more than 99% of the PCDD and PCDF.[15] In Germany[1] and Switzerland,[7] antifreeze type liquids were used as adsorption media after condensation. Significant amounts, particularly PCDFs, were found in that media. However, Prof. Ballschmiter states the need to establish whether the overall sampling efficiency was better than 95%.[14] This seems to imply that they are confident of at least 95% sampling efficiency.

3. In most cases, the analyses were performed by experienced laboratories using state-of-the-art extraction, clean-up and instrumental procedures.

[redacted] This is based on 10 tests at 4 facilities with ESPs, i.e. Chicago, N. W. and 3 plants in Hamburg. There is insufficient data at this time to determine a statistically significant distribution of homologs. Qualitatively, a trend is emerging for the predominance of hexas through octas among the PCDDs and tetras through hexas among PCDFs.[1]

The data from Sweden is incomplete. The results from Malmö may be indicative of what can be expected from a modern plant with a scrubber plus baghouse. Montreal represents the lowest emissions measured to date. This demonstrates that PCDD/PCDF emissions can be minimized in a properly designed and operated waste-to-energy facility.

The data from the Toronto incinerator, as reported in three different references,[15,16,17] is inconsistent (see Table II). Operation with too much excess air, as indicated by only 3.6% CO_2 in the flue gas, is atypical of waste-to-energy plants. Therefore, it is unrealistic to include such data when projecting emissions for new waste-to-energy plants.

Dalia Germanas

Dalia Germanas
Associate Research Scientist

REFERENCES

1. A. Nottrodt et al.: Emissions of PCDD and PCDF from Waste Combustion Plants. Mull u. Abfall, 1984, 11, 313-327.

2. Swedish Environmental Protection Agency: Report on Dioxin Discharge, etc., During Waste Combustion. Feb. 11, 1985.

3. Swedish Environmental Protection Agency: Operational Studies at the SYSAV Energy from Waste Plant in Malmö, Sweden. Report No. SNV PM 1807, June, 1983.

4. Swedish Environmental Protgection Agency: Driftstudie av Linköpings Avfallsvarmeverk. Report No. SNV PM 1885, October, 1984.

5. Environment Canada: Measurement of Emissions of PCDD and PCDF from the Des Carrieres Incinerator in Montreal. Report No. EPS 5/UP/RQ1, December, 1984.

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8. Martin GmbH: List of Martin Refuse Burning Installations. January, 1977

9. C. L. Haile, et al.: Assessment of Emissions of Specific Compounds from a Resource Recovery Municipal Refuse Incinerator. Final Report, EPA Contract No. 68-01-5915, May, 1984.

10. EMPA, Dübendorf: Erprobung einer neuen Apparatur zur Probhenahme von Reingas aus Mullverbrennungsanlagen und Analyse des Reingases auf PCDD und PCDF. EMPA No. 43670, March, 1982.

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12. Von Roll: Reference List of Refuse Incineration Plants. March, 1984.

13. Personal Communication: A. Licata of Gibbs and Hill.

14. K. Ballschmiter, et al.: Distribution of PCDD and PCDF Emissions between Particulates, Flue Gas Condensate and Impinger Absorption in Stack Gas Sampling. Chemosphere, 1985, 14(6//7), 851-854.

15. R. E. Clement, et al.: Levels of Chlorinated Organics in a Municipal Incinerator. Presented at the ACS National Meeting in Washington, D.C., August 28-September 2, 1983.

16. V. Ozvacic, et al.: Emissions of Chlorinated Organics from Two Municipal Incinerators in Ontario. Presented at the 77th Annual Meeting of the APCA, San Francisco, June 24-29, 1984. Paper No. 84-37.6.

17. CARB: Air Pollution Control at Resource Recovery Facilities. May, 1984.

TABLE 1

PCDD/PCDF EMISSIONS FROM MSW, MASS-BURN, ENERGY RECOVERY PLANTS

Location	Chicago, N.W	Zürich, Josefst.	Hamburg Borsigstrasse	Hamburg Stellinger Moor	Hamburg Stapelfeld	Linköping	Malmö	Montreal	
Design no. of units	Martin/4	Martin/1	Martin/1 Von Roll?/3	Martin/2 Von Roll?/3	Steinmüller/?	Von Roll/2	Martin/2	[illegible]/4	
Tonnage, MT/d/unit	363	510	M 288/VR 200	M 592/VR 200	?	165/288	204	360	
Pollution Control	ESP	ESP	scrubber?/ESP	scrubber?/ESP	ESP/wet scrubber	ESP	[redacted] ESP/[redacted]	ESP	
Start of Operation	1971	1978	M 1967/VR 1963	M 1973/VR 1963	?	1982	1974	1970	
Year Tested	1980	1981	1984	1984	1984	1983	1982	1982	1983
No. of tests	3	1 (5 day)	2	2	3	2	3 (1 analyzed)	4	8
Flue Gas dry basis, % CO_2	9.5	10.9	N.R.	N.R.	N.R.	10	12.1	7.6	8.0
O_2	9.8	N.R.	N.R.	N.R.	N.R.	8.9(wet)	7.0	13.2	11.4
Emissions, ng/m^3	1)	1)	2)	2)	2)	3),4)	3)	5)	
CDD									
3	13	N.R.							
4 (2,3,7,8-TCDD)	6.3 (0.41)	4.4 (0.17)	25 (0.2)	19 (0.7)	6 (0.1)	0.45(0.025)	0.15(0.01)	0.001	0.090
5	N.R.	12				0.1	0.15	0.004	0.094
6	16	27						0.003	0.135
7	8	26						0.003	0.144
8	2.5	54	13	15	11			0.002	0.282
4-8 PCDD	32.8	123.4						0.013	0.745
3-8 PCDD	45.4		151	114	42				
CDF									
3	300	N.R.							
4 (2,3,7,8-TCDF)	90	24	65 (3.0)	127 (4.0)	37 (1.2)	4.25 (0.6)	2 (0.5)	0.002	0.179
5	N.R.	30				5	3	0.007	0.154
6	62	20				169	26	0.005	0.095
7	7.5	14						0.004	0.063
8	0.6	9	3	2	2			0.002	0.051
4-8 PCDF	160.1	97						0.019	0.542
3-8 PCDF	460.1		160	323	109				

1) dry basis, standard conditions - 1 atm, 20°C

2) dry basis, standard conditions - 1 atm, 0°C

3) dry basis, 1 atm. 0°C, corrected to 10% CO_2

4) RDF burned during these tests.

5) dry, 1 atm 25°C corrected to 12% CO_2

TABLE II

Emissions from a Toronto Incinerator
Average of Three Tests

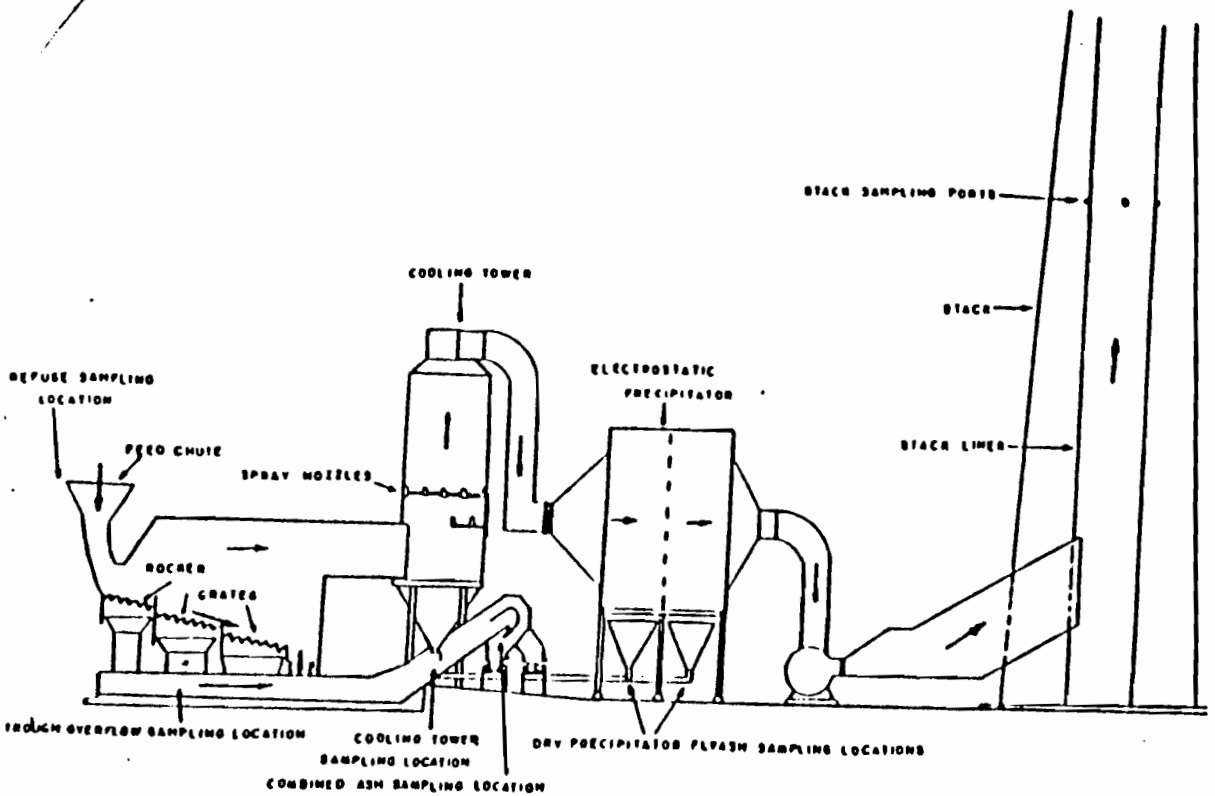
(Flue gas, 3.6% CO_2)[16]

As reported by	CARB Ref.17	Ozvacic Ref. 16	Clement Ref. 15
CDD, ng/m^3		1)	2)
4	55.8		40.6
5	76.2		73.0
6	376.2		254.4
7	414.7		209.9
8	86.9		59.3
Total	1009.8		637.2
CDF			
4	220.1		237.4
5	168.3		164.9
6	344.0		262.9
7	226.9		174.6
8	59.2		18.9
Total	1018.5		858.7
PCDD + PCDF	2028.3	1933.3	1495.9
PCB			55
CB			2476
CP			7077
ΣPCB, CB, CP		9550.	9608

1) m^3 at standard condition, 1 atm, 25°C, dry basis

2) m^3 dry basis

Figure 1 : Clement et al



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

REF: 4APT-AP

Mr. Thomas M. Henderson
Project Director,
Broward County Resource
Recovery Office
Ft. Lauderdale, Fl. 33301

RE: South Broward County Solid Waste Energy Recovery Facility

Dear Mr. Henderson:

On November 22, 1983, the EPA approved Florida's Prevention of Significant Deterioration (PSD) regulations as part of the federally approved State Implementation Plan (SIP), Florida Administrative Code §17.2-500, thereby transferring to Florida the legal authority to process and issue PSD permits to sources in Florida which are required to obtain PSD permits. However, EPA recently became aware that, due to a conflict between the language of the Florida Electrical Power Plant Siting Act (PPSA), Public Health Code §§403.501-403.519, and that of the PSD regulations in the Florida SIP, EPA's approval of the PSD regulations as part of the SIP is void as to sources which are subject to the PPSA. Therefore, a source which obtains certification pursuant to the PPSA is still required to obtain a valid PSD permit before constructing or modifying.

We understand that Florida has issued certification, under the PPSA, to the South Broward County Solid Waste Authority to construct a solid waste energy recovery facility which shall generate electric power from combustion of municipal solid waste. This is to notify you that any such certification issued by Florida does not abrogate your responsibility to obtain a federal PSD permit. Construction of the source without a valid PSD permit will be considered a violation of the Clean Air Act and subject to enforcement action.

We are currently engaged in discussions with the Florida Department of Environmental Regulation (DER) regarding courses of action that would enable a source subject to the PPSA to apply for a federal PSD permit with the DER. One possible solution currently under consideration by the DER and EPA involves placing the responsibility for the technical and administrative portions of the federal PSD review with the DER and the responsibility for issuance of the PSD permit with EPA.

There are a number of legal considerations which must be addressed before the current situation is resolved. EPA will keep you informed of all developments.

In the meantime, you or your representatives may call our office to discuss the current status of these discussions. If you have any questions regarding this letter, or information on how to apply for a PSD permit, please feel free to contact Mr. Wayne Aronson, Team Leader, Program Support Team at 404/881-4901.

Sincerely Yours,

Winston Smith, Director
Air, Pesticides & Toxics Division

cc:
Mr. Steve Smallwood, Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

REF: 4APT-AP

Mr. Thomas M. Henderson
Project Director,
Broward County Resource
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Ft. Lauderdale, Fl. 33301

RE: South Broward County Solid Waste Energy Recovery Facility

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On November 22, 1983, the EPA approved Florida's Prevention of Significant Deterioration (PSD) regulations as part of the federally approved State Implementation Plan (SIP), Florida Administrative Code §17.2-500, thereby transferring to Florida the legal authority to process and issue PSD permits to sources in Florida which are required to obtain PSD permits. However, EPA recently became aware that, due to a conflict between the language of the Florida Electrical Power Plant Siting Act (PPSA), Public Health Code §§403.501-403.519, and that of the PSD regulations in the Florida SIP, EPA's approval of the PSD regulations as part of the SIP is void as to sources which are subject to the PPSA. Therefore, a source which obtains certification pursuant to the PPSA is still required to obtain a valid PSD permit before constructing or modifying.

We understand that Florida has issued certification, under the PPSA, to the South Broward County Solid Waste Authority to construct a solid waste energy recovery facility which shall generate electric power from combustion of municipal solid waste. This is to notify you that any such certification issued by Florida does not abrogate your responsibility to obtain a federal PSD permit. Construction of the source without a valid PSD permit will be considered a violation of the Clean Air Act and subject to enforcement action.

We are currently engaged in discussions with the Florida Department of Environmental Regulation (DER) regarding courses of action that would enable a source subject to the PPSA to apply for a federal PSD permit with the DER. One possible solution currently under consideration by the DER and EPA involves placing the responsibility for the technical and administrative portions of the federal PSD review with the DER and the responsibility for issuance of the PSD permit with EPA.

There are a number of legal considerations which must be addressed before the current situation is resolved. EPA will keep you informed of all developments.

In the meantime, you or your representatives may call our office to discuss the current status of these discussions. If you have any questions regarding this letter, or information on how to apply for a PSD permit, please feel free to contact Mr. Wayne Aronson, Team Leader, Program Support Team at 404/881-4901.

Sincerely Yours,

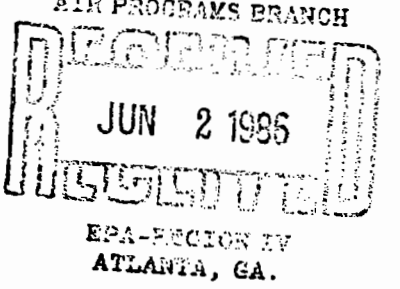
Winston Smith, Director
Air, Pesticides & Toxics Division

cc:
Mr. Steve Smallwood, Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Wayne - Roger

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

May 30, 1986



U.S. Environmental
Protection Agency
Air Programs Branch
345 Courtland Street
Atlanta, Georgia 30365

Attention: Mr. Bruce Miller
Acting Chief

Re: Prevention of Significant Deterioration (PSD) Permit Application for the South Broward County Resource Recovery Project, Inc.

Gentlemen:

Please find enclosed a Prevention of Significant Deterioration (PSD) application for the South Broward County Resource Recovery Project, Inc. This application is being submitted to you in accordance with CFR Title 40, Part 52.21, Prevention of Significant Deterioration of Air Quality.

A copy of this application has also been sent to the State of Florida Department of Environmental Regulation (FDER) Power Plant Siting Section. We have formally requested FDER to begin the administrative and technical review of the PSD application.

Should you have any questions regarding this application or the Project, please do not hesitate to contact us at your convenience.

Very truly yours,

Thomas M. Henderson

Thomas M. Henderson
Project Director
Broward County Resource Recovery Office
and
Attorney-in-Fact
South Broward County Resource Recovery Project, Inc.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

4APT-AP/ch

Mr. Clair H. Fancy, P. E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

OCT 9 1986

RE: South Broward and West Palm Beach Counties Resource Recovery Facilities

Dear Mr. Fancy:

This is in reference to your September 25, 1986, letter submitting the staff analysis, hearing officer's recommended orders, and final certifications of the above-referenced power plant site certifications. The staff analyses as presented for both facilities present the Department's preliminary determinations for PSD reviews. However, the public notices were not included. These notices must provide a description of the project, increment consumption, and the opportunity to comment and request a public hearing. We request that you forward these notices to EPA. Based upon our conclusions, drawn from your staff analyses, 90% acid gas control and particulate emissions on the order of 0.015 gr./dscf will be required for both facilities. Although this will be in conflict with the State of Florida final order issued for the South Broward facility, we feel that the BACT determination for acid gas control and stringent particulate emissions limits is in agreement with "state of the art" controls now being employed at similar facilities throughout the country and the PSD remand for the North County Resource Recovery facility in California. The remand states that more stringent BACT requirements for regulated pollutants may be imposed where the simultaneous control of hazardous yet unregulated pollutants is acheived.

Please prepare the final determinations to reflect the requirement for acid gas control and a 0.015 gr/dscf particulate emission limit for the two facilities. Once we receive the final determinations and public notices, we will proceed to issue the PSD permits.

If you have any questions and/or comments regarding this letter, you may contact me at 404-347-2864 or Mr. Wayne J. Aronson at 404-347-4901.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller
Chief
Air Programs Branch
Air, Pesticides, & Toxics
Management Division

DER
OCT 13 1986
BAQM

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 21, 1986

J. Alan Cox
Attorney at Law
105 West Fifth Avenue
Tallahassee, Florida 32303

RE: South Broward County Resource Recovery Project

Dear Mr. Cox:

Pursuant to your request, I am enclosing my personal notes and the attendance sheet from a meeting I attended in Atlanta, Georgia, on November 17, 1986. Attendees at the meeting included representatives from EPA Region IV, Florida DER, and Broward County,

The primary topic on the meeting agenda concerned EPA's recent letter to DER's Bureau of Air Quality Management, which instructed DER to draft the federal PSD permit for the South Broward County Resource Recovery Facility requiring 90% acid gas control and particulate control of .015 grains dscf.

During the meeting in Atlanta, EPA's Bruce Miller advised those present that the EPA staff had met earlier with the EPA Regional Administrator, and it was the Regional Administrator's position that no more resource recovery facilities would be built in Region IV without providing some means for controlling acid gases.

The meeting concluded with EPA's commitment to review the information Broward County had provided to support Broward County's position that acid gas control wasn't truly available technology, or even needed.

If you have any questions, you may contact me at (904) 488-9730.

Sincerely,

Julia Cobb Costas
Assistant General Counsel

JCC/ks

Enclosures

cc:
Steve Smallwood

DER

NOV 24 1986

AQM

11-17-81e Broward Co. meeting w/ EPA Region IV

Tom Henderson - gave history of background re SBCRRF
claimed credit for getting
legislation thru Legislature,
expecting that Fla would
receive delegation back from
EPA

PSD permit the only outstanding
permit not in-hand.
Ready to proceed as soon as
PSD permit obtained

unproven equipment any where in
system puts it at risk.
Additionally concerned about $

DER's rulemaking choice is
appropriate. Will be supportive
of participation" in rulemaking
process. (whatever that means)

Catch-22 - if nothing
else, wants to resolve who's
to do what

Tom Keith
Jim PBCRRF
& also present

EPA - Roger Miller

revised Hillsborough permit.
looking at Pinellas presently

After July 1, 1986, applications
went to Fla, who will issue
PSD permits

EPA didn't feel comfortable w/ certification
Oct 9 letter directed FDER to include
015, and 90% acid gas control
Fla. can either ~~[illegible]~~ issue
final determination or prelim
determination & go thru public
notice, comment, etc.

general comments: generic look at industry
as a whole
Broward's documentation will
have to convince EPA otherwise

TH: every project needs to be reviewed
on its own merits, case-by-case
thinks there's something unique
about SFIA that doesn't necessitate
acid gas control

BM: RA says no more RRF will be
built in this Region w/out
acid gas control

BACT - no construction of
above acceptable limits

beyond that. (for non-regulated pollutants
control for the sake of
control is desirable when
you consider the economics

err on the side of more
control as long as its affordable

TH: Primary concern re acid gas control
Marion Co. Oregon whole plant is smaller
than 1 boiler at SBCRRF
questions effectiveness & efficiency
of acid gas control
as now available

put it on as the plant evolves
(sure!)
Doesn't want to be locked
in now

TH: .03 was the appropriate number
when application sent in, will
tighten up now, but for
acid gas control, sincerely
concerned about committing
to build unproven, untested,
seemingly unnecessary
technology

especially w/out justification,
have a real problem w/
Region 8's blanket statement that
acid gas required

RM: can't wait 10 years for state-of-the-art to be proven

irrelevant whether impacts above or below ambient impact

benefit gained by less emissions, especially when cost reasonable

TIT = next door to 2 power plants emitting around 30 tons SO2, SBRRF would emit, as a comparison, about 2

for SB:
ambient impacts less than Bridgeport facility, which has acid gas controls

TH: says they can't get vendors to guarantee equipment would function as intended.

Massive vendor guarantees low reliability, only about 50-60% removal

impacts may not be great for criteria & non-criteria pollutants, but what about toxic ~~exotic~~ pollutants of concern

Chief: regression back to landfill - due to cost ($28 for landfill, $60 + for RRF)

TH: What if it doesn't work?! BC will have to spend more $ to landfill/ band-aid RRF
Marion county is experiencing some problems

Signal putting in acid gas control on 2 of its facilities in NE would like luxury of being able to see if it works

SB has 4 to 10 X lower than ~~for~~ Bridgeport's impacts

BM: landfill vs RRF a municipal-level decision outside the PSD process to evaluate landfill optics
reliability of equipment: doesn't see any difference in others presently being permitted, absent impacts would wait for 200 years to agree that something is proven tech. or not

TH: What about enforcement - what if we put on acid gas control & it doesn't work. "We don't want to have a problem plant"

willing to spend the $, to have the best plant

- unknown factor -
  $ 112 action if clear & convincing hazard

- acid gas control won't reduce dioxins, etc
  - its good combustion followed by fine particulate

Scrubbers justified on cost/ton
(DGR staff report)
Don't agree w/ that criteria

Region II remand allows to consider net environmental impact of removal other non-criteria and criteria pollutants

Forced to make BACT based on state-of-the-art as it exists right now, not wait for years

Limited flexibility

Operation & efficiency the question not really the $ factor

the acid gas control reqmt has been primarily political

DOE figured $1 per month per household for acid gas control

TH: We violently disagree with

Signal: (what type of guarantees are you making?)
permits require acid gas control, but allows for grace period or down-time if acid gas control doesn't work
discussed w/ NE regulatory authorities: reduce acid gases is best the way for reducing acid deposition

cost of installing FGD far exceed inflationary costs associated w/ control

Signal reduced its guarantee of the amount of waste going thru plant, thus less electricity generated ...

ESP 99.98% = reliability
when you add scrubbing, you reduce effectiveness

Millbury .03
90% control on HCl

Bridgeport .015
90% HCl

30 days down time allowed

Don Shiao: .015 not BACT for particulate control
ESP: won't be able to meet over
life of plant, for a new plant
maybe yes, but not for
long term, forever.

Baghouse even less reliable
haven't worked as well
on RRF

Honolulu: no acid gas control
reqd to ~~meet~~ meet 2.92 #/ton SO_2
but if they don't
will be reqd to
install lime injection
timeline included in permit
.025 grains/dscf (?)
no experience on injection in
mass burn facilities

TH: particulate limit they would be willing
to meet: won't agree to w/out
some EPA flexibility on acid gas
control

Reasonable position to take:
stair-step acid gas control, i.e.
agree to some # now, then
tighten-up at a future date

time-frame: 1st industrial plants
will be coming on line in
1988, w/ 18 mos shake-down

after that. Assuming relatively successful w/ only minor changes, ~~the~~ BC would agree to have it up, operati etc - w/in 5 years of startup

5 years from commercial operations date of 1989 Start-up date also in 1989. (Even though you figure 18 mos. for shake-down)

Marion Co — started up in ~~March~~ April, will go commercial in March (11 mos later)
2/3 the size of 1 Signal module

Particulate limit at start-up: .02 gr/dscf day in, day out, ~~max~~ + ↑
Can do better when acceptance tests done

BM: that would be a problem. Baghouse can consistently meet .015 ^ .02 # a problem. Evidence shows higher concentrations of nasty emissions in lower, submicron-sized range.

CF: (Clean Energy) No mention of combustion efficiency in SBRRF as was included in NBLRRF and PBCRRF

AZ: (Arizona Source Signal) offset of effects associated w/ adding acid gas control to already existing ESP

Palm Beach Co = has gotten commitments from vendors. At this time, at this location, agreeable to putting on scrubbers - Would not be upset if EPA said they didn't have to, though

"differences in BDF from MBI not significant
agrees w/ arguments BC made
just willing to go ahead and do it

- .02 justification
- modelled impacts of lower plume rise w/ scrubber
- cost difference for different options

BC to provide

EPA promises to investigate delayed installation date, but doesn't hold out much hope

BM: after EPA looks at additional data - must consider the fact that the citizens and public ~~[illegible]~~ officials support acid gas control

TH: only issue in commission race was scrubbers, both won reduction by 60% even tho' they opposed adding acid gas control

public of BC represented by BC Bd of County Commissioners. TH et al represents the elected leaders of BC BCC

Compare the only municipality that we've been involved with & not really negotiated with them

Reps from other cities haven't really tried to participate

BM: what is bond situation?

(Response)

TH: if no construction start by 2-26-87, have to return $. Trying to get an extension but that's where it stands today

"great sense of urgency to get projects going" given deadlines for closing landfills etc

BM: Steve Smallwood still believes that acid gas controls justified technically, regardless of what PPS Board certified

Workshop

~~Hearing~~ before Co Commissioners Wed - decision to put on acid gas control / NO - discuss interlocal agreement i.e. waste of low to

plant, and pricing. Acid gas reqm't will be discussed

No formal action will be taken, & its certainly no drop-dead date to decide for or against acid gas control

EPA's schedule: as soon as they get Fla's analysis, 30 days
DER will issue a "final draft" for EPA's review
2 or 3 weeks - should be up here. Trying to get PB up here first
around Dec. 8, would be up here

LF: from BAQM's perspective site certification tied DER's hands & DER didn't want to write permit for EPA that they didn't believe in. Wanted EPA to write. EPA directed Fla. to write w/ certain reqm'ts.

TH: Bond extension request will be dealt with in Dec.

$521 million

EPA - South Broward 11/17/86

Name	Organization	Phone
Donald F. Elias	RTP Environmental Assoc.	(201) 469-2947
Tim Smith	Greenberg, Traurig (Broward Cty)	(305) 579-0571
Cliff Schulman	Greenberg Traurig "	(305) 579-0613
Bruno Dunn	SESDPC	(305) 579-2607
Andrew Szurgot	Signal Envir Systems	603/926-1337
Bill Ferguson	Signal Envir. Systems	813/576-9163
Clair Fancy	Florida Dept Env Reg	904 488 1344
Jewell A. Harper	EPA-ORC	(404) 347-2885
Julia Cobb-Costas	Fla. DER/OGC	904/488-9730
Barry Andrews	Fla DER/BAQM	904/488-1344
Michael Brandon	EPA	404/347-2864
Matt Coglianese	EPA/Region IV Off Regional Counsel	(404) 347-2555
Bruce Miller	EPA	404/347-2864
Wayne Aronson	EPA	404/347-2864
Ronald T. Mills	Malcolm Pirnie, Inc.	914/694-2100
Kennard R. Kosky	KBN Engineering	904/378-8000
Thomas M. Henderson	Broward County	305/357-6456
Thomas R. Keith	Palm Beach County Solid Waste Authority	305/471-5770

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

December 1, 1986

Mr. Bruce Miller
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30308

RE: South Broward Resource Recovery Project PSD Permit - Follow Up To November 17, 1986 Meeting

Dear Mr. Miller,

As discussed at our meeting on November 17, 1986, Broward County does not believe Acid Gas Controls are Best Available Control Technology (BACT) for the South Broward Resource Recovery Project based upon the technical evaluation of the Project. At present, Acid Gas Controls for resource recovery facilities are unreliable and undemonstrated technology, hardly BACT. We believe a strong case, accepted by the State of Florida, has been made for this position over the past year and a half which can not and should not be swept away by an informal regulatory policy determination. At the same time, despite our apparent disagreement on what constitutes BACT for this particular Project, we appreciate the position of the Region IV Air Program Branch Staff favoring installation of such controls on resource recovery facilities in general as a matter of policy.

Without waiving any of our rights, we therefore propose the following solution which we believe accomplishes the objectives of both the applicant and the Air Program Branch and is consistent with the BACT determination of the State of Florida for the Project:

1. Specific not to exceed limits for certain acid gases will be included in the Prevention of Significant Deterioration (PSD) Permit, i.e. limits will be set for Sulfur Dioxide, Fluoride, Sulfuric Acid Mist and Hydrogen Chloride.

2. Acid Gas limits will be set for an Initial Operating Period not to exceed five years from the beginning of commercial operations of the Project based on the State

of Florida's BACT determination and for a Continuing Operating Period covering the remaining life of the Project at the limits suggested in your letter to Clair Fancy of the Florida Department of Environmental Regulation (FDER) dated October 9, 1986;

3. We would agree to the same Acid Gas PSD Permit conditions for the North Broward Resource Recovery Project; and

4. We would also agree in the North Project PSD Permit to install during the Initial Operating Period on one of four modules Acid Gas Controls designed to meet the limits specified for the Continuing Operating Period. Operation of these Controls would be intended to demonstrate the effectiveness and reliability of the installed equipment.

PSD Permits with these conditions would allow the County the time and capacity to monitor the development of Acid Gas Controls on facilities similar to those being developed in Broward County. We would remind you that there are no such facilities currently operating in North America and that it will be more than a year until a facility with modules similar in size to those to be installed at South Broward become operational. Further since there is no Project similar to North Broward under construction, we would agree to install and operate such controls on one of the four modules at the North Broward Facility.

The County could with such PSD Permits proceed with these urgently needed Projects with some confidence that they will be able to operate reliably.

The Region IV Air Program Branch and FDER would have PSD Permits solidly supported by the State of Florida's BACT determination, Projects with emissions significantly lower than any in Region IV today and with a commitment to lower emissions further in the future and Projects with good prospects for operating without air pollution control equipment problems requiring enforcement actions.

Finally, since we have referred to the State of Florida's BACT determination a number of times, first at our meeting and then again in this Letter, some further amplification of this point seems to be in order. FDER entered into a stipulation with the County in May of this year that the acid gas emission rates proposed by the County are BACT for the South Project. This stipulation was based upon information presented by the County, an evaluation of the Department's Staff and the permit hearing. The joint stipulation was subsequently accepted without change by the Governor and Cabinet in its capacity as Power Plant Siting Board. We believe the record is clear as to the sound technical basis for the State's final BACT

determination and the State's support for the final BACT determination represented in its Conditions of Certification.

Before leaving our meeting on November 17, 1986, we said we would be supply you with additional information on effects of reduced plume rise caused by dry scrubbers on project ambient impacts and establishment of BACT for particulate emissions at 0.2 gr/dscf corrected to 12% CO2. You will find this information attached to this letter.

I hope you find the above information and attachments useful in preparing our Permits.

Sincerely yours

Thomas M. Henderson

Thomas M. Henderson
Project Director

TMH/bd
Attachments: 1. Effects of Reduced Plume Rise
2. Particulate Emissions

cc: Cliff Schulman, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.
Bruno Dunn, Signal Environmental Systems
Peter Ware, Waste Management, Inc.
Clair Fancy, FDER Air Bureau
Jewell Harper, Assistant EPA General Counsel

Effects of Reduced Plume Rise Caused By Dry Scrubbers on Projected Ambient Impacts

An analysis has been performed to evaluate the effects of reduced plume rise caused by the installation of dry scrubbers on the projected ambient air quality impacts due to the South Broward County resource recovery project. The modeling procedures were the same as identified in the Technical Support Document for the Prevention of Significant Deterioration (PSD) Permit for the Resource Recovery Facility in South Broward County, Florida, May 1986. Stack parameters used in the modeling were obtained from Signal Environmental Systems, Inc., and similar to that proposed for Signal's Millbury, Massachusetts facility. Primarily, this consisted of lowering the exhaust gas temperature to 226°F (381K) and adjusting the flow rate accordingly (refer to Table 3-2 in the PSD Technical Support Document).

The results of this analysis indicate that the maximum projected 3-hour, 24-hour and annual concentrations would increase by 181%, 215% and 267%, respectively, over that presented in the technical support document (refer to Table 6-2). These results suggest that ambient concentrations of some pollutants, which would not be expected to significantly decrease by the addition of a dry scrubber, i.e., particulates may increase by a factor of 2. Even with more effective particulate control, i.e., reducing emissions from 0.02 gr/dscf corrected (to 12% CO_2) to 0.015 gr/dscf corrected, ambient concentrations would be expected to increase by 50%. Those pollutants for which an increase of up to 200% in ambient concentrations may occur include:

Regulated:

- Particulate Matter
- Lead
- Beryllium
- Arsenic

Non Regulated:

- Cadmium
- Chromium
- Copper
- Manganese
- Nickel
- Antimony
- Selenium
- Vanadium
- Zinc
- Polychlorinated dibenzodioxins (PCDD) (assuming good combustion control)
- Polychlorinated dibenzofurans (PCDF) (assuming good combustion control)

The health related implications beyond that previously estimated of an increase in ambient concentrations of certain pollutants are unknown. As presented previously in the Impact Assessment of Non Regulated Pollutants Emitted from the Proposed South Broward County Resource Recovery Facility, and the hearing transcripts, effects to public health due to air pollutant emissions from the South Broward facility are below levels where health effects are likely to occur. The premise of reducing the quantity of certain air pollutant emissions (e.g., SO_2, HCL and Hg) as a means of favoring public health may indeed be contradicted by the ambient increases of certain pollutants.

Particulate Emissions - 0.02 gr/dscf vs. 0.015 gr/dscf

The establishment of a BACT limit for particulate matter so as not to exceed 0.015 gr/dscf corrected to 12% CO_2 is not appropriate for three reasons. First, the BACT analysis performed for the South Broward County Facility indicates that, based on environmental, economic and energy impacts, the control from 0.03 gr/dscf to 0.015 gr/dscf (corrected) was not justified. The projected particulate matter impacts at 0.03 gr/dscf are substantially less than the significance levels, and projected impacts of potentially toxic metals are well below levels where health effects are likely to occur. In addition, the estimated costs of particulate control are expected to increase from 17 to 36 percent over the proposed control, with cost per ton of pollutant removed exceeding $3000. Nonetheless, Broward County has authorized Signal to install an ESP with a particulate removal of 0.02 gr/dscf. At this level of control, particulate emissions are expected to be substantially less than 0.02 g/dscf, with emissions likely to be 0.015 g/dscf or less much of the time. Establishment of a lower maximum limit than 0.02 g/dscf is not warranted.

Second, the establishment of a more stringent emission limit than 0.02 g/dscf will not effect any public health benefits. By definition, the establishment of an emission limit is a limit that will not be exceeded. To ensure that the 0.02 gr/dscf emission limit is not exceeded, the ESP will be designed at a maximum limit that is lower than the 0.02 gr/dscf. The likely actual ambient air quality impacts resulting from the ESP design basis for the facility will be consistent with an emission of 0.015 g/dscf since actual emissions are expected to be in this range. Therefore, the imposition of a 0.015 gr/dscf will not effect any measurable benefits from ambient concentrations.

Finally, the imposition of emission limits of 0.015 g/dscf corrected to 12% CO_2 or less that have been established by other states were made on the basis of Lowest Achievable Emission Rate (LAER) rather than BACT. The decisions made for particulate control on resource recovery facilities in

states such as California, New Jersey, and Connecticut were made clearly on the basis of LAER.

The difference between LAER and BACT determinations is significant. The need to meet non-attainment provisions, which includes requiring LAER, generally applies to new or modified sources which are located in, or have a significant impact on, a designated non-attainment area. LAER as defined in EPA's Emission Offset Interpretive Ruling (see 40 CFR, Part 51, Appendix S) is:

> "Lowest achievable emission rate" means, for any source, the more stringent rate of emissions based on the following:
>
> (i) The most stringent emissions limitation which is contained in the implementation plan of any state for such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or
>
> (ii) The most stringent emissions limitation which is achieved in practice by such class or category of stationary source. This limitation, when applied to a modification, means the lowest achievable emissions rate for the new or modified emissions units within the stationary source to emit any pollutant in excess of the amount allowable under applicable new source standards of performance.

This definition, which is similar to that promulgated by DER (see Rule 17-2.640 Fla. Admin. Code) does not allow consideration of any economic or environmental impacts; rather LAER is technology based. As a result, a clear distinction must be made between LAER and BACT determinations. For the South Broward facility, the application of LAER is clearly inappropriate since the area is in compliance with the ambient air quality standards for particulate matter. Indeed, for the South Broward facility, the economic, environmental, and energy impacts must be taken into account for determining BACT. It should be pointed out that resource recovery facilities located in non-attainment areas can be exempted under certain circumstances from

applying LAER. Clearly, EPA recognized the need to dispose of MSW in urban areas. Therefore, the establishment of a BACT limit of 0.02 g/dscf is clearly an appropriate BACT limit.

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

December 1, 1986

DER
DEC 5 1986
BAQM

Mr. Bruce Miller
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30308

RE: South Broward Resource Recovery Project PSD Permit - Follow Up To November 17, 1986 Meeting

Dear Mr. Miller,

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The County could with such PSD Permits proceed with these urgently needed Projects with some confidence that they will be able to operate reliably.

The Region IV Air Program Branch and FDER would have PSD Permits solidly supported by the State of Florida's BACT determination, Projects with emissions significantly lower than any in Region IV today and with a commitment to lower emissions further in the future and Projects with good prospects for operating without air pollution control equipment problems requiring enforcement actions.

Finally, since we have referred to the State of Florida's BACT determination a number of times, first at our meeting and then again in this Letter, some further amplification of this point seems to be in order. FDER entered into a stipulation with the County in May of this year that the acid gas emission rates proposed by the County are BACT for the South Project. This stipulation was based upon information presented by the County, an evaluation of the Department's Staff and the permit hearing. The joint stipulation was subsequently accepted without change by the Governor and Cabinet in its capacity as Power Plant Siting Board. We believe the record is clear as to the sound technical basis for the State's final BACT

determination and the State's support for the final BACT determination represented in its Conditions of Certification.

Before leaving our meeting on November 17, 1986, we said we would be supply you with additional information on effects of reduced plume rise caused by dry scrubbers on project ambient impacts and establishment of BACT for particulate emissions at 0.2 gr/dscf corrected to 12% CO2. You will find this information attached to this letter.

I hope you find the above information and attachments useful in preparing our Permits.

Sincerely yours

Thomas M. Henderson
Project Director

TMH/bd
Attachments: 1. Effects of Reduced Plume Rise
2. Particulate Emissions

cc: Cliff Schulman, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.
Bruno Dunn, Signal Environmental Systems
Peter Ware, Waste Management, Inc.
Clair Fancy, FDER Air Bureau
Jewell Harper, Assistant EPA General Counsel

Effects of Reduced Plume Rise Caused By Dry Scrubbers on Projected Ambient Impacts

An analysis has been performed to evaluate the effects of reduced plume rise caused by the installation of dry scrubbers on the projected ambient air quality impacts due to the South Broward County resource recovery project. The modeling procedures were the same as identified in the Technical Support Document for the Prevention of Significant Deterioration (PSD) Permit for the Resource Recovery Facility in South Broward County, Florida, May 1986. Stack parameters used in the modeling were obtained from Signal Environmental Systems, Inc., and similar to that proposed for Signal's Millbury, Massachusetts facility. Primarily, this consisted of lowering the exhaust gas temperature to 226°F (381K) and adjusting the flow rate accordingly (refer to Table 3-2 in the PSD Technical Support Document).

The results of this analysis indicate that the maximum projected 3-hour, 24-hour and annual concentrations would increase by 181%, 215% and 267%, respectively, over that presented in the technical support document (refer to Table 6-2). These results suggest that ambient concentrations of some pollutants, which would not be expected to significantly decrease by the addition of a dry scrubber, i.e., particulates may increase by a factor of 2. Even with more effective particulate control, i.e., reducing emissions from 0.02 gr/dscf corrected (to 12% CO_2) to 0.015 gr/dscf corrected, ambient concentrations would be expected to increase by 50%. Those pollutants for which an increase of up to 200% in ambient concentrations may occur include:

Regulated:

- Particulate Matter
- Lead
- Beryllium
- Arsenic

Non Regulated:

- Cadmium
- Chromium
- Copper
- Manganese
- Nickel
- Antimony
- Selenium
- Vanadium
- Zinc
- Polychlorinated dibenzodioxins (PCDD) (assuming good combustion control)
- Polychlorinated dibenzofurans (PCDF) (assuming good combustion control)

The health related implications beyond that previously estimated of an increase in ambient concentrations of certain pollutants are unknown. As presented previously in the Impact Assessment of Non Regulated Pollutants Emitted from the Proposed South Broward County Resource Recovery Facility, and the hearing transcripts, effects to public health due to air pollutant emissions from the South Broward facility are below levels where health effects are likely to occur. The premise of reducing the quantity of certain air pollutant emissions (e.g., SO_2, HCL and Hg) as a means of favoring public health may indeed be contradicted by the ambient increases of certain pollutants.

Particulate Emissions - 0.02 gr/dscf vs. 0.015 gr/dscf

The establishment of a BACT limit for particulate matter so as not to exceed 0.015 gr/dscf corrected to 12% CO_2 is not appropriate for three reasons. First, the BACT analysis performed for the South Broward County Facility indicates that, based on environmental, economic and energy impacts, the control from 0.03 gr/dscf to 0.015 gr/dscf (corrected) was not justified. The projected particulate matter impacts at 0.03 gr/dscf are substantially less than the significance levels, and projected impacts of potentially toxic metals are well below levels where health effects are likely to occur. In addition, the estimated costs of particulate control are expected to increase from 17 to 36 percent over the proposed control, with cost per ton of pollutant removed exceeding $3000. Nonetheless, Broward County has authorized Signal to install an ESP with a particulate removal of 0.02 gr/dscf. At this level of control, particulate emissions are expected to be substantially less than 0.02 g/dscf, with emissions likely to be 0.015 g/dscf or less much of the time. Establishment of a lower maximum limit than 0.02 g/dscf is not warranted.

Second, the establishment of a more stringent emission limit than 0.02 g/dscf will not effect any public health benefits. By definition, the establishment of an emission limit is a limit that will not be exceeded. To ensure that the 0.02 gr/dscf emission limit is not exceeded, the ESP will be designed at a maximum limit that is lower than the 0.02 gr/dscf. The likely actual ambient air quality impacts resulting from the ESP design basis for the facility will be consistent with an emission of 0.015 g/dscf since actual emissions are expected to be in this range. Therefore, the imposition of a 0.015 gr/dscf will not effect any measurable benefits from ambient concentrations.

Finally, the imposition of emission limits of 0.015 g/dscf corrected to 12% CO_2 or less that have been established by other states were made on the basis of Lowest Achievable Emission Rate (LAER) rather than BACT. The decisions made for particulate control on resource recovery facilities in

states such as California, New Jersey, and Connecticut were made clearly on the basis of LAER.

The difference between LAER and BACT determinations is significant. The need to meet non-attainment provisions, which includes requiring LAER, generally applies to new or modified sources which are located in, or have a significant impact on, a designated non-attainment area. LAER as defined in EPA's Emission Offset Interpretive Ruling (see 40 CFR, Part 51, Appendix S) is:

> "Lowest achievable emission rate" means, for any source, the more stringent rate of emissions based on the following:
>
> (i) The most stringent emissions limitation which is contained in the implementation plan of any state for such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or
>
> (ii) The most stringent emissions limitation which is achieved in practice by such class or category of stationary source. This limitation, when applied to a modification, means the lowest achievable emissions rate for the new or modified emissions units within the stationary source to emit any pollutant in excess of the amount allowable under applicable new source standards of performance.

This definition, which is similar to that promulgated by DER (see Rule 17-2.640 Fla. Admin. Code) does not allow consideration of any economic or environmental impacts; rather LAER is technology based. As a result, a clear distinction must be made between LAER and BACT determinations. For the South Broward facility, the application of LAER is clearly inappropriate since the area is in compliance with the ambient air quality standards for particulate matter. Indeed, for the South Broward facility, the economic, environmental, and energy impacts must be taken into account for determining BACT. It should be pointed out that resource recovery facilities located in non-attainment areas can be exempted under certain circumstances from

applying LAER. Clearly, EPA recognized the need to dispose of MSW in urban areas. Therefore, the establishment of a BACT limit of 0.02 g/dscf is clearly an appropriate BACT limit.

December 2, 1986
86042

DER
DEC 4 1986
BAQM

Mr. Bruce Miller
Air Programs Branch
Environmental Protection Agency (EPA)
Region IV
345 Courtland Street
Atlanta, Georgia 30308

RE: South Broward County Resource Recovery Project

Dear Mr. Miller:

Please find enclosed a full copy of the draft permit for the Honolulu Resource Recovery Facility which is being submitted at the request of the Broward County Resource Recovery Office, Mr. Thomas Henderson, Director. This draft permit was obtained from the Division of Refuse Collection and Disposal; Department of Public Works, City and County of Honolulu. The conditions of this draft permit were approved by the State of Hawaii Department of Health and the U.S. EPA Region IX. This facility and the South Broward County resource recovery project are appropriate to compare for two reasons. First, the size of the facilities and, therefore, the economics would be similar. Second, and most importantly, the environmental impacts are similar in both cases (see page 16 of Ambient Air Quality Impact Report for the Honolulu facility). This is in contrast to any comparisons made with facilities located in California, New Jersey or Connecticut. In fact, a direct comparison of the Honolulu and South Broward facilities indicates that South Broward will have even lower environmental impacts. In addition, the particulate emission rate proposed for South Broward (i.e., 0.02 gr/dscf) and other suggestions made at the November 17, 1986, meeting would suggest that the environmental impacts of the South Broward project would be substantially less than any facility in the country.

Also enclosed are relevant portions of the PSD analyses for the Bridgeport, Mid-Connecticut and Bristol facilities which describe the emissions limiting standards. Please note that in all three permits a particulate emission limit of 0.015 gr/dscf was imposed as a combined BACT/LAER limit. Since LAER is more stringent by definition, it would

KBN ENGINEERING AND APPLIED SCIENCES, INC.
P. O. Box 14288 5700 SW 34th Street Gainesville, FL 32604 904/375-8000

take precedence over BACT. As a result, it would be inappropriate to apply a LAER standard on the South Broward facility as BACT since LAER provisions clearly do not apply.

If after a review of this information you have any questions, please call.

Sincerely,

Kennard F. Kosky

Kennard F. Kosky
Principal Engineer

msb

Enclosures

cc: Thomas Henderson
Timothy Smith
Andrew Szurgot
Ronald Mills
Claire Fancy ✓

CONN. DEPT. OF ENVIRONMENTAL PROTECTION - AIR COMPLIANCE

August 15, 1985

TO: J. Eichler, Principal APCE
G. Lovvoll, Assistant Director
L. Bruckman, Director

DATE RECV'D: 4/12/85
EPE #: 15269, 15270

FROM: A. Conklin
Senior APCE Alfred Conklin

SUBJECT: SUMMARY OF THE ENGINEERING EVALUATION OF AN APPLICATION FOR PERMITS TO CONSTRUCT A 650 TON PER DAY RESOURCE RECOVERY FACILITY CONSISTING OF TWO OGDEN MARTIN SYSTEMS, 325 TON PER DAY MUNICIPAL SOLID WASTE (MSW) FIRED FURNACE/BOILERS AT OGDEN MARTIN SYSTEMS OF BRISTOL, INC., BRISTOL INDUSTRIAL PARK, BRISTOL PURSUANT TO SECTION 22A-174-3 OF THE REGULATIONS AND 40 CFR 52.21 (PSD)

SUMMARY:

The emission rates and other parameters of this source have been deemed acceptable by the Enforcement Section. The Technical Services Section has, based on the application and its amendments, predicted acceptable PSD increment consumption.

COMPLIANCE WITH ADMINISTRATIVE AND EMISSIONS CRITERIA:

The application has been examined for compliance with applicable administrative and emissions regulations. The following summarizes the results:

A. Administrative Criteria - The applicant is not required to submit registration forms for this premise. An emergency standby plan has not been submitted.

B. Stack Criteria - This source must install an approved smoke monitor. Stack sampling must be performed on this unit.

C. Applicable Emission Standards

Allowable (Maximum Emission Rates After Any Air Pollution Controls)	Application (Proposed Design Operation)

Particulates

Furnaces/Boilers

BACT/LAER Design 0.010 gr/dscf
Corrected to 12% CO_2
Operate 0.015 gr/dscf
corrected to 12% CO_2
Maximum emission rate =
4.40 pounds per hour.

BACT/LAER Design 0.010 gr/dscf
Corrected to 12% CO_2
Operate 0.015 gr/dscf
corrected to 12% CO_2
Maximum Emission Rate =
4.40 pounds per hour.

Sulfur Oxides as Sulfur Dioxide

BACT MSW 0.32#/10^6 BTU (input)

BACT MSW 0.32#/10^6 BTU (input)

Nitrogen Oxides as Nitrogen Dioxide

BACT MSW - 0.6#/10^6 BTU

BACT MSW - 0.6#/10^6 BTU

Volatile Organic Compounds
(as CH_4)

BACT/LAER MSW
70 ppm v corrected to 12% CO_2

BACT/LAER MSW
70 ppm v corrected to 12% CO_2

Carbon Monoxide

LAER Maximum CO/CO_2 ratio
of 0.002

LAER Maximum CO/CO_2 ratio
of 0.002

Hydrogen Chlorides (HCl)

BACT Minimum 90% Reduction
or
50 ppmv corrected to
12% CO_2, whichever
is least stringent.

BACT Minimum 90% Reduction
or
50 ppmv corrected to
12% CO_2, whichever
is least stringent.

CONN. DEPT. OF ENVIRONMENTAL PROTECTION - AIR COMPLIANCE

(203) 566-4030 / 566-[illegible]

September 19, 1985

TO: J. Eichler, Principal APCE
G. Lovvoll, Assistant Director
L. Bruckman, Director

DATE RECV'D: 4/29/85
EPE #: 15214-15216
NOTICE PUBLISHED: 8/23/85

FROM: Joseph Ulevicus
Senior APCE

SUBJECT: SUMMARY OF THE ENGINEERING EVALUATION OF AN APPLICATION FOR PERMITS TO CONSTRUCT A 2250 TON PER DAY RESOURCE RECOVERY FACILITY CONSISTING OF THREE BABCOCK & WILCOX 750 TON PER DAY MUNICIPAL SOLID WASTE (MSW) FIRED FURNACE/ BOILERS AT SIGNAL ENVIRONMENTAL SYSTEMS, HOWARD AVENUE, BRIDGEPORT PURSUANT TO SECTION 22A-174-3 OF THE REGULATIONS AND 40 CFR 52.21 (PSD)

I. SUMMARY:

The emission rates and other parameters of this source have been deemed acceptable by the Enforcement Section. The Technical Services Section has, based on the application and its amendments, predicted acceptable PSD increment consumption. Also, no violations of any NAAQS were predicted.

COMPLIANCE WITH ADMINISTRATIVE AND EMISSIONS CRITERIA:

The application has been examined for compliance with applicable administrative and emissions regulations. The following summarizes the results:

A. Administrative Criteria - The applicant has submitted permit application forms for this premise. An emergency standby plan is required, and must be submitted.

B. Stack Criteria - This source must install an approved smoke monitor. Stack sampling must be performed on this unit.

C. Applicable Emission Standards

Allowable (Maximum Emission Rates After Any Air Pollution Controls)	Actual (Proposed Design/Operation)
1. Particulates	
Furnaces/Boilers	
BACT/LAER Control Strategy: Baghouse	
BACT/LAER Design 0.010 gr/dscf Corrected to 12% CO_2 Operate 0.015 gr/dscf corrected to 12% CO_2 Maximum emission rate = 33.2 pounds per hour total for 3 units. Maximum 10% opacity.	BACT/LAER Design 0.010 gr/dscf Corrected to 12% CO_2 Operate 0.015 gr/dscf corrected to 12% CO_2 Maximum Emission Rate = 33.2 pounds per hour total for 3 units. Maximum 10% opacity.

2. Sulfur Oxides as Sulfur Dioxide - BACT: Dry Scrubbers

BACT MSW 0.32#/10^6 BTU (input)	BACT MSW 0.32#/10^6 BTU (input) 312 #/hr Total

3. Nitrogen Oxides as Nitrogen Dioxide - BACT: Boiler Design and Operation

BACT: MSW - 0.6#/10^6 BTU	BACT: MSW - 0.6#/10^6 BTU 585 #/hr Total

4. Volatile Organic Compounds - BACT/LAER: Boiler Design and Operation (as CH_4)

BACT/LAER MSW 70 ppmv as methane corrected to 12% CO_2, 44.9 #/hr total	BACT/LAER MSW 70 ppmv as methane corrected to 12% CO_2, 44.9 #/hr total

5. Carbon Monoxide - BACT/LAER: Boiler Design and Operation

LAER: Maximum CO/CO_2 ratio of 0.002 in stack exhaust; 273 #/hr total	LAER: Maximum CO/CO_2 ratio of 0.002 in stack exhaust; 273 #/hr total

6. Hydrogen Chlorides (HCl) - BACT: Dry Scrubbers

BACT: Minimum 90% Reduction or 50 ppmv corrected to 12% CO_2, whichever is least stringent.	BACT: Minimum 90% Reduction or 50 ppmv corrected to 12% CO_2, whichever is least stringent.

Significant Net Emission Increase (for PSD Applicability)	Proposed Emission Rate
7. Lead: BACT - Baghouse; compliance with NAAQS 0.6 TPY	2.8 TPY
8. Mercury: BACT - Baghouse 0.1 TPY	3.9 TPY
9. Fluorides (as HF): BACT - Dry Scrubber 3.0 TPY	19.5 TPY
10. Beryllium: BACT - Baghouse; compliance with NESHAPS 0.0004	0.004 (not to exceed 10 grams over 24 hours period)
11. Sulfuric Acid Mist: BACT - Dry Scrubber 7.0 TPY	132 TPY

CONN. DEPT. OF ENVIRONMENTAL PROTECTION - AIR COMPLIANCE

January 14, 1985

TO: J. Eichler, Principal APCE
G. Lovvoll, Assistant Director
L. Bruckman, Director

DATE RECV'D: 11/28/83
DATE AMENDMENT RECV'D: 12/20/84
EPE #: 14623-25, 27-31, 33-37

FROM: A. Conklin
Senior APCE

SUBJECT: SUMMARY OF THE ENGINEERING EVALUATION OF AN AMENDED APPLICATION FOR PERMITS TO CONSTRUCT A 2000 TON RESOURCE RECOVERY FACILITY WHICH WILL INCLUDE EQUIPMENT FOR BOTH PROCESSING AND BURNING WASTE AT NEU/CRRA MID-CONNECTICUT PROJECT, RESERVE ROAD, HARTFORD

SUMMARY:

The emission rates and other parameters of this source have been deemed acceptable by the Enforcement Section. The Technical Services Section has, based on the amended application, predicted acceptable PSD increment consumption.

COMPLIANCE WITH ADMINISTRATIVE AND EMISSIONS CRITERIA:

The application has been examined for compliance with applicable administrative and emissions regulations. The following summarizes the results:

A. Administrative Criteria - The applicant is not required to submit registration forms for this premise. An emergency standby plan has not been submitted.

B. Stack Criteria - This source must install an approved smoke monitor. Stack sampling must be performed on this unit.

C. Applicable Emission Standards

	Allowable (Maximum Emission Rates After Any Air Pollution Controls)	Application (Proposed Design Operation)
1. Particulates		
Incinerators/Boilers		

BACT/LAER Design 0.010 gr/dscf
Corrected to 12% CO_2
Operate 0.015 gr/dscf
Maximum emission rate =
11.7 pounds per hour.

BACT/LAER Design 0.010 gr/dscf
Corrected to 12% CO_2
Operate 0.015 gr/dscf
Maximum Emission Rate =
11.7 pounds per hour.

Process Equipment

Stack 104
BACT 0.01 gr/dscf and
minimum 99.8% TSP reduction

Mfr. Guarantee 3.4 #/hr (0.01 gr/dscf)

Stack 105
BACT 0.01 gr/dscf and
minimum 99.9% TSP reduction

Mfr. Guarantee 3.4 #/hr (0.01 gr/dscf)

2. Sulfur Oxides as Sulfur Dioxide

BACT RDF 0.32#/10^6 BTU (input)
BACT Coal 0.55#/10^6 BTU (input)

BACT RDF 0.32#/10^6 BTU (input)
BACT Coal 0.55/#10^6 BTU (input)

3. Nitrogen Oxides as Nitrogen Dioxide

BACT RDF & Coal - 0.6#/10^6 BTU

BACT RDF & Coal - 0.6#/10^6 BTU

4. Volatile Organic Compounds
(as CH_4)

BACT/LAER RDF and Coal
70 ppmv corrected to 12% CO_2

BACT/LAER RDF and Coal
70 ppmv corrected to 12% CO_2

5. Carbon Monoxide

LAER Maximum CO/CO_2 ratio
of 0.002

LAER Maximum CO/CO_2 ratio
of 0.002

6. Hydrogen Chlorides (HCl)

BACT 90% Reduction Design
80% Minimum Operate
or
50 ppmv corrected to
12% CO_2, whichever
is least stringent.

BACT 90% Reduction Design
80% Minimum Operate
or
50 ppmv corrected to
12% CO_2, whichever
is least stringent.

D. Contribution to Ambient Air:

The increment in annual emissions for all permittable equipment at the site has been calculated as:

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

DRAFT

LESLIE S. MATSUBARA
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EPHSD/EPB

October 30, 1986

A1057MK

Mr. Russell L. Smith, Jr.
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Dear Mr. Smith:

Subject: Approval to Construct (HI 84-01)
City and County of Honolulu
Honolulu Resource Recovery Facility
Located at Campbell Industrial Park, Ewa Beach, Oahu

In accordance with the provisions of the Clean Air Act, as amended, and the PSD delegation agreement of August 15, 1983 between the U.S. Environmental Protection Agency, Region 9, and the State of Hawaii, the Department of Health has reviewed the application submitted by the City and County of Honolulu for the subject resource recovery facility to be located at Campbell Industrial Park, Ewa Beach, Oahu.

A request for public comment and a notice of public hearing regarding the Department's proposed action on the subject project were published on February 3, 1986 in the Honolulu Advertiser. An informational meeting regarding the revisions to the Draft Permit was held on September 2, 1986. Written comments on the revisions were accepted from September 2 to September 16, 1986.

After consideration of the expressed view of all interested persons (including Federal, State, and Local agencies), and pertinent Federal and State statutes and regulations, the Hawaii State Department of Health with the concurrence of the U.S. Environmental Protection Agency hereby issues the enclosed Approval to Construct/Modify a Stationary Source for the facility described above. This action does not constitute a significant change from the proposed action set forth and offered for public comment.

The Consolidated Permit Regulations (40 CFR Part 124) which were promulgated by the U.S. Environmental Protection Agency require that interested parties of the permit issuance be notified and advised that they may petition the Administrator, U.S. Environmental Protection Agency, Washington, D.C., to review any condition of the permit decision.

The petition shall include a statement of the reasons supporting that review, including a demonstration that any issues being raised were raised during the public comment period to the extent required by these regulations and when appropriate, a showing that the condition in question is based on:

(1) A finding of fact or conclusion of law which is clearly erroneous; and
(2) An exercise of discretion or an important policy consideration which the Director should, in his or her discretion, review.

An appeal to the Administrator for review of the permit decision must be filed not later than thirty (30) days from the date the final permit is issued.

This Approval to Construct/Modify a Stationary Source shall take effect thirty (30) days from the date it is received by the City and County of Honolulu.

If you have any questions regarding this matter, please contact Mr. Wilfred Nagamine of the Environmental Permits Branch at (808) 548-6410.

Sincerely,

LESLIE S. MATSUBARA
Director of Health

Date: OCT 31 1986

DAVID P. HOWEKAMP
Director, Air Management Division
U.S. Environmental Protection Agency
Region 9

Date: _____

Enclosures

DRAFT

APPROVAL TO CONSTRUCT/MODIFY A STATIONARY SOURCE

In compliance with the provisions of the Clean Air Act, as amended, and the PSD delegation agreement of August 15, 1983 between the U.S. Environmental Protection Agency, Region, 9, and the State of Hawaii, the City and County of Honolulu is granted approval to construct the Honolulu Resource Recovery Facility in accordance with the plans submitted with the application and with the Federal regulations governing the Prevention of Significant Air Quality Deterioration (40 CFR 52.21) and other conditions attached to this document and made a part of this approval.

Failure to comply with any condition or term set forth in this approval will be considered grounds for enforcement action pursuant to Section 113 of the Clean Air Act.

This Approval to Construct/Modify a Stationary Source grants no relief from the responsibility for compliance with any other applicable provision of 40 CFR 52, 60 and 61 or any applicable Federal, State, or Local air quality regulations.

This approval shall become effective thirty (30) days from the date it is received by the City and County of Honolulu.

LESLIE S. MATSUBARA
Director of Health

Date: OCT 31 1986

DAVID P. HOWEKAMP
Director, Air Management Division
U.S. Environmental Protection Agency
Region 9

Date: _____

DRAFT FINAL

PERMIT CONDITIONS

I. Permit Expiration

This Approval to Construct/Modify shall become invalid (1) if construction is not commenced (as defined in 40 CFR 52.21(b)(8)) within 18 months after the approval takes effect, (2) if construction is discontinued for a period of 18 months or more, or (3) if construction is not completed within a reasonable time.

II. Notification of Commencement and Completion of Construction and Commencement of Startup

The Department of Health shall be notified in writing of the anticipated date of initial startup (as defined in 40 CFR 60.2) of each facility of the source not more than sixty (60) days nor less than thirty (30) days prior to such date and shall be notified in writing of the actual date of commencement and completion of construction and commencement of startup within fifteen (15) days after such date.

III. Facilities Operation

All equipment, facilities, and systems installed or used to achieve compliance with the terms and conditions of this Approval to Construct/Modify shall at all times be maintained in good working order and be operated as efficiently as possible so as to minimize air pollutant emissions.

IV. Malfunction

The Department of Health shall be notified by telephone within 48 hours following any failure of air pollution control equipment, process equipment, or of a process to operate in a normal manner which results in an increase in emissions above any allowable emissions limit stated in section IX. of these conditions. In addition, the Department of Health shall be notified in writing within fifteen (15) days of any such failure. This notification shall include a description of the malfunctioning equipment or abnormal operation, the date of the initial failure, the period of time over which emissions were increased due to the failure, the cause of the failure, the estimated resultant emissions in excess of those allowed under section IX. of these conditions, and the methods utilized to restore normal operations. Compliance with this malfunction notification provision shall not excuse or otherwise constitute a defense to any violations of this permit or of any law or regulations which such malfunction may cause.

V. Right to Entry

The Director for the Department of Health, the Regional Administrator for the Environmental Protection Agency (EPA), Region 9 and/or their authorized representatives, upon the presentation of credentials, shall be permitted:

A. To enter upon the premises where the source is located or in which any records are required to be kept under the terms and conditions of this Approval to Construct/Modify; and

B. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this Approval to Construct/Modify; and

C. To inspect any equipment, operation, or method required in this Approval to Construct/Modify; and

D. To sample emissions from the source.

VI. Transfer of Ownership

In the event of any changes in control or ownership of facilities to be constructed or modified, this Approval to Construct/Modify shall be binding on all subsequent owners and operators. The applicant shall notify the succeeding owner and operator of the existence of this Approval to Construct/Modify and its conditions by letter, a copy of which shall be forwarded to the Regional Administrator for EPA, Region 9 and the Department of Health.

VII. Severability

The provisions of this Approval to Construct/Modify are severable, and, if any provision of this Approval to Construct/Modify is held invalid, the remainder of this Approval to Construct/Modify shall not be affected thereby.

VIII. Other Applicable Regulations

The owner and operator of the proposed project shall construct and operate the proposed stationary source in compliance with all other applicable provisions of 40 CFR Parts 52, 60 and 61 and all other applicable Federal, State and local air quality regulations.

IX. Special Conditions

A. Certification

The City and County of Honolulu shall notify the Department of Health, in writing, of compliance with special condition IX.B. and shall make such notification within fifteen (15) days of such compliance. This letter must be signed by a responsible representative of the City and County of Honolulu.

B. Air Pollution Control Equipment

The City and County of Honolulu shall install, continuously operate, and maintain the following air pollution controls to minimize emissions. Controls listed shall be fully operational upon startup of the proposed plant.

1. Each boiler shall be equipped with an electrostatic precipitator for the control of particulate emissions.

2. Each primary shredder shall be equipped with a baghouse for the control of particulate emissions.

3. Each of the RDF processing lines shall be equipped with a baghouse for the control of particulate emissions.

4. Each building vent shall be equipped with replaceable filters for the control of particulate emissions.

5. The City shall prepare the final engineering design, plans, and specifications for the complete dry sorbent injection system prior to start-up of the facility. The Department of Health shall be notified upon completion of the design and shall be provided with applicable drawings and a description of the operating characteristics.

6. Each boiler shall be constructed with appurtenant facilities necessary to provide for the injection of a dry sorbent into the combustion chambers. Such appurtenant facilities shall include, but are not limited to, all hardware which would be a part of the boiler structure, such as injectors, ducting, and other equipment part of or immediately adjacent to the boiler. The Department of Health shall require the City to place in full operation the dry sorbent injection system should the continuous emission monitor indicate exceedance of the SO_2 emission rate as specified by condition IX.F. A compliance schedule for full scale operation is specified in condition IX.T.

C. Operating Limitations and Alternate Fuel

1. The instantaneous combustion temperature in the boilers shall be maintained at or above 1800°F. For purposes of monitoring, the flue gas temperature as measured downstream of the superheaters shall be maintained at or above the value that correlated to 1800°F in the boilers, as obtained during the performance tests required under special condition IX.D.5.

2. The boilers, one emergency diesel engine generator, and one emergency diesel engine pump shall use only fuel oil with a maximum sulfur content not to exceed 0.5% by weight.

3. Each boiler shall not use more than 1,830 gallons per hour or exceed 1,738,500 gallons in a year of fuel oil. Fuel use records shall be maintained and reported as required by special condition IX.N.8. While firing fuel oil or fuel oil/RDF combination, the electrostatic precipitators shall be operated to minimize particulate emissions.

4. The operating hours for the emergency diesel engine generator or the emergency diesel engine pump shall not exceed 32 hours per year. Fuel use and operational records shall be maintained and reported as required by special condition IX.N.7.

D. Performance Tests

1. Within 60 days after achieving the maximum production rate of the proposed equipment, but not later than 180 days after initial startup of the equipment as defined in 40 CFR 60.2, and at such other times as specified by the Department of Health, the City and County of Honolulu shall conduct performance tests for particulate matter, SO_2, NO_x, CO, VOC, lead, mercury, fluoride, beryllium, and total PCDD, PCDF and the specific/related isomer 2, 3, 7, 8 - tetrachloro-dibenzodioxin, and furnish to the Department of Health a written report on the results of such tests. The tests shall be conducted on an annual basis and at the maximum operating capacity of the facilities being tested. Upon written request from the City and County of Honolulu, the Department of Health may approve the conducting of performance tests at a lower specified production rate. After the initial performance tests and upon written request from the City and County of Honolulu, the Department of Health may approve the deletion of a specific annual tests for the resource recovery facility.

2. Performance tests for the emissions of particulate matter, SO_2, NO_x, CO, VOC, lead, mercury, fluoride, and beryllium shall be conducted and the results reported in accordance with the test methods set forth in 40 CFR 60, Part 60.8, and Appendix A and 40 CFR 61, Part 61.14, and Appendix B. The following test methods shall be used:

   a. Performance tests for the emissions of TSP shall be conducted using EPA Methods 1-5.

   b. Performance tests for the emissions of SO_2 shall be conducted using EPA Methods 1-4 and 6.

   c. Performance tests for the emissions of NO_x shall be conducted using EPA Methods 1-4 and 7.

   d. Performance tests for the emissions of CO shall be conducted using EPA Methods 1-4 and 10.

   e. Performance tests for the emissions of VOC shall be conducted using EPA Methods 1-4 and 18 or 25.

   f. Performance tests for the emissions of lead shall be conducted using EPA Methods 1-4 and 12.

   g. Performance tests for the emissions of mercury shall be conducted using EPA Method 101 (40 CFR 61, Appendix B).

   h. Performance tests for the emissions of fluoride shall be conducted using EPA Methods 1-4 and 13.

   i. Performance tests for the emissions of beryllium shall be conducted using EPA Method 103 (40 CFR 61, Appendix B).

j. The test method for the emissions of total PCDD, PCDF and isomer 2, 3, 7, 8 - tetrachloro-dibenzodioxin shall be agreed upon with the Department of Health prior to testing.

3. The Department of Health shall be notified in writing of the scheduled performance tests at least 30 days prior to such tests. A performance test plan shall be submitted with the notification. Prompt notification and submittal of the performance test plan allows time for the review and approval of the test plan and to arrange for an observer to monitor the test. Such prior approval will minimize the possibility of Department of Health rejection of test results for procedural deficiencies. In lieu of the above methods, equivalent methods may be used with prior written approval from the Department of Health.

4. For performance test purposes, sampling ports, platforms, and access shall be provided by the City and County of Honolulu on each boiler exhaust system in accordance with 40 CFR 60.8(e) and 40 CFR 61.12.

5. During the performance tests, the combustion temperatures for each boiler shall be measured simultaneously with the flue gas temperatures measured downstream of the superheaters. The downstream location shall be at the location of the continuous monitoring temperature probe. The measurements shall be reported and correlations made between the boiler combustion temperatures and the downstream temperatures and included with the stack performance tests.

6. Where reporting values are required in parts per million (ppm), the dry standard cubic feet of flue gas shall be corrected to 12 percent CO_2 and 68 degrees fahrenheit.

E. Emission Limits for Particulate Matter

1. On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere from the boiler gases which:

   a. Contain particulate matter in excess of the more stringent of 0.8 lb/ton-RDF, 57 lbs/hr. or 0.0365 gr/dscf corrected to 12 percent CO_2 and 68 degrees fahrenheit (3-hour average).

   b. Exhibit an opacity of 20 percent or greater for any period or periods aggregating more than six minutes in any one hour with the following exception. During the building of a new fire or equipment breakdown, the opacity shall not exceed 60 percent for any period or periods aggregating more than six minutes in any one hour.

2. On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere from the RDF processing area baghouses gases which:

   a. Contain particulate matter in excess of 1.02 lbs/hr (3-hour average).

   b. Exhibit 20 percent opacity or greater.

3. On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere from building vents gases which contain particulate matter in excess of 0.39 lbs/hr for the aggregate total for all building vents.

F. Emission Limits for SO_2

On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere, gases which contain SO_2 in excess of the following limits, except that the limit contained in b. must be met on and after the ninetieth day following startup.

a. 349 lbs/hr (3-hour average)

b. 143 ppm (dry, @12% CO_2, 30-day rolling average)

The City and County of Honolulu may meet this limit by using or combining any techniques that may be available including the use of "low sulfur MSW", source separation, or preprocessing of the MSW stream.

G. Emission Limits for NO_x

On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere NO_x (as NO_2) in excess of the more stringent of 260 parts per million or 340 lbs/hr (3-hour average) from the stack venting from the boilers.

H. Emission Limits for CO

On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere CO in excess of the more stringent of 377 parts per million or 300 lbs/hr (3-hour average) from the boiler stack.

I. Emission Limits for VOC

On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere VOC in excess of the more stringent of 21 parts per million or 18 lbs/hr (3-hour average) from the boiler stack.

J. Emission Limits for Lead

On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere lead in excess of the more stringent of 0.0028 lbs/ton-RDF or 0.20 lbs/hr (3-hour average) from the boiler stack outlet.

K. Emission Limits for Mercury

On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere mercury in excess of the more stringent of 0.0022 lbs/ton-RDF or 0.16 lbs/hr (3-hour average) from the boiler stack outlet.

L. Emission Limits for Fluoride

On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere fluoride in excess of the more stringent of 0.036 lbs/ton-RDF or 2.6 lbs/hr (3-hour average) from the boiler stack outlet.

M. Emission Limits for Beryllium

On and after the date of startup, the City and County of Honolulu shall not discharge or cause the discharge into the atmosphere beryllium in excess of the more stringent of 0.000013 lbs/ton-RDF or 0.0009 lbs/hr (3-hour average) from the boiler stack outlet.

N. Continuous Monitoring Systems and Recordkeeping

1. Prior to the date of startup and thereafter, the City and County of Honolulu shall install, maintain, and operate the following continuous monitoring systems in each of the boiler exhaust stack:

   a. Continuous monitoring systems to measure stack gases NO_x and SO_2 concentrations. The systems shall meet EPA monitoring performance specifications (40 CFR 60.13 and 40 CFR 60, Appendix B, Performance Specifications).

   b. A continuous monitoring system to measure stack gas volumetric flow rates, the system shall meet EPA monitoring performance specifications (40 CFR Part 52, Appendix E).

   c. When emissions data are not obtained because of continuous monitoring system's breakdowns, repairs, calibration checks, and zero and span adjustments, emissions data shall be obtained using other monitoring systems as approved by the Department of Health and the EPA or EPA reference methods. Emissions data is required for a minimum of 21 hours in at least 27 out of 30 successive boiler operation days.

2. Prior to the date of startup and thereafter, the City and County of Honolulu shall install, maintain, and operate a transmissometer system for continuous measurement of the opacity of stack emissions in each of the boiler exhaust stacks. The system shall meet EPA monitoring performance standards (40 CFR 60.13 and 40 CFR 60, Appendix B, Performance Specification 1).

3. Prior to the date of startup and thereafter, the City and County of Honolulu shall install, maintain, and operate a continuous monitoring system to measure and record the flue gas temperatures downstream of the superheaters for each boiler.

4. The City and County of Honolulu shall maintain a file of all measurements, including continuous monitoring systems performance evaluations; all continuous monitoring system or monitoring device calibration checks; adjustments and maintenance performed on these system or devices; and

all other information required by 40 CFR 60 recorded in permanent form suitable for inspection. The file shall be retained for at least three years following the date of such measurement, maintenance, reports, and records.

5. City and County of Honolulu shall submit a written report of all excess emissions to the Department of Health for every calendar quarter. The report shall include the following:

   a. The magnitude of excess emissions computed in accordance with 40 CFR 60.13(h), any conversion factors used, and the date and time of commencement and completion of each time period of excess emissions.

   b. Specific identification of each period of excess emissions that occurs during startups, shutdowns, and malfunctions of the furnace/boiler systems. The nature and cause of any malfunction (if known) and the corrective action taken or preventative measures adopted, shall also be reported.

   c. The date and time identifying each period during which the continuous monitoring system was inoperative except for zero and span checks. The nature of each system repair or adjustment shall be described.

   d. The report shall so state if no excess emissions have occurred. Also, the report shall so state if the continuous emission monitoring system operated properly during the period and was not subject to any repairs or adjustments except for zero and span checks.

   e. Excess emissions of SO_2 shall be defined as any three-hour or any thirty-day period during which the average emissions, as measured by the continuous monitoring system, exceeds the maximum emissions specified for SO_2 pollutants in condition IX.F.

   f. Excess emissions of NO_x (as NO_2) shall be defined as any three-hour period during which the average emissions, as measured by the continuous monitoring system, exceeds the maximum emissions specified for NO_x in condition IX.G.

   g. Excess emissions shall be defined as any six-minute period during which the opacity as measured by Method 9 or the continuous monitoring exceeds the opacity limits set in condition IX.E.

6. Excess emissions as indicated by the continuous monitoring system shall be considered violations of the applicable emissions limit. Any such violation shall be grounds for enforcement under section 113 of the Clean Air Act.

7. Prior to the date of startup and thereafter, the City and County of Honolulu shall install, maintain, and operate a non-resetting hour meter on each emergency diesel engine for the permanent recording of the total hours each engine has operated. Records shall be maintained on the amount of fuel consumed and the dates and hours of operation for each

emergency diesel engine. The records shall be in a permanent form suitable for inspection and retained for at least three years following the date of such records. A summary shall be reported on an annual basis.

8. The City and County of Honolulu shall monitor and maintain records on the total gallons of fuel oil consumed by each boiler in the calendar year. The records shall be in a permanent form suitable for inspection and retained for at least three years following the date of such records. A summary shall be reported on an annual basis.

9. The City and County of Honolulu shall monitor and maintain monthly records on the raw refuse received, the ferrous metals and other materials removed, and the RDF burned. The records shall be in a permanent form suitable for inspection and retained for at least three years following the date of such records. A summary shall be reported on an annual basis.

O. Ambient Monitoring

An ambient monitoring program shall be established by the City and County of Honolulu for the collection of meteorological and ambient air quality data. The program shall be operational at least one year prior to and shall continue not less than two years after startup of the facility. A description of the monitoring program shall be submitted to the Department of Health for approval within one year after the date of issuance of the Approval to Construct. Although other pollutants may be required or included, SO_2 shall be monitored as a minimum. Termination of the ambient monitoring program shall be at the discretion of the Department of Health.

The monitor(s) shall be located, installed, maintained, and operated by the City and County of Honolulu in accordance with the provisions of the program as agreed upon by the Department of Health.

The City and County of Honolulu shall maintain a file of all measurements, including the monitoring system performance evaluations; calibration checks; and adjustments and maintenance performed on the system or devices. The file shall be retained for at least three years following the date of such measurement, maintenance, reports, and records. Within 60 days after the end of each calendar year, the data for that calendar year shall be summarized and reported to the Department of Health.

P. Solid Waste Characterization Study

A solid waste characterization study shall be conducted by the City and County of Honolulu to identify the higher sulfur content waste within the MSW that can be effectively removed from the waste stream. The City and County of Honolulu shall initiate the study immediately upon project approval. Within 60 days after project approval, the City and County of Honolulu shall submit to the Department of Health, for its approval, the study plan including strategies and methods.

Q. Program to Remove Higher Sulfur Content Waste

At least 60 days prior to the startup of the facility, the City and County of Honolulu shall submit to the Department of Health, for its approval, the plan to

remove the higher sulfur content waste from the waste stream. The plan should address as a minimum the types of items targeted for removal, how and where these items will be removed from the waste stream, methods for disposal of these items, and the estimated level of sulfur removal.

Upon approval by the Department of Health, the plan to remove the higher sulfur content waste from the waste stream shall be implemented at the startup of the facility.

The City and County of Honolulu shall maintain monthly records on the amounts and types of refuse removed to achieve sulfur reduction. The records shall be in a permanent form suitable for inspection and retained for at least three years following the date of such records.

At the end of the first year of operation and continuing on an annual basis, a written report shall be submitted to the Department of Health summarizing the types and amounts of items removed, the level of sulfur reduction achieved, the methods used in achieving the reduction, problems encountered with the plan, and recommendations to improve the sulfur reduction program. The program to remove the higher sulfur content waste and the annual reporting may be discontinued or modified at the discretion of the Department of Health.

R. Establishment of an Escrow Account

The City and County of Honolulu shall establish and maintain an escrow account to provide a source of funds to implement additional SO_2 controls or sulfur reduction, should it be established that the SO_2 emission limits, as defined in Section IX.F. Emission Limitation for SO_2, are being exceeded or additional reductions are deemed necessary. The fund shall be established at the time the facility begins operation. The source of funds for the escrow account shall be by a solid waste disposal tip fee surcharge of $2.00 per ton delivered to the facility.

The surcharge and escrow account shall remain in effect until such time as the Department of Health determines that further SO_2 reduction is not required. Any excess funds shall at that time be returned to the City's general fund.

S. New Source Performance Standards

The proposed RDF fired boilers are subject to the federal regulations entitled Standards of Performance for New Stationary Sources (40 CFR 60). City and County of Honolulu shall meet all applicable requirements of Subparts A and E of this regulation including Subpart Db upon promulgation.

T. Schedule for Implementation of SO_2 Controls

If, at any time after the emissions limits specified in condition IX.F. are required to be met, the SO_2 emission limits are exceeded, the City and County of Honolulu shall take the following actions:

a. Within 15 days of the violation, send to the Department of Health and EPA a letter providing notification of the violation and a commitment to meet the following schedule for completion of constuction and final installation of the entire dry sorbent injection system.

b. Within two months of the date of violation, let contracts and begin fabrication of the dry sorbent injection system.

c. Within four months of the date of violation, begin actual on-site construction of the dry sorbent injection system.

d. Within fourteen months of the date of violation, complete construction/installation and startup of the dry sorbent injection system.

e. Within sixteen months of the date of violation, achieve final compliance with the emissions limitation.

f. Performance tests shall be conducted in accordance with condition IX.D.

Any proposed changes in the above conditions shall require prior written Department of Health and EPA concurrence.

U. Unregulated Pollutants

Should additional guidance relating to the June 3, 1986 PSD remand, applicable to this permitting action, be developed, the City and County of Honolulu shall provide to the Department of Health any such analysis, data or demonstration of compliance with other requirements within the time required by such guidance.

X. Agency Notifications

All correspondence as required by this Approval to Construct/Modify shall be forwarded to:

Deputy Director for Environmental Health
Hawaii State Department of Health
P.O. Box 3378
Honolulu, HI 96801

All correspondence to the Department of Health required under this permit, shall have duplicate copies forwarded to:

Director (Attn: A-1)
Air Management Division
U.S. Environmental Protection Agency
Region 9
215 Fremont Street
San Francisco, CA 94105

DRAFT

AMBIENT AIR QUALITY IMPACT REPORT
(HI 84-01)

I. Applicant

Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

II. Project Location

The project site is located at the Campbell Industrial Park on the southwest coast of the Island of Oahu (UTM grid square 592 E, 2356 N). This falls within the single Air Quality Control Region (AQCR) comprised of the entire State of Hawaii (37 FR 10860, 31 May 1972). The site is bounded in the north by the existing Chevron Refinery; in the east by Hanua Street; in the south by vacant land and Kaomi Loop; and in the west by vacant land. The site is vacant unused land.

III. Project Description

The Honolulu Resource Recovery Project proposed by the City and County of Honolulu, would (1) receive raw refuse (municipal solid waste, MSW) and process it into refuse-derived fuel (RDF); (2) recover ferrous metals; (3) combust RDF in spreader-stoker boilers to produce steam; (4) use a steam turbine to generate electricity for the plant's needs and any excess amount to be sold to Hawaiian Electric Company; and (5) use baghouses, electrostatic precipitators, and filters to control emissions. Maximum capacity of the facility is 779,640 tons per year of municipal solid waste (MSW). The major facilities, process and emission points are further described below.

The resource recovery facility can be divided into two processes: (1) the Resource Recovery Subsystem; and (2) the Energy Recovery Subsystem.

A. Resource Recovery Subsystem

This process will have the ability to receive and store municipal solid waste, separate ferrous metals, produce RDF, and inventory the RDF for programmed burning.

This subsystem can be further subdivided into the receiving area operations, front-end processing, and the RDF storage.

The receiving area operations are where the raw refuse is collected. The waste will be spread and compacted in the unloading storage area and fed out of the room as required for processing. Under normal conditions, the storage area will be emptied daily, however, the storage area is designed to hold slightly more than a three-day supply of raw refuse (5,400 tons) based on a maximum expected MSW flow of 1800 TPD.

Based on two-shift operation, the front-end process, will have the ability to process up to 2800 TPD of MSW. The designed shift capacity is 2 shifts/day at 6 days/week. Processes involved include shredding, separation of ferrous metals, and further shredding.

The RDF produced will be stored in a separate building awaiting programmed burning.

B. Energy Recovery Subsystem

Two furnaces each with a two drum, single pass boiler bank are to be installed. The furnaces will be operated 24 hours per day, 7 days a week and have a total capacity of 71.2 tons RDF per hour or 731 MMBTU/hr heat input. RDF would be fed from metered bins into a pneumatic distributor that would propel the fuel into the furnace. Drying and ignition of the RDF will occur immediately above the moving grate. It is expected that about 50% of the fuel will burn in suspension, although this percentage is subject to wide variations. The remainder will burn on the slowly moving grate. Combustion air will be introduced from both below and above the grate.

Low sulfur fuel oil will also be used by the boilers during cold starts, and during periods when RDF is of poor quality or unavailable.

The steam generator is a water-cooled furnace with a two drum, single pass boiler bank. It is equipped with a spreader-stoker for semi-suspension firing of the refuse-derived fuel.

Fuel is delivered to the boilers by two duplicate conveyors from the RDF storage building. The fuel enters metering bins which regulate the rate at which fuel enters the furnace.

Heat from combustion gases would be absorbed by pressurized water filled tubes in the furnace wall. The heated water would be heated to produce steam, collected and then passed through the steam generator superheater located in the furnace cavity.

The steam produced by the boilers would then be delivered to the steam turbine generators for the production of electricity. The electrical power produced would satisfy plant requirements and the remainder being sold to the power company.

From the turbines the steam would be delivered to a water cooled condenser which would convert the low pressure steam back to water. The condensed water would then be cooled further in a mechanical draft cooling tower and recirculated back to the boilers.

C. Emission Controls

The proposed resource recovery facility will use baghouses and filters to control particulate emissions from the resource recovery processes and an electrostatic precipitator for particulate cleanup of the flue gas prior to discharge through an elevated stack.

1. Front-End Processing and Dust Control. Baghouses will be installed to control particulate emissions from the primary shredder and for the main process air. There are two separate process lines and therefore four baghouses will be in operation.

2. Building Vents. The receiving and storage building and the RDF storage building will have a number of rooftop vents from which there will be particulate emissions. The vents on the receiving and storage building are primarily to prevent the buildup of motor vehicle pollutants operating in the building. The size of the building and the moisture content of the incoming refuse should effectively minimize the amount of dust generated. The RDF in the storage facility will be fairly coarse and large quantities of generated dust are not expected. On all vents, replaceable filter elements will be installed upstream of the exhaust fans.

3. Electrostatic Precipitators. On each of the two steam generators an electrostatic precipitator will be used to control particulate emissions.

D. Emergency Diesel Engine Generators

The resource recovery facility will have two (2) emergency diesel engines, one for backup electrical power generation and one for the fire fighting pump. The diesel engines are a Caterpillar rated at 150 KW and a Cummins rated at 75 KW. It is anticipated that the engines will be operated in the testing mode and for emergency situations not more than 32 hours per year for each diesel engine. The 150 KW generator will supply power to essential equipment when electrical power is unavailable from the plant and the power service lines. The diesel fire pump will provide fire flow to the plant if the fire water main is inoperable.

IV. Emissions from the Project

The resource recovery facility will emit significant amounts of all criteria pollutants and some non-criteria pollutants. The estimated emissions from the project are based upon emission data submitted for the PSD application, by the applicant.

Where measurement in parts per million (ppm) is called for the dry standard cubic feet of flue gas shall be corrected to 12 percent CO_2 and 68 degrees fahrenheit.

A. Particulate Matter

Particulate emissions from the facility will result from resource recovery and energy recovery operations. The applicant estimates that the uncontrolled emission factor from RDF combustion will be 120 lb/ton-RDF. The particulate emission factor, after controls, from the processing area is expected to be 0.0051 lb/ton of Municipal Solid Waste (MSW). Maximum total particulate emissions from the plant will be about 58.4 lb/hr.

B. Sulfur Dioxide

SO_2 emissions result from the combustion of sulfur bearing material in the boilers. The sulfur content in the MSW is estimated at 0.17 percent by weight.

After processing, the RDF will have a sulfur content of 0.136 percent by weight. At this sulfur content and assuming 100 percent conversion of the sulfur to sulfur dioxide, the calculated SO_2 emissions would be 5.44 lbs/ton-RDF. However, the applicant estimates that 10 percent of the sulfur in the RDF would be retained in the bottom process residue. This would result in SO_2 emissions of 4.90 lbs/ton-RDF or 349 lbs/hr, on a short term basis. The emissions will be lower on the long term basis resulting in an average SO_2 emissions of 262 lbs/hr.

C. Nitrogen Oxides

The combustion of RDF which contains nitrogen compounds and combustion air which contains nitrogen are the sources of NO_x emissions from the proposed facility. The applicant estimates that NO_2 emission factor will be approximately 4.78 lbs/ton-RDF. This will result in NO_x emissions of 340 lbs/hr.

D. Carbon Monoxide

Carbon Monoxide (CO) is generated by incomplete combustion of the RDF. The lower the amount of excess air the higher the level of CO emissions. The applicant estimates that the CO emission factor will be 4.21 lbs/ton-RDF. This will result in CO emissions from the plant of approximately 300 lbs/hr.

E. Hydrocarbons

Hydrocarbon (VOC) emissions result from the incomplete combustion of hydrocarbon/carbon based compounds. The applicant estimates that the hydrocarbon emission factor will be about 0.25 lb/ton-RDF. This will result in VOC emissions from the plant of approximately 18 lbs/hr.

F. Lead

The combustion of RDF containing lead will result in lead emissions from the proposed facility. Based on analysis taken from samples of refuse at several locations around the U.S., the maximum uncontrolled lead emission factor would be 0.42 lb/ton-RDF. However, lead is expected to be removed from the fuel during the RDF processing. In addition, lead removal is expected in the electrostatic precipitator due to lead absorption on fly ash which is captured in the precipitator. The applicant expects overall lead collection efficiency to be greater than 99%. Based on this, the applicant estimates the lead emission factor will be 2.8×10^{-3} lb/ton-RDF. The expected lead emission rate from the plant will be approximately 0.20 lb/hr.

G. Asbestos

Due to heterogeneity and variability of municipal solid waste it is possible that there may occasionally be trace emissions of asbestos fibers, but the proposed facility is not expected to be a significant asbestos emitter.

H. Beryllium (Be)

Typical municipal solid waste typically contains trace metals such as beryllium which when combusted would result in atmospheric emissions. Beryllium will not

be specifically controlled at the facility although some removal will occur during RDF processing, uptake in the bottom ash, and absorption onto fly ash which is collected in the precipitator.

I. Fluorides (as HF)

Hydrogen Fluoride (HF) emissions can be attributed to fluoride originating in the RDF contacting free hydrogen during combustion and forming HF. No data were found on fluoride content of Honolulu refuse. Based on data from the Hagerstown Incinerator, 0.036 lb/ton-RDF is the estimated HF emissions for the proposed facility. The estimated emissions of HF is 2.56 lbs/hr.

J. Mercury (Hg)

The combustion of mercury in the RDF will result in mercury emissions. Based on analysis of samples of refuse from around the U.S., the maximum uncontrolled potential mercury emission factor, estimated by the applicant, will be 0.0022 lb/ton-RDF. The estimated emissions of mercury is 0.16 lbs/hr.

K. Sulfuric Acid Mist

Due to the high stack temperature of the stack gas, formation of a sulfuric acid mist is unlikely.

L. Hydrogen Sulfide (H_2S), Total Reduced Sulfur, and Reduced Sulfur Compounds

Oxidation conditions present in the boilers insure minimal generation of these compounds.

M. Vinyl Chloride (VC)

The presence of polyvinyl chloride (PVC) materials in the refuse stream is highly probable, but the thermal decomposition of such material normally results in the release of phosgene, hydrogen chloride, and chlorine and lesser amounts of monomer vinyl chloride.

N. Polychlorinated Dioxins (PCDD) and Polychlorinated Furans (PCDF)

PCDD and PCDF may be present in the stack gas emissions of which some will be absorbed on the fly ash particulates and removed by the ESP. The mechanism of formation for PCDD and PCDF is unclear although studies indicate that the amounts emitted may vary depending on the waste stream, the combustion temperatures, and retention times.

Combustion temperatures above 1600°F along with increased retention times in the boilers not only destroys PCDD and PCDF but also minimizes its formation from chlorobenzenes (CB) and chlorophenols (CP), and polychlorinated biphenyls (PCB). The concern of PCDD and PCDF is due to the extreme toxicity of the 2, 3, 7, 8 -tetrachloro-dibenzodioxin isomer and other closely related (structurally) PCDD/PCDF compounds, as shown in animal tests.

In order to minimize the emissions of PCDD and PCDF, the Department of Health will require that the combustion temperature be maintained above

1800°F and that a stack emissions test be conducted for total PCDD, PCDF, and specific/related isomer 2, 3, 7, 8 - tetrachloro-dibenzodioxin.

O. Hydrogen Chloride (HCl)

Typical municipal solid waste has an average chlorine concentration of 0.5 percent by weight. The total chlorine in the refuse comes from paper (9-36 percent), plastics (30-49 percent), and glass, ceramics, fines and textiles (31-39 percent). Based on data from the waste processing facilities at Ames, Iowa and Madison, Wisconsin, the processing of the MSW to produce RDF removes approximately 10 percent of the chlorine while about 30 percent of the chlorine in the RDF remains in the ash. The emission rate for this unregulated pollutant from this project is estimated at 748 lbs/hr. Note that the New York State Air Guide sets the annual acceptable ambient level for hydrogen chloride at 140 ug/m^3. In comparison, the project's annual worst case ambient impact for hydrogen chloride is 1.96 ug/m^3 or 1.4 percent of the annual acceptable ambient level.

P. Other Unregulated Pollutants

Other unregulated pollutants emitted from the project boilers include certain small quantities of heavy metals. Control of these unregulated pollutants is accomplished by administrative or design features incorporated in the project.

1. Exclusion of Hazardous and Non-Combustible Industrial Wastes. Hazardous non-combustible industrial wastes will not be accepted for processing or disposal at the facility. Hazardous wastes must be disposed of in accordance with applicable federal regulations and at approved landfill sites. Non-combustible industrial items will be directed to the municipal landfills for disposal.

2. Processing of Waste to Produce RDF. In the processing of the incoming solid waste, approximately 20 percent by weight of the incoming refuse will be removed as non-combustible materials. The exclusion of non-combustibles is expected to significantly reduce the emissions of various heavy metals. Information is lacking to satisfactorily quantify the emission reduction of heavy metals as a result of processing the solid waste. However, a series of test burns of raw refuse and RDF at the Gallatin, Tennessee incinerator showed that the unabated air emissions of some heavy metals such as cadmium and arsenic were reduced by 27 and 66 percent, respectively.

3. Electrostatic Precipitators. For each boiler, a 4-field electrostatic precipitator will be installed to control particulate emissions. Additional reductions in the emissions of organic compounds and heavy metals such as lead, beryllium, cadmium, chromium, arsenic, selenium, manganese, and copper will also occur. The temperatures in the boiler combustion zone will exceed 2200°F causing most of the heavy metals to vaporize. As the temperatures of the flue gas decrease, organic and heavy metals will condense on particulates and will be removed as the exhaust stream passes through the electrostatic precipitator.

Table I
Estimated Emissions from the Project
(based on process rate of 2800 TPD-MSW or 1710 TPD-RDF)

Pollutant	Uncontrolled Emissions lb/hr	Uncontrolled Emissions ton/yr	Controlled Emissions lb/hr	Controlled Emissions ton/yr
Particulates	9,570	40,057	58.4	254.3
SO_2	349	1,529	349	1,529
NO_x	340	1,489	340	1,489
CO	300	1,314	300	1,314
VOC	18	79	18	79
Lead	30	131	0.20	0.9
Mercury	0.16	0.7	0.16	0.7
Fluoride	2.6	11.2	2.6	11.2
Beryllium	>0.0009	> 0.0039	0.0009	0.0039

V. Applicability of the Prevention of Significant Deterioration (PSD) Regulations

The Prevention of Significant Deterioration (PSD) regulations (40 CFR 52.21) defines a major source as any source type belonging to a list of 28 source categories which emit or has the potential to emit 100 tons/year or more of any pollutant regulated under the Clean Air Act, or any other source type which emits or has the potential to emit such pollutants in amounts equal to or greater than 250 tons/year.

Under PSD regulations, significant net emissions increase is defined as a net increase in emissions greater than the threshold prescribed for any pollutant subject to regulation. The significant thresholds prescribed by the PSD regulations for the subject pollutants are:

Pollutant	Significant Emission Rate tons/yr
Carbon Monoxide	100
Nitrogen Oxides	40
Sulfur Dioxide	40
Total Suspended Particulate	25
Ozone	40 of VOC
Lead	0.6
Mercury	0.1
Fluoride	3
Beryllium	0.0004

A PSD review would apply to all pollutants from a major source showing significant net increases in emissions for which the applicable National Ambient Air Quality Standards (NAAQS) have not been exceeded. In Campbell Industrial Park, Ewa Beach, Oahu, the NAAQS have not been exceeded for any pollutant.

The estimated uncontrolled and controlled emissions of these pollutants from the proposed resource recovery facility are listed in Table I. Under the PSD regulations, the proposed facility is a major source of TSP, SO_2, NO_x, and CO and a significant

source of VOC, Pb, Hg, F, and Be. Therefore, the source is subject to PSD review for TSP, SO_2, NO_x, CO, VOC, Pb, Hg, F, and Be as follows:

1. Application of Best Available Control Technology (BACT);
2. Analysis of Ambient Air Quality Impacts from the project;
3. Analysis of air quality and/or visibility impacts on Class I areas; and
4. Analysis of impacts on soil and vegetation.

VI. Best Available Control Technology (BACT)

In accordance with the PSD regulations (see Section V), the City and County of Honolulu must apply BACT to control emissions of TSP, SO_2, NO_x, CO, VOC, Pb, Hg, F, and Be from the proposed resource recovery facility. BACT is defined in the Clean Air Act Amendments of 1977 as "... an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this Act... on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs,..."

A. Total Suspended Particulate (TSP)

1. Boilers. The proposed particulate control devices for the boilers are electrostatic precipitators (ESP). Each boiler will be equipped with a 4-field ESP capable of particulate removal efficiencies in excess of 99%. An ESP would provide additional reductions in the emissions of organic compounds and heavy metals such as lead, beryllium, cadmium, chromium, arsenic, selenium, manganese, and copper. The temperatures in the boiler will volatize the heavy metals which would then condense on the particles in the flue gas stream. Collection of the particles in the ESP would provide some control of the heavy metals and organic compounds. The ESP's versatility in capturing a wide range of particulate sizes and low operating and maintenance costs offset the high capital costs and large installation space requirements. It is the applicant's contention that ESP represents BACT for the boilers of the proposed facility.

2. Front-End Processing and Dust Control. Baghouses are considered BACT for particulate emissions from the front-end processing of solid waste. Particulate removal efficiencies in excess of 99% will be obtained. In combination with the negative pressure and air withdrawal from the receiving and processing areas, the baghouses will provide for effective dust control.

3. Building Vents. Particulate emissions from the vents on the roofs of the MSW receiving and storage building as well as the RDF storage building will be controlled by replaceable Type 44 AAF filter elements installed upstream of the exhaust fans. The filters are believed to represent BACT for this source because of the low particulate emission rates associated with building vents.

Department of Health has determined that the use of baghouses for the front-end processing units, replaceable filters on vents on the receiving/storage buildings, and an electrostatic precipitator on the boilers represent BACT for particulate emissions. The emission rate for the boilers shall be no greater than

0.80 lb/ton-RDF or 57 lbs/hr. The emission rate for the main process air and dust control baghouse is to be limited to a total of 0.0051 lb/ton-MSW or a total of 1.02 lb/hr. The emission rate for particulate emissions from the building vents shall not be greater than 0.39 lb/hr for the aggregate total for all building vents.

B. Sulfur Dioxides (SO_2)

The amount of SO_2 emitted is solely a function of the sulfur content of the fuel. The fuel (RDF) which is to be burned at the proposed facility is expected to have a maximum sulfur content of 0.2 percent by weight. This sulfur content is at or below the sulfur content of the low sulfur fuel and coal available today, which is indicative that RDF is a low sulfur fuel. A 1984 analysis of Honolulu's municipal solid waste showed a sulfur content of 0.08% by weight. A 1983 analysis of the stack gas at the Waipahu incinerator suggested that the sulfur emitted equated to approximately 0.03% of the total mass fired.

A flue gas desulfurization (FGD) system is a control technology capable of reducing SO_2 emissions. The FGD system, consisting of a dry lime spray scrubber followed with a baghouse, has been proposed for several resource recovery projects which are in various stages of development. The applicant has stated that the addition of a FGD system would result in a construction and financing cost increase of $12.5 million. Also, the project annual operating cost will increase $2.8 million per year, and lost revenue, from a decrease in net electrical generation, will amount to $1.7 million per year. Over the twenty-year life, the resource recovery facility without the FGD system will cost approximately $362.8 million, but with FGD, the total cost will escalate to $567.4 million, an increase of $204.6 million representing a 56 percent cost increase for solid waste disposal. The increased cost of $204.6 million equates to approximately $10,000 per ton of SO_2 scrubbed over the twenty-year project life.

The impact that the project will have on the PSD Class II increments are covered in section VII. Air Quality Impact. The project's annual and 24-hour increment consumption for SO_2 are both less than 0.01 ug/m^3. For the 3-hour SO_2 standard, the increment being consumed by the project is 22.96 ug/m^3 which represents approximately 4.5 percent of the total PSD increment allotment of 512 ug/m^3.

A FGD unit has an estimated SO_2 removal efficiency of 70 percent. The effect such a unit will have on both the 24-hour and the annual SO_2 increment consumption will be virtually non-existent. The 3-hour SO_2 increment consumed by the project will be reduced to 6.9 ug/m^3. The cost over the life of the project to reduce the 3-hour increment by 16.1 ug/m^3 is $12.7 million per 1 ug/$m^3$ of reduction.

A FGD unit would also provide a reduction in HCl emission levels comparable to that of SO_2. At present, there is no federal emission standard for HCl, however, when compared to the New York State Air Guide No. 1, the project would contribute approximately 1.4 percent of the acceptable ambient level.

In addition, a FGD system will require potable water totaling 55.7 million gallons per year. Lime will have to be imported, transported, and finally be disposed of

in a landfill. The plant electrical output will be reduced from 540 KWH/ton of refuse to 520 KWH/ton of refuse, due to increased power requirements of the plant. Power that is not generated by the resource recovery project will be fulfilled by the Hawaiian Electric Company through the burning of imported fuel oil.

The Department of Health has determined that relative to the sulfur content, refuse derived fuel is comparable to other types of fossil fuels, such as low-sulfur coal and oil. Further, the Department of Health does not feel that flue gas desulfurization represents BACT because of the relatively small preservation of SO_2 increment, the high cost for the additional reduction in SO_2, and the additional impacts in areas of increased water consumption, importation and disposal of lime, and decreased plant efficiency. However, on a long term basis, the Department of Health is requiring an additional 25 percent reduction in SO_2 emissions. SO_2 emissions is limited to the more stringent of 349 lbs/hr (3-hour average) or 143 parts per million (30-day rolling average). Should the in-stack monitoring indicate exceedances of the allowable emission rate, the City and County of Honolulu will be required to install a dry sorbent injection system under a predetermined construction schedule.

The City and County of Honolulu will be required to establish an escrow account to provide a source of funds for additional SO_2 controls or sulfur reduction should the Department of Health decide further reduction is necessary. The source of the funds shall be a solid waste disposal tip fee of $2.00 per ton delivered to the facility.

Additionally, the City and County of Honolulu will be required to initiate a solid waste characterization study to identify the higher sulfur content wastes that could be removed from the MSW. Based upon the study, the City and County of Honolulu will be required to implement a program for reducing sulfur from the waste stream.

To assess the SO_2 impact on the air quality of the area, the City and County of Honolulu will be required to conduct ambient air quality monitoring before and after construction is completed. Also, in-stack continuous emission monitoring will be required.

C. Oxides of Nitrogen (NO_x)

Two promising NO_x control methods were examined by the applicant, (1) flue gas recirculation (FGR); and (2) selective non-catalytic reduction (SNCR).

Flue gas recirculation may reduce NO_x emissions by up to 25 percent by (1) reducing the availability of oxygen in the peak NO_x formation region and (2) reducing the essential peak temperatures necessary for thermal NO_x generation. However, by reducing the availability of oxygen and peak temperature, emissions of VOC's and CO are expected to increase with the decrease in NO_x.

Selective non-catalytic reduction involves the injection of ammonia into the combustion zone. The combustion temperature must be maintained between 1600° to 1800° Fahrenheit. Temperatures above this range retards NO reduction and in temperatures above 2000°F causes increase NO emissions. Temperatures below 1600°F limits NO reduction and result in the emission of unreacted

ammonia. The uncertainties on the technical feasibility and reliability of ammonia injection are sufficient to dismiss this method as BACT.

Department of Health has determined that FGR is the only BACT candidate which appears feasible for the proposed plant. However, this method has not yet been demonstrated on an RDF spreader-stoker and coupled with a probable increase in CO and VOC emissions, this device was ruled out as BACT. In addition, FGR may result in a lower internal temperature that may not effectively destroy dioxins and furans and may, in fact encourage its formation. NO_x emissions is limited to the more stringent of 260 parts per million or 340 lbs/hr.

D. Carbon Monoxide (CO) and Volatile Organic Compounds (VOC)

Carbon monoxide is generated by combustion of RDF. Carbon monoxide is a function of the amount of excess air introduced into the boilers as combustion air. As the amount of excess air is decreased, the amount of CO generated will increase.

VOC is generated by the incomplete combustion of hydrogen/carbon based compounds.

VOC and CO will be controlled by a combustion control system which carefully matches the amount of fuel and air supplied to the boiler, insuring the demand and supply of oxygen are properly balanced. To do this, the incoming MSW is to be preprocessed (shredded and blended) to a more consistent RDF, the combustion air will be preheated, and a high degree of control will be provided to distribute and control the combustion air to all combustion zones within the boiler.

Department of Health believes this to be BACT. The emission limitation for CO is 377 parts per million. The emission limitation for VOC is 21 parts per million.

E. Lead (Pb) and Beryllium (Be)

The applicant proposes to control lead and beryllium emissions through RDF processing and the collection of lead emissions in the ESP. Lead and Be will be removed from the fuel in the RDF processing with additional removal taking place in the ESP. Overall collection efficiency is expected to be in excess of 99 percent. The Department of Health considers RDF processing and the use of ESP along with the emissions limitation of 0.0028 lb/ton-RDF for lead and 0.000013 lb/ton-RDF for beryllium to best represent BACT for the control of lead and beryllium emissions from the proposed facility.

F. Mercury

Mercury emissions were based on sample analysis of refuse from several locations around the U.S. The emission rate was determined from the highest reported concentration value and assumed the entire amount of mercury in the refuse is emitted from the stack.

Mercury and mercury compunds have unusually high vapor pressures. Consequently, mercury does not condense, does not show a high degree of fly ash deposition, and will probably exit the facility in the vapor phase.

Mercury removal can be obtained to a limited extent by a spray dryer and baghouse combination. It is unknown what kinds of mercury removal efficiencies can be obtained. This type of device, which would cool and condense the vapor to a fine particulate would create an excessive pressure drop across the device increasing removal costs.

At this time the Department of Health does not recognize any proven technology for the control of mercury emissions. The Department of Health has set a mercury emissions limit of 0.0022 lb/ton-RDF.

G. Fluoride (F)

Hydrogen fluoride (HF) is emitted from the combustion process as a result of the combination of fluoride with free hydrogen in the boiler. Because HF is an acid, the only control system potentially capable of reducing HF emissions from the facility is a flue gas scrubbing such as the FGD system described under VI.B. Sulfur Dioxides (SO_2). At this time the Department of Health does not consider FGD as BACT for only fluoride removal. Some fluoride removal can be expected during the RDF processing stage. The Department of Health has limited HF emission to the more stringent of 0.036 lb/ton-RDF or 2.6 lb/hr for the proposed facility. Should a dry sorbent injection system be installed in conjunction with the need for additional SO_2 emission reductions, hydrogen fluoride will see a decrease equivalent to the percentage reduction in the SO_2 emission rate.

VII. Air Quality Impact

Federal regulations governing prevention of significant deterioration of air quality (40 CFR 52.21) require that an air quality analysis be performed to determine the impacts on any applicable increments and on the NAAQS. The proposed project will be located in a Class II designated area with the nearest Class I designated area located on the Island of Maui (Haleakala National Park), over 100 kilometers from the project site.

A. Existing Air Quality

To evaluate the impact of the proposed Honolulu Resource Recovery Project upon the NAAQS, measurements of existing sources and estimates of the project were combined. Additionally, monitoring data from the State Department of Health at Campbell Industrial Park (1971-1983), Hawaiian Electric Company's monitoring for SO_2, and EPA's baseline study of Campbell Industrial Park/Kahe formed a basis for both existing and the estimated ambient air quality levels. These levels are needed for criteria pollutants that will be emitted above the significant emission levels (i.e., TSP, SO_2, NO_2, CO, VOC, Pb, Hg, F, and Be).

Table 2 shows the estimated existing ambient air quality levels for the Campbell Industrial Park area. SO_2 levels are based on computer modeling using 1982-84 emissions data submitted by the existing sources located at Campbell Industrial Park. All other data shown are Department of Health monitoring data.

In addition to the above, the applicant has conducted one year at preconstruction monitoring for sulfur dioxide on the hillside west of Makakilo City. Previous modeling indicated maximum SO_2 concentrations occurring in the high terrain north-northeast of the proposed project site. The maximum impact point for the proposed source and for other existing and approved PSD sources occurred at different points. With the concurrence of both the EPA and the Department of Health, the maximum impact point due to existing PSD sources was chosen as the monitoring site. This point occurred at UTM coordinates 594.25E and 2360.5N (elevation 360 feet). The results of the air monitoring revealed that the highest 3-hour and 24-hour SO_2 concentrations occurred under westerly and northerly wind conditions, suggesting that sources other then those at Campbell Industrial Park are contributing to the maximum pollutant levels in the area. Federal and State ambient air quality standards for both 3-hour and 24-hour averaging periods were never exceeded during the monitoring period.

Table 2
Estimates of Existing Ambient Air Quality Levels
Near the Project Site

Pollutant	Averaging Period	Concentration (ug/m^3)
TSP	Annual	50
	24-hour	95.0
SO_2	Annual	39.1
	24-hour	224.3
	3-hour	1024.7
NO_2	Annual	14.0
CO	8-hour	4.8
	1-hour	7.5
Pb	Quarter	0.8
O_3	1-hour	92

Notes:
1. All concentrations in ug/m^3 except CO in mg/m^3
2. SO_2 values based on ISCST and COMPLEX-I modeling
3. TSP values based on Department of Health monitoring at Barbers Point (1984)
4. NO_2 values based on monitoring by Department of Health (1976)
5. CO values based on Department of Health urban Honolulu monitoring (1984)
6. O_3 values based on Department of Health Sand Island monitoring (1984)
7. Pb values based on Department of Health urban Honolulu (Liliha) monitoring (1984)

B. Air Quality Analysis

PSD increment consumption is summarized in Table 3. The table shows the net results of combining the estimated impacts of the proposed facility with existing and permitted-but-not-constructed PSD increment consuming sources. The table

shows that the Class II increments for SO_2 and TSP will not be exceeded by the addition of emissions from the proposed facility.

Table 4 summarizes the maximum impact on the ambient air quality as a result of the proposed facility and the existing sources. The effects of air emissions from the proposed facility was determined through dispersion modeling. The modeled values were added to the existing concentrations shown in Table 2. The values show that the NAAQS will not be exceeded.

Tables 3 and 4 show PSD increment consumption and the impact on the ambient air quality, respectively. The results of the two tables occur at different locations. Therefore, the project's impacts cannot be interchanged between the tables.

Table 5 compares the project's maximum impact with the de minimus levels, below which preconstruction ambient monitoring for the corresponding pollutant may be exempted. The results indicate that only SO_2 required preconstruction monitoring.

1. Models

   Two models were used to determine the pollutant impacts for the proposed project. The models are EPA models Complex-I for elevated terrain and Industrial Source Complex-Short Term (ISCST) for the flat terrain.

   These models were run with five years of preprocessed meteorological data from the nearby Barbers Point Naval Air Station in order to determine maximum concentrations for the averaging times corresponding to the standards for criteria pollutants.

2. Meteorological Data

   Five years (1967-1971) of surface observations from the Barbers Point Naval Air Station, which is within two miles of the project site, was used for the models.

3. Receptor Grids

   In the flat terrain, the ISC receptor grid initally covered a six by seven kilometer area with receptors spaced at 500 meter intervals. Once the highest concentrations were identified a second two by three kilometer grid with receptors spaced at 200 meters was formed around the areas of highest concentration estimates.

   In the high terrain, Complex-I receptor locations were selected on the basis of elevations equivalent to effective plume-height under stable conditions. Those elevations were determined using the PTMAX screening model and were found to range from 500 to 600 feet elevation. Receptors were then placed along the 400-, 520-, 600-, and 720-foot contours at approximately 500 meter intervals between the 591.00 and 596.00 UTM-East grid lines.

Once the highest concentrations were identified, at least ten additional receptors were placed around each point of highest concentration and the model rerun.

Table 3
Modeled Impact on Maximum Allowable
Second Highest Concentrations
PSD Increments (ug/m^3)

Pollutant	Averaging Time	Project Contributions	Total Consumed	PSD Increments Class II
SO_2	Annual	less than 0.01	3.36	20
	24-hour	less than 0.01	25	91
	3-hour	22.96	96.73	512
TSP	Annual	1.17	0.18	19.0
	24-hour	0.4	13.7	37.0

Table 4
Modeled Impact on National Ambient Air Quality Standards (ug/m^3)

Pollutant	Averaging Time	Predicted Project Impact	Maximum Impact & Background	NAAQS
TSP	Annual	1.3	51.3 (2)	60
	24-hour	6.6	101.6 (2)	150
SO_2	Annual	0.2	39.3	80
	24-hour	6.3	230.6	365
	3-hour	30.1	1054.8	1300
NO_2	Annual	0.9	14.9 (3)	100
Pb (1)	Quarterly	0.003	0.804 (2)	1.5

Notes:
1. Quarterly standard; Department of Health monitoring (1984) Project lead is second highest 24-hour concentration.
2. Department of Health monitoring data (1984) for existing sources.
3. Department of Health monitoring data (1976) for existing sources.

Table 5
Honolulu Resource Recovery Venture
Comparison of Modeling Results with
Monitoring Exemption De Minimus Levels

Pollutant	Averaging Period	Highest of 2nd Highest Concentration(1)	De Minimus Concentration(1)
TSP	24-hour	6.6	10
SO_2	24-hour	29.1	13
NO_2	Annual	0.57	14
CO	8-hour	119 (2)	575
Pb	24-hour	0.017	0.1
F (as HF)	24-hour	0.214	0.25
Hg	24-hour	0.13	0.25
Be	24-hour	0.00007	0.0005

Notes: 1. All concentrations in ug/m^3
2. This is a 3-hour maximum CO concentration. Since the 3-hour concentration is less than the 8-hour de minimus value it follows that the maximum 8-hour average concentration will be even lower.

VIII. Additional Impact Analysis

PSD regulations require additional impacts on visibility, soils, vegetation, and growth besides assessing the ambient air quality impact from the proposed project.

A. Visibility

The nearest Class I area is over 100 kilometers from the project site (Haleakala National Park on the Island of Maui), thus a visibility analysis is not required.

B. Soils and Vegetation

Between the Campbell Industrial Park and the start of the high terrain north of the project site are agricultural lands presently used for sugar cane cultivation. This would be the area of primary concern with regard to possible soils and vegetation impacts. In this case, the estimated concentrations of regulated pollutants are all so low as to pose a negligible hazard to the sugar cane or the agricultural soils.

1. TSP: With the highest 24-hour cumulative concentration of TSP estimated at 102 ug/m^3, there is no evidence to show adverse effects on soils or vegetation at that level.

2. SO_2: SO_2 is a known phytotoxicant and is therefore of concern. In this case, it is the existing refineries at Campbell Industrial Park which are already creating relatively high SO_2 concentrations. In the high terrain in particular, the existing 3-hour SO_2 level is estimated at 1025 ug/m^3. The proposed project will contribute a small additional increment and bring the level to approximately 1055 ug/m^3. This is still below the secondary NAAQS which is intended to prevent crop damage. The maximum 24-hour concentration estimated at 231 ug/m^3 is still well below the 400-800 ug/m^3 levels at which plant injury has been observed after continuous exposure.

3. NO_2: NO_2 is also a known phytotoxic gas, and has been observed to cause a decrease in plant weight at concentrations as low as 280-490 ug/m^3 after several days exposure. These levels are substantially higher than the estimated annual concentration of 14.9 ug/m^3 for this project plus baseline. By taking the highest recorded 24-hour NO_2 level at the industrial park and adding it to the highest estimated 24-hour contribution for the proposed source, one gets 49 + 28 = 77 ug/m^3, which is also below the apparent effect level.

4. Pb: The projected lead levels are so low as to represent little if any threat to vegetation or soils. Existing monitoring data for Honolulu show annual lead concentrations of 0.25 ug/m^3 and the proposed project would contribute up to 0.001 ug/m^3 more on an annual average basis. This amounts to a 0.4% increase.

5. F (as HF): Fluorides are toxic to plants at very low concentrations. Continuous exposures in the 0.54 - 0.66 ug/m^3 range have resulted in measurable plant injury. If one accepts the assumption that existing airborne fluoride levels are nil (due to lack of sources), then the estimated second highest 24-hour concentrations (0.214 ug/m^3) from the proposed facility still provides a 2.52 safety factor (0.54/0.214 = 2.52). This is for the highest value in the high terrain. In the low terrain, where the sugar cane is grown, the safety factor would be 0.54/0.031 = 17.4.

6. Hg: There is little data available on the phytotoxicity of mercury. Most research has focused on the accumulation of mercury compounds in biological tissues and the subsequent mammalian toxicological effects. Siegel has collected many airborne mercury samples on Oahu over the 1969-1979 period and found concentrations ranging from 0.04 - 1.36 ug/m^3. On the Island of Hawaii, where sugar cane is also grown, significantly higher mercury levels have been recorded by Siegel in his work around the volcanoes and geothermal development areas. There has been no evidence that the sugar cane grown on Oahu or Hawaii has been adversely affected by mercury at these concentrations. The second highest concentration in high terrain contributed by the proposed facility would be 0.01 ug/m^3. In the low terrain that contribution would be 0.002 ug/m^3.

7. Be: The estimated beryllium concentrations are well below both the "de minimus" level for a monitoring exemption and, in fact, below the "significance" level which was originally proposed by the EPA. The estimated 24-hour concentration of 0.00007 ug/m^3 is low enough to be considered insignificant in terms of its possible effect on vegetation and soils.

8. HCl: HCl is also known to be phytotoxic both in its gaseous state as well as in its more common acid mist state. Chlorophyl destruction has been observed in some plants after fumigation with HCl at 596 ug/m^3, 8 hr/day for 6 days. Other studies of plant injury involved exposure to substantially higher concentrations. The estimated 3-hour and 24-hour HCl concentrations due to operation of the proposed facility were approximately 1/2 to 1/10, respectively, of the effect level cited above.

C. Growth

The proposed facility is designed to accommodate existing solid waste generation with the purpose of reducing the requirement for landfill sites. Limited amounts of land on the island makes the siting of landfills a serious problem. The proposed facility will alleviate that problem. The project is not expected to stimulate the development of new industries, commercial, or residential development.

IX. Conclusions and Proposed Action

Based on the information submitted by the City and County of Honolulu and the evaluation by the Department of Health, it is the determination of the Department of Health that the proposed project will employ best available control technology and will not interfere with the attainment or maintenance of any PSD increment or NAAQS in the Campbell Industrial Park or its surrounding areas. Therefore, the Hawaii State Department of Health intends to issue an approval to construct which will contain the following conditions.

SUMMARY OF REVISIONS TO DRAFT PERMIT CONDITIONS
APPROVAL TO CONSTRUCT (HI 84-01)

The following are brief descriptions of the revisions that were incorporated into the Final Permit Conditions of Approval to Construct (HI 84-01) issued to the City and County of Honolulu for the Honolulu Resource Recovery Facility located at Campbell Industrial Park, Ewa Beach, Oahu:

1. II. Notification of Commencement and Completion of Construction and Commencement of Startup

   This section has been modified to include an additional notification requirement for completion of construction.

2. IX.B. Air Pollution Control Equipment

   Condition 5 has been added requiring the City and County of Honolulu to prepare final engineering plans and specifications for a dry sorbent injection system prior to facility startup. In addition, the Department of Health must be notified of design completion and be provided with applicable drawings of the system and a description of the operating characteristics.

   Condition 6 has been added requiring that each boiler be constructed with appurtenant facilities for a dry sorbent injection system. Condition 6 also specifies when the dry sorbent injection system must be installed.

3. IX.C. Operating Limitations and Alternate Fuel

   Condition 1 has been revised to reflect the position of the continuous monitoring temperature probe which has been relocated from upstream of the superheater to downstream of the superheater. The 1800°F temperature has been clarified to mean the instantaneous combustion temperature.

   Condition 2 has been revised because the project now has one emergency diesel engine generator and one emergency diesel engine pump. The specific grade of fuel oil has been deleted. Fuel oil with a maximum sulfur content of 0.5 percent by weight is now the specified fuel.

   Condition 3 has been revised to clarify that the intended fuel use restriction of 1,830 gallons per hour or 1,738,500 gallons per year is for each boiler rather than for both boilers. The requirement that the ESP be operational during the firing of fuel oil or fuel oil/RDF combination in the boilers has been added.

   Condition 4 has been revised to reflect one emergency diesel engine generator and one emergency diesel engine pump.

4. IX.D. Performance Tests

   Condition 3 has been revised to clarify that the performance test plan shall be submitted to the Department of Health by the applicant at the time notification is given of the performance test.

Condition 5 has been revised to reflect the relocation of the continuous monitoring temperature probe from upstream of the superheater to downstream of the superheater.

5. IX.F. Emission Limits for SO_2

The section has been revised to reflect the addition of a lower SO_2 emission limit for the long term basis. The SO_2 emission limits are 349 lbs/hr for a 3-hour average and 143 parts per million (262 lbs/hr) for a 30-day rolling average.

6. IX.N. Continuous Monitoring Systems and Recordkeeping

Condition 1.c. has been added to require alternative monitoring systems when the continuous emission monitors are inoperative for extended periods.

Condition 3 has been revised to reflect the relocation of the continuous monitoring temperature probe from upstream of the superheater to downstream of the superheater.

Condition 5.c. has been revised to clarify reporting requirements for periods when the continuous emission monitoring system was inoperative.

Condition 5.d. has been revised to clarify reporting requirements for periods when no excess emissions occurred or when the continuous emission monitors operated without malfunctions.

Condition 5.e. has been expanded into Conditions 5.e., 5.f., and 5.g. for clarity. In addition, the Condition 5.e. has been revised to include the SO_2 excess emissions for the 30-day averaging period.

Condition 7 has been revised to reflect one emergency diesel engine generator and one emergency diesel engine pump.

Condition 8 has been revised deleting the specific grade of fuel oil.

7. IX.O. Ambient Monitoring

The section has been revised to clarify the time period of the ambient monitoring program. The monitoring must be maintained for at least two years after startup of the facility. Termination of the program is at the discretion of the Department of Health.

8. IX.P. Solid Waste Characterization Study

New section requiring the City and County of Honolulu to conduct such study immediately upon project approval and to identify the higher sulfur content waste within the MSW that can be effectively removed from the waste stream.

9. IX.Q. Program to Remove Higher Sulfur Content Waste

New section requiring the City and County of Honolulu to plan and implement a program to remove the higher sulfur content waste from the waste stream. Records shall be maintained and reports submitted to the Department of Health.

10. IX.R. Establishment of an Escrow Account

New section requiring the City and County of Honolulu to establish and maintain an escrow account for funds to implement additional SO_2 controls should it be established that SO_2 limitations are being exceeded or additional reductions are deemed necessary.

11. IX.T. Schedule for Implementation of SO_2 Controls

New section requiring the City and County of Honolulu to install a dry sorbent injection system in accordance with the compliance schedule should the SO_2 emission limits be exceeded.

12. IX.U. Unregulated Pollutants

New section requiring the City and County of Honolulu to comply with future guidance relating to the PSD remand on unregulated pollutants.

IN THE DEPARTMENT OF HEALTH

STATE OF HAWAII

CITY AND COUNTY OF HONOLULU, WASTE PROCESSING AND RESOURCE RECOVERY FACILITY, PREVENTION OF SIGNIFICANT DETERIORATION PERMIT APPLICATION.	)	DOCKET NO. 86-EP-PA-1 HEARING OFFICER'S REPORT

HEARING OFFICER'S REPORT

A public hearing was conducted on March 6, 1986 beginning at 6:30 p.m. at the Roosevelt High School Cafeteria, 1120 Nehoa Street, Honolulu, Hawaii. The purpose of the hearing was to consider the City and County of Honolulu's Resource Recovery Project Draft Permit for Regulating the Emission of Air Pollutants. Public comments and testimonies were accepted from the time of the public notice until March 21, 1986. This was an extension of the March 13, 1986 date originally noted in the notice of public hearing.

The Notice of Public Hearing appeared in the Honolulu Advertiser on February 3, 1986.

I. Participating Citizens

Comments and testimonies were received from the following persons:

Name	Representing	Mode of Testimony
Jacqueline N. Miller	University of Hawaii Environmental Center	Written & oral
Susan E. Miller	Sierra Club, Hawai'i Chapter	Written & oral
Vicki H. Tsuhako	U. S. Environmental Protection Agency, Region IX	Written & oral

Stephen M. Francis	American Lung Association	Written & oral
Frank Doyle	City & County of Honolulu	Written & oral
Rick Scudder	Conservation Council for Hawaii	Written & oral
Brenner Munger	Hawaiian Electric	Written & oral
Dr. Alvin Greenberg	City of Honolulu & Combustion Engineering	Written & oral
Russell L. Smith, Jr.	City & County of Honolulu	Written
Joseph Singer	Self	Written
Nelson Ho	Sierra Club	Written
Dorothy Lum	League of Women Voters	Written

FINDINGS OF FACT

1. The City and County of Honolulu proposes to construct a waste processing and resource recovery project at Campbell Industrial Park on the Leeward (southwest) Coast of the Island of Oahu.

2. The application was first submitted to the Hawaii State Department of Health in November, 1983. As the project design was refined, the applicant submitted revisions to the application in September, 1985, and a Supplemental BACT Evaluation in December 1985.

3. The facility has two major functions: (A) The Resource Recovery System will have the ability to receive and store municipal solid waste, separate ferrous metal, produce refuse derived fuel (RDF) and inventory the RDF for programed burning. (B) The Energy Recovery Subsystem includes two furnaces with a total capacity of 71.2 tons RDF per hour or 731 MM BTU/hr. heat input. Heat from combustion gases will be used to heat water and produce steam for the

generation of electricity. The electrical power produced will satisfy plant requirements, with the remainder being sold to the power company.

4. No. 2 fuel oil will be used by the boilers during cold starts and during periods when RDF is of poor quality or unavailable.

5. The facility will use baghouses and filters to control particulate emissions from the resource recovery processes and an electrostatic precipitator for particulate cleanup of the flue gas prior to discharge through an elevated stack.

6. The facility will have three emergency diesel engine generators which will provide backup electrical power to areas and equipment essential for fire fighting.

7. The facility will emit significant amounts as defined for all criteria pollutants (those identified in the Clean Air Act for which National Ambient Air Quality Standards have been defined) and some non-criteria pollutants. The estimated emissions from the project are based upon emission data submitted for the PSD application by the applicant.

Ambient Air Quality

8. The applicant has conducted a one year preconstruction monitoring for sulfur dioxide on the hillside west of Makakilo City. Previous modeling indicated maximum SO_2 concentrations occurring in the high terrain north-northeast of the proposed project site. The maximum impact point for the proposed source and for other existing and approved PSD sources occurred at different points. With the concurrence of both the EPA and the Department of Health, the maximum impact point due to existing PSD sources was chosen as the monitoring site. This point occurred at UTM coordinates 594.25E and 2360.5N

(elevation 360 feet). The results of the air monitoring revealed that the highest 3-hour and 24-hour SO_2 concentrations occurred under westerly and northerly wind conditions, suggesting that sources other than those at Campbell Industrial Park are contributing to the maximum pollutant levels in the area. Federal and State ambient air quality standards for both 3-hour and 24-hour averaging periods were never exceeded during the monitoring period.

Air Quality Impact Analysis

9. The Prevention of Significant Deterioration (PSD) regulations (40 CFR 52.21) defines a major source as any source type belonging to a list of 28 source categories which emit or has the potential to emit 100 tons/year or more of any pollutant regulated under the Clean Air Act, or any other source type which emits or has the potential to emit such pollutants in amounts equal to or greater than 250 tons/year.

10. Estimated emissions from the project are as follows (based on process rate of 2,800 TPD-MSW or 1,710 TPD-RDF)

Pollutant	Uncontrolled Emissions		Controlled Emissions	
	lb/hr	ton/yr	lb/hr	ton/yr
Particulates	9,570	40,057	58.4	254.3
SO_2	349	1,529	349	1,529
NO_x	340	1,489	340	1,489
CO	300	1,314	300	1,314
VOC	18	79	18	79
Lead	30	131	0.20	0.9
Mercury	0.16	0.7	0.16	0.7
Fluoride	2.6	11.2	2.6	11.2
Beryllium	> 0.0009	> 0.0039	0.0009	0.0039

11. Under PSD regulations, significant net emissions increase is defined as a net increase in emissions greater than the threshold prescribed for any pollutant subject to regulation. The significant thresholds prescribed by the PSD regulations for the subject pollutants are:

Pollutant	Significant Emission Rate tons/yr
Carbon Monoxide	100
Nitrogen Oxides	40
Sulfide Dioxide	40
Total Suspended Particulate	25
Ozone	40 of VOC
Lead	0.6
Mercury	0.1
Fluoride	3
Beryllium	0.0004

12. A PSD review would apply to all pollutants from a major source showing significant net increases in emissions for which the applicable National Ambient Air Quality Standards (NAAQS) have not been exceeded. In Campbell Industrial Park, Ewa Beach, Oahu, the NAAQS have not been exceeded for any pollutant.

13. Under the PSD provisions, the facility is a major source of total suspended particulates (TSP), sulfur dioxide (SO_2), nitrogen oxides (NO_x), and carbon monoxide (CO), and a significant source of lead (Pb), mercury (Hg), fluoride (F) and beryllium (Be) and is subject to PSD review for TSP, SO_2, NO_x, CO, Pb, Hg, F and Be.

Best Available Control Technology (BACT)

14. BACT is defined in the Clean Air Act Amendments of 1977 as ". . . an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this Act . . . on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, . . ."

15. Total Suspended Particulates (TSP). The Department of Health has determined that the use of baghouses for the front-end processing units, replaceable filters on vents on the receiving/storage buildings, and an electrostatic precipitator on the boilers represent BACT for particulate emissions.

16. Sulfur Dioxides (SO_2). A flue gas desulfurization (FGD) system is a control technology capable of reducing SO_2 emissions. The FGD system, consists of a dry lime spray scrubber followed with a baghouse. The applicant has stated that the addition of a FGD system would result in a construction and financing cost increase of $12.5 million. Also, the project annual operating cost will increase $2.8 million per year, and lost revenue, from a decrease in net electrical generation, will amount to $1.7 million per year. Over the 20-year life, the resource recovery facility without the FGD system will cost approximately $362.8 million, but with FGD, the total cost will escalate to $567.4 million, an increase of $204.6 million representing a 56 percent cost increase for solid waste disposal. The increased cost of $204.6 million equates to approximately $10,000 per ton of SO_2 scrubbed over the 20-year project life.

A FGD unit has an estimated removal efficiency of 70 percent. The effect such a unit will have on both the 24-hour and the annual SO_2 increment consumption will be virtually non-existent. The 3-hour SO_2 increment consumed by the project will be reduced from 23.0 to 6.9 ug/m^3. The cost over the 20-year

project life to reduce the 3-hour increment by 16.1 ug/m^3 is $12.7 million per 1 ug/$m^3$ of reduction.

In addition, a FGD system will require potable water totaling 55.7 million gallons per year. Lime will have to be imported, transported, and finally be disposed of in a landfill. The plant electrical output will be reduced from 547.6 KWH/ton of refuse to 520 KWH/ton of refuse, due to increased power requirements of the plant. Power that is not generated by the resource recovery project will be fulfilled by the Hawaiian Electric Company through the burning of imported fuel oil.

17. Oxides of Nitrogen (NO_x). Flue gas recirculation (FGR) may reduce NO_x emissions by up to 25 percent by (1) reducing the availability of oxygen in the peak NO_x formation region and (2) reducing the essential peak temperatures necessary for thermal NO_x generation. However, by reducing the availability of oxygen and peak temperature, emissions of VOC's and CO are expected to increase with the decrease in NO_x.

In addition, FGR may result in a lower internal temperature that may not effectively destroy dioxins and furans and may, in fact encourage its formation. Permit conditions limit NO_x emissions to the more stringent of 260 parts per million or 340 lbs/hr.

18. Carbon Monoxide (CO) and Volatile Organic Compounds (VOC). VOC and CO will be controlled by a combustion control system which carefully matches the amount of fuel and air supplied to the boiler, insuring the demand and supply of oxygen are properly balanced. To do this, the incoming municipal solid waste is to be preprocessed (shredded and blended) to a more consistent refuse

derived fuel (RDF), the combustion air will be preheated, and a high degree of control will be provided to distribute and control the combustion air to all combustion zones within the boiler.

Department of Health believes this to be Best Available Control Technology. Under permit conditions, the emission limitation for CO is 377 parts per million. The emission limitation for VOC is 21 parts per million.

19. Lead (Pb) and Beryllium (Be). The applicant proposes to control lead and beryllium emissions through RDF processing and the collection of lead emissions in the electrostatic precipitators (ESP). Lead and beryllium will be removed from the fuel in the RDF processing with additional removal taking place in the ESP. Overall collection efficiency is expected to be in excess of 99 percent. The Department of Health considers RDF processing and the use of ESP along with the emissions limitation of 0.0028 lb/ton-RDF for lead and 0.000013 lb/ton-RDF for beryllium to best represent BACT for the control of lead and beryllium emissions from the proposed facility.

20. Mercury (Hg). Mercury and mercury compounds have usually high vapor pressures. Consequently, mercury does not condense, does not show a high degree of fly ash deposition, and will probably exit the facility in the vapor phase.

Mercury removal can be obtained to a limited extent by a spray dryer and baghouse combination. It is unknown what kinds of mercury removal efficiencies can be obtained. This type of device, which would cool and condense the vapor to a fine particulate, would create an excessive pressure drop across the device increasing removal costs.

At this time, the Department of Health does not recognize any proven technology for the control of mercury emissions. Permit conditions set a mercury emissions limit of 0.0022 lb/ton-RDF.

21. Fluoride (F). Hydrogen fluoride (HF) is emitted from the combustion process as a result of the combination of fluoride with free hydrogen in the boiler. Because HF is an acid, the only control system potentially capable of reducing HF emissions from the facility is a flue gas scrubbing such as the FGD system described above. At this time, the Department of Health does not consider FGD as BACT for only fluoride removal. Some fluoride removal can be expected during the RDF processing stage. Permit conditions limit HF emission to the more stringent of 0.036 lb/ton-RDF or 2.6 lb/hr for the proposed facility.

CONCLUSIONS AND RECOMMENDATIONS

At the hearing and during the comment period, testimony was submitted countering the applicant's selection of control technology. Testimony submitted stated that BACT for a project of this type is dry scrubbers.

Evidence presented indicates that the environmental benefits to be gained by the utilization of a dry scrubber are minimal. The monetary costs and potential environmental costs that will be realized with the utilization of a dry scrubber system must be taken into consideration.

If BACT is to be determined on a case-by-case basis and is to take into account "energy, environmental and economic impacts and other costs," then the impacts of incorporating dry scrubbers need to be considered.

The impacts of incorporating dry scrubbers are assessed as follows:

ENVIRONMENTAL

- Near insigificant air quality benefits.
- Relatively small additional preservation of SO_2 increment.

- Water usage of an additional 55.7 million gallons per year in an area where there is a limited supply of water.
- Additional landfill space required to dispose of lime.
- HECO corresponding emissions increase from the burning of 335,000 gallons per year of oil to offset net reduction of new electrical output.

ENERGY

- Reduction in net electrical output of 27.6 million KWH/year.
- HECO will burn 335,000 gallons per year of oil to offset this reduction.
- Additional fuel usage to mine and import lime to Hawaii and haul to landfill.

ECONOMIC

- $12.5 million financing and construction cost.
- $2.8 million annual operating cost.
- $1.7 million annual decrease in energy revenues.
- Increase in first year tip fee from $26.61 to $37.43 per ton.
- With the addition of interest and escalation a $204.6 million increase over the 20-year project life.

Based on information submitted by the City and County of Honolulu and analyses conducted by the Department of Health and utilizing the definition of BACT as per Clean Air Act Amendments of 1977 including a balancing of the energy, environmental and economic impacts, the emission control techniques proposed by the applicant are BACT. The project as proposed will not interfere with the attainment or maintenance of any PSD increment or NAAQS in Campbell Industrial Park or its surrounding area.

It is RECOMMENDED that a Prevention of Significant Deterioration permit be issued to the applicant including the "Permit Conditions" presented by the Department in their report of February 3, 1986 and that the following be included as permit conditions:

1. The City and County of Honolulu initiate a solid waste characterization study to identify the higher sulfur content waste streams that can be effectively removed at the source. Based on the survey results and an analysis of the benefits, a program will be initiated to limit the identified waste streams from being delivered to the resource recovery facility.

2. The City and County of Honolulu establish and maintain an escrow account to provide a source of funds for the implementation of a sulfur reduction program, should it be established that the SO_2 emission limits as defined in the permit are not being met or that additional sulfur reduction is needed. The fund shall be established at the time the facility begins operations. The source of funds for said escrow account shall be by a solid waste disposal tip fee surcharge of $2.00 per ton delivered to the facility. The surcharge and escrow account will stay in effect until such time as it is determined that further SO_2 reduction is not required. Any excess funds shall at that time be returned to the City's general fund.

It is RECOGNIZED that an agreement for "Delegation of Authority" between the State Department of Health and the Environmental Protection Agency is in effect and that the agreement requires concurrence between both parties be obtained before the final permit is issued.

It is RECOMMENDED that the Department and EPA concur on the final wording of the proposed permit in a timely manner.

DATED: Honolulu, Hawaii May 19, 1986.

Colleen A. Spiering

COLLEEN A. SPIERING
Hearing Officer

RESPONSIVENESS SUMMARY

DRAFT PERMIT FOR THE HONOLULU

RESOURCE RECOVERY PROJECT REGULATING

THE EMISSION OF AIR POLLUTANTS

Docket #86-EP-PA-1

Department of Health

April 30, 1986

CONTENTS

I. Hearing Conducted and Method of Public Notification

A hearing was conducted on March 6, 1986 to consider the City and County of Honolulu's Resource Recovery Project Draft Permit for Regulating the Emission of Air Pollutants. A total of 12 individuals submitted testimony during the comment period.

The Notice of Public Hearing appeared in the Honolulu Advertiser on February 3, 1986.

II. Summary of Testimonies Received

A. Jacquelin Miller, representing the University of Hawaii Environmental Center questioned the Department's approval of allowing alternate test methods for conducting performance tests for various chemical emissions. She also stated that "There is no question that this project falls within the limits established by federal regulations as requiring BACT and it is professionally recognized by EPA that the BACT is dry scrubbers."

B. Susan E. Miller, representing the Sierra Club, Hawaii Chapter, objected that the draft permit does not require BACT for SO_2 emissions. She also raised several questions regarding the monitoring of polychlorinated dioxins and furans through stack emissions tests. She stated that the frequency of the tests and the method of reporting the tests should be part of the permit. She also stated that it should be specified who should monitor that the tests are being done correctly.

C. Vicki Tsuhako representing EPA, Region IX, read a letter and submitted comments from David P. Howekamp, Director, Air Management Division, EPA, Region IX. The letter and comments stated that EPA had determined BACT for SO_2 for municipal incinerators to be a dry

scrubber, realizing approximately 80% control. This would be the primary BACT direction for this project, unless unique circumstances justify another level of control at the source. Three alternatives were suggested for consideration.

D. Stephen Francis, representing American Lung Association, stated that "Consistent with our national policy, the American Lung Association of Hawaii strongly believes that resource recovery plants should include state-of-the-art pollution controls, including acid gas controls and baghouse filters or equally effective control technologies."

E. Frank Doyle, representing the Department of Public Works, City and County of Honolulu, stated that "The proposed facility will fully protect air quality and will operate in compliance with all PSD air quality standards while providing an environmentally acceptable and cost effective method of disposal of solid waste on Oahu." He also stated the project is important because of the scarcity of useable land for solid waste disposal, and that it is Hawaii's first major alternate energy generator which will help reduce dependence on imported oil. He went on to say, "The H-POWER facility will preprocess incoming solid waste to remove non-combustible materials and produce a Refuse Derived Fuel (RDF). The cleaner fuel is then fired in on-site boilers to raise steam and produce electricity. The emissions resulting from the firing are the subject of tonight's hearing.

"The inclusion of electrostatic precipitators and combustion control systems will significantly reduce TSP and CO and NO_x. SO_2 emissions will be mitigated by the relatively low sulfur content of the fuel, the reduction of sulfur in preprocessing, and the amount of sulfur in combustion remaining in the bottom ash. The RDF when fired produces a sulfur emission rate which is equal to or lower than other low-sulfur fuels.

"There is virtually no impact on the health and welfare based National Ambient Air Quality Standards. The impact of these emissions on the PSD increment analysis is also minimal. The proposed project will contribute only about 2.3%, 1.7% and 0.25% additional consumption of the respective 3-hour, 24-hour, and annual ambient levels of the NAAQS for SO_2.

"The current estimates of PSD increment consumption indicate that less than 15% of the 3-hour, less than 28% of the 24-hour, and less than 17% of the annual Class II SO_2 increments have been consumed. The proposed project will consume less than 4.5% of the 3-hour standard, less than 0.01% of the 24-hour standard, and less than 0.05% of the annual standard.

"Based on the above and other conditions unique to H-POWER, the City agrees with DOH that fuel preprocessing and the use of low-sulfur fuel meet the criteria of providing Best Available Control Technology (BACT) for the project.

"We believe our determination of BACT for SO_2 is supported by the following EPA guidelines:

> Under the Revised Act, BACT is to be determined on a case-by-case basis rather than automatically applying an applicable Federal New Source Performance Standard (NSPS), as was the case under the previous regulation.
>
> In the context of case-by-case BACT, consistency does not necessarily mean that a new facility in one area will have an identical emission limit as the same type of facility in another area.

The BACT decision is to take into account energy, environmental, and economic impacts and other costs associated with application of alternate control systems."

He cited the following as a synopsis of the impacts of incorporating dry scrubbers: near insignificant air quality benefits, relatively small additional preservation of SO_2 increment, water usage of an additional 55.7 million gallons per year in an area where there is a limited supply of water, additional landfill space required to dispose of lime, reduction in net electrical output of 27.6 million KWH/year, HECO will burn 335,000 gallons per year of oil to offset this reduction, additional fuel usage to mine and import lime to Hawaii and haul to landfill, $10 million construction cost, $3 million first year operating cost, $2 million first year loss in energy revenues, increase in first year tip fee from $26.61 to $37.43 per ton, with the addition of interest and escalation a $200 million increase in 20 year service fee.

He also stated that the City and County of Honolulu agrees to initiate a study to identify high sulfur content waste streams that can be effectively removed at the source and that they would establish an escrow account to provide a source of funds for a sulfur reduction program, if it is deemed that the facility causes a significant adverse impact on the SO_2 ambient air concentration.

F. Rick Scudder representing Conservation Council for Hawaii stated that the Council agrees with the concept of burning municipal solid waste to generate electricity, but they "are very concerned with the precedent being set by allowing no control on acid gases to be considered as BACT." He also disagreed with the City's claim that FGD's use of 55.7 million gallons per year of water is a valid argument for not controlling SO_2. He stated that acid rain may become an important issue if we allow increased local uncontrolled emissions of acid gases.

G. Brenner Munger representing Hawaiian Electric Company spoke in favor of issuance of the draft permit. He stated that the project supports Hawaiian Electric's policies for developing alternate energy sources and reducing dependence on imported oil; that the potential air quality impacts for this project have been adequately addressed and are below the levels that could have adverse effects; and that the draft permit imposes stringent emission limitations and monitoring requirements to insure that emissions stay below allowable levels.

H. Dr. Alvin Greenberg, consultant to the project retained by Combustion Engineering, stated that he agrees with the conclusion that impacts on air quality and public health proposed by the facility are negligible.

I. Russell L. Smith, Jr., representing the City and County of Honolulu, stated that he agrees with the Department's BACT determination and provided technical comments on other aspects of the draft permit.

J. Joseph Singer offered suggestions on the draft permit as follows:

"1. The Best Available Control Technology (BACT) determination should include: (a) Flue Gas Scrubbers to reduce sulfur dioxide emissions; (b) Continuous monitoring of the emissions: sulfur dioxide, oxides of nitrogen, particulates carbon monoxide, hydrocarbons, dioxin and furan derivatives; lead, mercury, beryllium, chlorides, fluorides, ozone, and asbestos at the exit stack of the incinerator installation.

2. References in the draft Permit should be to the Ambient Air Quality Standards of the State of Hawaii, not to NAAQS, i.e., HAAQS should not be exceeded."

K. Nelson Ho, representing the Sierra Club, Hawaii Chapter, stated that he is extremely upset with the Department's determination that BACT for SO_2 is "no control." He also criticized the Department's previous actions relating to geothermal development and the test burning of coal. He urged the Department to reconsider its findings of no BACT and urged EPA not to concur on BACT determination and to consider withdrawing the Prevention of Significant Deterioration Program if the DOH is not following proper procedures.

L. Dorothy Lum, representing the League of Women Voters stated their concern that no new air pollution source be allowed to emit sulfur dioxide without controls, but that seems that high efficiency scrubbing may not be necessary for H-Power. She also stated that if the project is allowed a control for SO_2 which is less than provided by scrubbers that this not be seen as a precedent for BACT for other new sources in Hawaii.

III. Summary of Comments and Responses

The following includes comments and corresponding departmental responses to testimonies received.

To those that testified that this project falls within the limits established by federal regulations that require Best Available Control Technology (BACT) and it is professionally recognized by EPA the BACT is dry scubbers, the Department offers the following:

As defined in 40 CFR 52.21 prevention of significant deterioration of air quality, Best Available Control Technology (BACT):

"...means an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to

regulation under Act (ed: Clean Air Act) which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs..."

EPA has recognized the dry scrubber technology and its application for some projects located within the United States. However, BACT is determined on a case-by-case basis considering energy, environmental, and economic impacts and other costs. Therefore, what is considered BACT for one project may not necessarily be BACT for another project. In the past two years, resource recovery projects in Michigan, Georgia and Florida have been approved without dry scrubbers required as BACT.

In response to the testifier that commented on frequency of testing methods of reporting testing and monitoring, the Department notes that the permit conditions, under "Part D. Performance Tests," state:

"Within 60 days after achieving maximum production rate of the proposed equipment, but not later than 180 days after initial startup of the equipment... and at other times specified by the Department of Health, the City and County of Honolulu shall conduct performance test for...total PCDD, PCDF and the specific/related isomer 2,3,7,8-tetrachloro-dibenzodioxin, and furnish to the Department of Health a written report of such tests. The tests shall be conducted on an annual basis and at the maximum operating capacity of the facility being tested."

The Department shall be responsible for the monitoring of the performance to insure that it is done properly. Part D.3 states "the Department of Health shall be notified at least 30 days prior to such tests to allow time for the development of an approvable performance test plan and to arrange for an observer to be present at the test." Alternate test methods are considered by the Department of Health with such approval done in consultation with the EPA.

To the testifier that stated BACT should include continuous monitoring of several specified emissions and that references in the draft permit should be to Ambient Air Quality Standards of the State of Hawaii and not to national standards, the Department offers the following response.

The permit requires the installation of continuous emission monitors for SO_2, NO_X, and opacity. Continuous emission monitoring for the other pollutants may not be practical due to questions on the availability and reliability of such monitors. The permit requires stack tests for particulates, SO_2, NO_X, CO, VOC, lead, mercury, fluoride, beryllium, and total PCDD, PCDF and isomer 2,3,7,8-tetrachloro-dibenzodioxins. Chlorides is not a pollutant subject to regulation under the PSD regulations. The amounts of asbestos expected to be released is dependent upon the waste stream (i.e., amount of asbestos in the municipal waste). Asbestos is a hazardous product and federal regulations require disposal at an approved site. The amounts of asbestos expected to be emitted is below the federally established "significant" levels.

Summary of Comments and Responses on the Draft Permit for the Honolulu Resource Recovery Project Regulating The Emission of Air Pollutants

Docket #86-EP-PA-1

Department of Health

October 28, 1986

CONTENTS

I. Informational Meeting Conducted

A hearing was conducted on March 6, 1986 to consider the City and County of Honolulu's Resource Recovery Project Draft Permit for Regulating the Emission of Air Pollutants.

Subsequent to that hearing certain changes were made to the draft permit. (See attached summary.) An informational meeting regarding the revised draft permit was held on September 2, 1986.

The meeting was announced to all those who had previously submitted testimony by telephone. Additionally, each testifier was mailed documents detailing the permit conditions and the ambient air quality impact.

A press release announcing the meeting was issued and as a result a front-page story appeared in the Honolulu Star-Bulletin on August 30, 1986.

II. Summary of Testimonies Received

A. Richard J. Scudder, representing the Conservation Council for Hawaii, stated that the Council supports the concept of burning municipal solid waste to generate electricity as long as environmental impacts are mitigated. He noted that the BACT requirements for all other recent permits in EPA Regions IX and I required dry-scrubbers and bag house systems and therefore these systems should be required for Hawaii. He also expressed concern with the precedent being set by allowing almost no control on acid gases to be considered BACT.

Additionally he commented on the Permit Conditions and Ambient Air Quality Impact Report relating to the use of No. 2 fuel oil, the 90 day grace period, the use of a 30 day rolling average, lime disposal and the sale of produced electricity.

B. Arthur L. Mori, representing Life of the Land, commented that "no control" cannot be equated with "best available control technology" and that dry scrubbers are being installed on recently permitted resource recovery projects in EPA Region IX. He also stated that the emissions from H-Power and other industries at Campbell Industrial Park will at times be impacting areas the City wants to urbanize and populate.

He also noted that the VOC of 79 ton/yr in Table I of the Ambient Air Impact Report is greater than the "significant emission rate" of 40 ton/yr shown in Section V of that report.

C. Helene Takamoto, representing the American Lung Association of Hawaii, commented that the proposed permit still fails to require BACT for sulfur dioxide. She noted that the lax emission rate of 143 ppm is further aggravated by the proposed 30-day averaging period. All other

pollutants listed in the draft permit are averaged over 3-hrs. She also expressed concern that a lax BACT would set a bad precedent for Hawaii.

Additionally she noted that Table I of the Ambient Air Impact Report shows no controls for eight pollutants and that there is no indication that alternatives were evaluated with regard to removing unregulated pollutants as required by the recent EPA remand of a PSD permit in California.

In additional comments submitted on September 16, 1986, she included a copy of the EPA Region IX response to the PSD Appeal No. 85-2 to the San Marcos resource recovery facility. She stated that the document provides a succinct discussion of the effectiveness of a dry scrubber-baghouse system in controlling unregulated air toxics. She urged that a proper determination of BACT for SO_2 be made, thus setting the appropriate precedent for future BACT determinations in the State.

D. Richard L. O'Connel, representing Hawaiian Electric Company, submitted written comments dated September 3, 1986 stating that if the facility is allowed to burn only No. 2 fuel oil in its boilers, it will prevent the use of other less expensive fuel oils with the same low sulfur content. He suggested deleting the phrase "No. 2" from paragraphs IX (C)(2) & (3). Additionally, in comments received on September 16, 1986, he noted that paragraph IX (C)(3) limits the H-POWER facility to burning no more than 1,752,750 gallons per year of fuel oil in each of two boilers, which amounts to 11% of the hourly fuel use limit contained in the same paragraph of the permit. He cautioned that this could prevent the facility from generating electricity at all times when refuse is not available and would limit income from the sale of electricity and reduce the economic benefits of the project to Oahu taxpayers.

E. Arlene Kim Ellis, representing the League of Women Voters stated that case-by-case decision making is appropriate and that the H-Power plant should be built with conditions. Building should proceed with careful monitoring and sulfur dioxide control should be added if air quality suffers. She also noted that the costs of including environmental controls should be distributed throughout the community and supported by bonds paid for by general funds and debt service expenses.

F. Susan E. Miller, representing the Sierra Club, Hawaii Chapter, stated that the club had taken the following position:

"(1) to approve of the proposed maximum emission level of 143 ppm sulfur dioxide for the start-up of H-POWER; and

(2) that the City & County of Honolulu be required to accumulate the necessary funds within 3 years in escrow to cover the total expense for the installation of a complete system to inject dry sorbent, irrespective of whether the 143 ppm sulfur dioxide level can be maintained by presorting the fuel, that the injection shall commence 3 years after the initial start-up, and that the maximum permissible level for sulfur dioxide emission from that time on shall be 86 ppm sulfur dioxide or lower.

(3) If the above conditions are not included in the H-POWER permit, the group will automatically file a petition for review with the EPA Administrator."

She also noted that not only the existing affected populations should be considered, but also the long-time population growth and its effect on emissions.

G. Joseph F. Mullen, representing J. F. Mullen and Associates, stated that there seems to be a general misunderstanding of the meaning of BACT. He cited an EPA publication "Guidelines For Determining BACT" which states BACT is to be determined on a case-by case basis considering available technology and economic, energy and environmental impacts.

H. Muriel B. Seto, representing Hawaii's Thousand Friends, urged the control of this point source in a manner that will minimize the degradation of air quality in the long term, especially when considering the planned development of the Ewa Plain. She also felt that the purpose of the permit is to require active forms of emission control, which will only be achieved if the project is required to adopt the available technology which will produce the highest level of emission control.

I. Hiroji Abe, representing himself, emphasized that the City's primary concern should be the disposal of solid waste with emphasis on protecting the health of its citizens while so doing. He also stated that the generation and sale of electric power should be secondary and the additional power necessary to operate a FGD system should not be considered an expense or loss. He also commented that there is a great deal of water in the area and that the availability of water should not be a concern.

J. Russell L. Smith, representing the City and County of Honolulu, submitted comments on September 2, 1986 stating that the project will improve the overall environmental quality of Honolulu and that the citizens of Honolulu should not be required to spend millions of dollars because of a technical interpretation of a regulation and the impacts of SO_2 emissions on both NAAQS and the PSD increments are minimal. He also restated the meaning of BACT and emphasized that BACT is not a specified hardware, not a 30 ppm emission rate, not Lowest Achievable Emission Rate (LAER) and is not what some plants are doing

on the mainland. He also stated that the City strongly believes each project should be assessed on its individual benefits and environmental impacts, therefore disagreeing with those that believe H-Power will set a precedent for future projects.

Comments were also submitted by the City on September 16, 1986, requesting that the permit be revised to incorporate the additional 25% reduction of SO_2 emssion in areas where appropriate. Additionally a document was submitted that responded to major issues raised at the September 2, 1986 meeting.

K. Joseph Singer, representing himself, submitted comments dated September 2, 1986 and September 15, 1986 stating that the proposal technology for controlling pollutants falls far below standards set by best advanced technology in other states. He illustrated that the City's estimates of H-Power emissions are higher than the critical pollutant emission established by the government for PSD review. He also stated that Hawaii's air and agriculture lands would in the long term be affected by uncontrolled pollutant emissions. He also commented on the specific new permit amendments stating that the estimate of 143 ppm sulfur dioxide appears to have been set artificially high; the possibility of a "no control" BACT will serve to set a precedent both in Hawaii and throughout the nation; to comply with proposed new source performance standards, H-Power might have to use a flue gas desulfurization (FGD) system, thus the City should plan now to comply with those rules; a (FGD) system should be installed to combat high nitrogen oxide levels. He also stated the cost to reduce the SO_2 emissions seems to be incorrectly calculated in the Ambient Air Quality Impact Report and cost estimates do not add up to the $204.6 million mentioned.

Additionally Mr. Singer questioned the small consumption of the sulfur dioxide increment stating that the increment reported in Table 3 of the

Ambient Air Quality Impact Report contradicts numbers indicated in Tables 4 and 5. He therefore believes that H-Power's increment consumption is significantly greater than contended by the City and DOH. He also submitted documentation regarding a Detroit facility that is in the midst of a permit revocation process with EPA because of its BACT determination.

L. Jacquelin N. Miller, representing the University of Hawaii Environmental Center, stated that she assumes that most, if not all of the 21 waste to energy plants in EPA Region IX with scrubbers and baghouses were economically justified. Thus, how does the H-POWER plant differ in design to make it economically unjustifiable with emission controls? She also questioned the City's projection that a flue gas desulfurization system and baghouse would cost $12.5 million whereas a similar project in Long Beach, California $6.4 million. Additionally she cited figures questioning the City's projections of annual operating costs for the FGD system. She also expressed concern regarding precedent setting; the SO_2 limit and a 30-day rolling average instead of a 3-hour average; the absence of HCl, furans and dioxins on Table 1; the monitoring plans for dioxins and furans. She also noted that proposed regulations for Resource [SIC] Derived Fuel (RDF) appearing the Federal Register of June 19, 1986 may require FGD systems and 90 percent reduction in SO_2.

III. Summary of Comments and Responses

In response to those that commented that recent EPA permits have required dry-scrubbers and bag house systems for burning municipal solid waste and therefore these systems should be required for Hawaii, the Department offers the following:

As defined in 40 CFR 52.21 prevention of significant deterioration of air quality, Best Available Control Technology (BACT):

> "...means an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under Act (ed: Clean Air Act) which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition (sic) of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results."

EPA has recognized the dry scrubber technology and its application for some projects located within the United States. However, BACT is determined on a case-by-case basis considering energy, environmental, and economic impacts and other costs. Therefore, what is considered BACT for one project may not necessarily be BACT for another project.

To those that commented that the BACT determination for the H-Power project would create an unfavorable or costly precedent, the Department maintains that because BACT determinations are made on a case-by-case basis, each project must be assessed on its individual merits and environmental impacts. It is therefore unreasonable to assume that the control technology required for H-Power would therefore automatically be designated the appropriate technology for other projects in Hawaii or elsewhere.

To those that feel that the SO_2 emission limitations of 143 ppm is too lenient, the Department states the following:

> The sulfur content in the municipal solid waste (MSW) has been estimated as 0.17 percent by weight. If the MSW is burned as such and all of the available sulfur is emitted as SO_2, the concentration would be approximately 331 ppm. With the processing of the MSW into RDF and accounting for the sulfur remaining in the ash, the total SO_2 emissions has been estimated at 191 ppm. Additionally, the applicant has agreed to an identification and removal program of high sulfur items to assure an emission level of 143 ppm or less on a 30-day rolling average.
>
> Should the applicant fail to maintain the SO_2 emissions at or below the 143 ppm on a 30-day rolling average, a dry sorbent injection system shall be installed. 143 ppm represents a 56 percent reduction in SO_2 emissions.

To those that feel that the BACT determination for the H-Power project constitutes no pollution control for SO_2 and NO_x and other emissions, the Department notes that specifics in the draft permit address abatement procedures.

With the understanding that the municipal solid waste is processed into refuse derived fuel (RDF), the revised draft permit requires the H-POWER project to maintain compliance with the SO_2 limitation (Special Condition IX.F). Further refinement of the RDF system will be required by a program to remove high sulphur content waste (Special Condition IX.Q). Moreover, if the facility fails to maintain compliance with the SO_2 emissions limitation, the permit requires the installation of an innovative dry sorbent injection system to ensure compliance (Special Condition IX.T). Similarly, to control emissions of dioxins and furans, the revised draft permit prescribes combustion temperatures at or above 1800 degrees F thereby minimizing the formation of these pollutants.

To the commentor that stated that there is a potential conflict between the 3-hour and the 30-day rolling average SO_2 emission limits, the two emission averaging periods represent a short-term emission limitation (3-hour average) and a long-term emission limitation (30-day rolling average). There is no conflict between the emission limitations. Special condition IX.N.5.e has been corrected in the final permit to reflect the dual SO_2 emission limitations specified in special condition IX.F.

To the individual that stated that Table I on page 7 of the draft Ambient Air Quality Impact Report is misleading, Table 1 shows the controlled and uncontrolled emissions from the project. The control device that will be installed is the electrostatic precipitator. The table reflects a reduction in particulates and lead emissions. The table does not reflect emission reductions that can be expected through the processing of the MSW into RDF and the program to identify and remove high sulfur items.

To those that expressed concerns regarding the emissions of dioxins and furans, the Department is requiring, that the combustion temperature be maintained at or above 1800°F. The City is required to conduct performance tests to determine the combustion temperature and to monitor it thereafter.

Studies completed to date indicate that at temperatures above 1600°F and with good turbulence, the formation of dioxins and furans are significantly reduced and destruction extensive. Recently EPA has been working with states, boiler manufacturers, regulators, designers and operators on a draft Design and Operating Guide to minimize dioxins from municipal waste facilities. In accordance with the Guide, the combustion chamber size should be large enough so that combustion gases stay in the hot zone at temperatures of 1500°-1800°F for 1 to 2 seconds. The H-POWER combustion temperature shall average 2150°F with a residual time of approximately 2.5 seconds. Thus H-POWER would fully comply with this draft EPA guide.

To the commentors that expressed concern that the project does not meet the New Source Performance Standard (NSPS), the Department notes that the facility will be required to comply with all applicable NSPS provisions.

To the individual commenting that the cost to reduce the 3-hour increment was incorrectly calculated by dividing the reduction for one (1) three hour period over the total additional cost for a FGD system operated over twenty years, the following explanation is offered:

> The Department believes the cost of reducing the 3-hour increment by 16.1 ug/m^3 should include the cost of the control device and its operation over the expected life. The 3-hour increment was chosen because it represents the worse case of the listed increments (3-hour, 24-hour, and annual). The 16.1 ug/m^3 reduction represents the installation and operation of a dry scrubber system. The total cost for such a system has been determined as $204.6 million more than the cost without the system.

To all those that questioned certain cost estimates presented by the City, the Department understands that the cost data was compiled utilizing expertise from the City, HRRV and their consultants. Unless proven otherwise, the Department will accept the data submitted as an accurate calculation of projected costs.

To the commentor that questioned the buring of No. 2 fuel oil, the Department's major concern is with the amount of sulfur in the fuel. Although the grade of fuel oil (No. 2) has been deleted from the special condition, the maximum sulfur content of 0.5 percent by weight is still specified. The use of a higher number fuel oil would increase particulate emissions but the amounts emitted would be far below that of burning RDF. To further minimize the amount of particulates being emitted, the ESP is required to be operational at all times the boiler is being fired.

To the commentor that recommended the deletion of the fuel usage limitation of 1,752,750 gallons per year for each of the boilers, the applicant has stated that fuel oil is an alternate fuel for use during cold starts and during periods when RDF is of poor quality or unavailable. Fuel oil is therefore only a backup fuel and the limitation reflects this.

To the individual that expressed concern that the 2200 F temperature would increase NO_x which could be countered by a flue gas scrubber, the Department agrees that higher boiler temperatures may cause higher NO_x emissions. However, high temperatures are beneficial in destroying toxic organic pollutants that can be of greater environmental concern than NO_x. The Department is not aware of any evidence that indicates scrubbers are effective in removing NO_x.

To those that commented that increased water consumption of potable water would be preferred to increased emissions of SO_2 and that water could be obtained from existing wells, the Department offers the following:

> Under the permit as presently drafted, the garbage-to-energy project would allow for future industrial development. A scrubber system would consume large amounts of potable water. Oahu is dependent on existing ground water supplies, which are a finite resource. Hawaii is designated attainment with respect to the NAAQS for SO_2. The SO_2 emissions from the project would consume only 4.5 percent of the available 3-hour PSD SO_2 emissions from increment. Thus, the permit as presently drafted, the project would allow for

future industrial development. This would not be the case if large amounts of potable water were consumed.

To the individual that stated that BACT should be applied to VOC emissions in order to inhibit ozone:

BACT for volatile organic compounds (VOC) is discussed in section VI.D of the Ambient Air Quality Impact Report. VOC is generated by incomplete combustion of hydrogen/carbon based compounds. By carefully controlling fuel and air balance, VOC can be minimized. The preprocessing of MSW into RDF creates a more uniform fuel. The RDF together with a high degree of control to distribute and control the combustion air to all zones within the boiler represents BACT for VOC.

To the individual that stated that based upon a review of Tables 3, 4 & 5 of the Ambient Air Quality Impact Report and the original application, the project's SO_2 increment consumption is significantly greater than that contended by the City and County of Honolulu:

Tables 3, 4, and 5 represent different impact points. Table 3 represents the project's impact on PSD increments. The impact point is the maximum impact point of the proposed facility with existing and permitted-but-not-constructed PSD increment consuming sources. This represents the point of highest PSD increment consumption for the area.

Table 4 represents the point where maximum ambient air quality degradation occurs due to the project and other existing sources. This point is separate from the point represented in Table 3.

Table 5 represents the maximum impact of the project without consideration to the other surrounding sources. The point represented by Table 5 is different from those in Tables 3 and 4. The numbers in Tables 3, 4, and 5

cannot be interchanged because they represent the project's impacts at different locations.

To the individual that expressed concern that emissions from the project will exceed the significant emissions increases in 40 CFR 52.21(b)(23) the Department responds as such:

Significant emissions in the context of a PSD regulations is a trigger level above which a BACT review is required. The exceedence of significant levels are not an indication of the level of exposure to human, animal, or plant life. A more crucial indicator of possible health effects is the impact to the National Ambient Air Quality Standards.

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 9, 1987

Mr. Bruce Miller
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-105
Comments on stating emission rates in pounds per hour.

Dear Mr. Miller,

I am writing today to provide comments on the apparent intent of your office to modify the draft PSD permit for the South Broward Resource Recovery Project to provide emission limits in pounds per hour instead of pounds per million British thermal units (lb/MMBtu). We believe this is a significant change which is contrary to recent regulatory action of the Agency and industry practice.

I would refer you to a discussion of the appropriate units for specifying emission rates contained in the Federal Register, Vol. 49, No. 119, Page 25107, June 19, 1984 (Copy Enclosed). It is the conclusion of the Agency that "A mass per unit of heat input format was selected for the purposed standards since this format directly relates to the net quantity of pollutants emitted to the amount of fuel fired in the steam generating unit." I do not think it is necessary for me to recite all of the reasons given by the Agency for this conclusion. We agree with the conclusion and received concurrence from the Florida Department of Environmental Regulation. Both the state permit conditions and the draft final determination and PSD permit provide emission rates, except for particulate, in lb/MMBtu. I have and will continue to argue that even particulate emissions should be stated in lbs/MMBtu as the current New Stationary Sources Standard (11/86) for particulate at waste burning facilities is stated in these units (0.10 lb/MMBtu).

Several weeks ago we were told your compliance branch was concerned with how heat input could be established if lb/MMBtu rates were used. This can be done accurately without any additional Agency effort using monitoring procedures that have been developed which utilize Standard ASME Test Codes and plant instrumentation. With my letter to you of January 14, I enclosed

several technical papers on this subject. This approach is being used almost universally in the resource recovery industry today.

We would urge you to reconsider restating emission rates in pounds per hour. All emission rates should be stated in lb/MMBtu. I have, however, enclosed with this letter a table which expresses the emission rates proposed in my letter of January 14, 1987, in pounds per hour for your reference.

In my discussion with Wayne Aronson last week, he indicated your office was also considering adding to the permit emission rates expressed in parts per million for Sulfur Dioxide, Nitrogen Oxides and Carbon Monoxide . These values would apparently be used in conjunction with Continuous Emission Monitoring (CEM) devices. Mr. Aronson stated no firm decision had yet been made on requiring a CEM for Sulfur Dioxide but CEMs would probably be required for Nitrogen Oxides and Carbon Monoxide.

We have already agreed to installation of Oxygen and Opacity CEM's. We believe that along with annual stack tests required by the state permit these CEM's will provide more than enough information for the plant operator to comply with permitted emission rates and for your Agency to monitor the plant.

Before closing, I would once again ask that we be included in any discussions during the permit decision making process. If I had not contacted Mr. Aronson last week, we would be unaware of any of the important matters addressed in this letter. The only written communication concerning our application received by this office from EPA Region IV to date is a letter dated **September 17, 1985**, from Mr. Winston Smith related to State Implementation Plan problems because of provisions of the Florida Power Plant Siting Act. We have not received a single word related specifically to our application. We have not received any feed back on what we feel were reasonable proposals and technical matters requireing consideration contained in my letters to you dated December 1, 1986, and January 14, 1987. Along with the North Broward Resource Recovery Project, the subject of our application has been proposed to meet a critical need for an environmentally sensitive means of disposing of solid waste in the unique South Florida environment. I am sure that better communications between our two public agencies would result in a better permit and Project. I urge you to get us more involved and keep us better informed as to the status of our permit.

Sincerely yours

Thomas M. Henderson
Project Director

TMH/bd

Enclosure: Federal Register, Vol. 49, No. 119, Pages 25107 and 25108, June 19, 1984; and
Maximum Emission Rates in Pounds per Hour and Parts per Million

cc: F. T. Johnson, County Administrator
Cliff Schulman, Greenberg Traurig Askew
Tim Smith, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.
Bruno Dunn, Signal Environmental Systems
Peter Ware, Waste Management, Inc.
Dale Twachtmann, FDER Secretary
Steve Smallwood, FDER Air Bureau
Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau
Julia C. Costas, FDER Assistant General Counsel
Winston Smith, EPA Air, Pesticides & Toxics Division
Wayne Aronson, EPA Air Program Branch
Jewell Harper, EPA Assistant General Counsel

MAXIMUM EMISSION RATES
SOUTH BROWARD RESOURCE RECOVERY PROJECT

	Proposed Emission Rates		
	In Application	January 14, 1987 Letter	
Pollutant	lb/hr[1]	lb/hr	ppm[2]
Particulate Matter	71.8	36.7 [0.015gr/dscf-12%]	
Sulfur Dioxide	533.8	301.9	124 ppm[3]
Nitrogen Dioxides	543.5	539.2	309 ppm[4]
Carbon Monoxide	87.4	86.3	81 ppm[5]
Lead	2.9	1.51	
Fluorides	17.5	3.88	
Beryllium	0.0009	0.00091	
Mercury	0.89	0.895	
Sulfuric Acid Mist	45.6	Operating Practice < 150.95 lb/hour Total Sulfur	

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1 Emission Rates presented in pounds per hour on Page 2-17 of the Technical Support Document.

2 All Emission Rates in ppm corrected to 12% CO_2.

3 Maximum 3-hour average.

4 Maximum 30-day rolling average. Maximum 3-hour average - 350 ppm.

5 Maximum 30-day rolling average. Maximum 1-hour average - 400 ppm.

under the proposed standards of performance. Similarly, nitrogen oxides have been selected for regulation under the proposed standards of performance.

Sulfur dioxide emissions from industrial-commercial-institutional steam generating units have been selected for regulation under a separate proposal. As part of the deliberations on reauthorization of the Clean Air Act, amendments were introduced in the 97th Congress that would have changed the definition of standard of performance. Development of sulfur dioxide standards for industrial-commercial-institutional steam generating units was suspended shortly after the start of the 97th Congress in 1981, pending the outcome of the Clean Air Act amendments. However, amendments to the Act have not been adopted by Congress to date and, rather than continue to defer development of new source performance standards for sulfur dioxide, analysis of standards for sulfur dioxide emissions has been resumed. Sulfur dioxide emission standards for industrial-commercial-institutional steam generating units will be proposed as a separate rulemaking.

The potential impacts associated with this "phased" approach to proposing particulate matter and nitrogen oxides standards now and proposing sulfur dioxide standards in the future have been considered. There appears to be no reason for delaying the proposal of emission standards for particulate matter and nitrogen oxides while waiting for the sulfur dioxide standards to be developed. State sulfur dioxide standards now in effect would not interfere with compliance with today's proposed standards for particulate matter or nitrogen oxides. Similarly, when standards are proposed for sulfur dioxide, they would not be retroactive and would affect only new steam generating units built after that date. Since the standards will not affect steam generating units which have commenced construction prior to that time, this will assure that no unreasonable impacts occur. Any unforeseen impacts a sulfur dioxide standard may have on particulate matter and nitrogen oxides emissions control will be addressed at the time sulfur dioxide standards are proposed. In the interim, the present standards of performance limiting sulfur dioxide emissions from large fossil fuel-fired steam generating units (40 CFR Part 60, Subpart D) will remain in effect. No potential problems have been identified which might result from proposal of standards for particulate matter and nitrogen oxides today and proposal of standards for sulfur dioxide in the future.

Carbon monoxide and hydrocarbons were not selected for regulation due to their relatively low emission rates and the lack of any control technology for these pollutants which is reasonable in cost. Trace metals have not been selected for regulation under the proposed standards because of the lack of information on the performance of alternative control technologies to reduce these emissions. It is anticipated that the proposed particulate matter standard would result in significant reductions in trace metal emissions.

Trace amounts of radionuclides present in coal are also emitted by industrial-commercial-institutional steam generating units but are not a direct subject of these proposed regulations. Control of particulate matter emissions from coal-fired steam generating units to low levels is expected to bring about a corresponding reduction in emissions of radionuclides. Further discussion of the control of radionuclides from coal-fired steam generating units can be found in the Federal Register (48 FR 15085, April 6, 1983) as part of recently proposed standards for radionuclides under section 112 of the Act.

The proposed standards would limit emissions from steam generating units firing natural gas, residual and distillate oil, coal, wood, solid waste and fuel mixtures containing any of these fuels. Steam generating units or incinerators with heat recovery firing only municipal-type solid waste or steam generating units firing only wood (5 percent fossil fuel or less on an annual basis) would be covered by the proposed particulate matter standards, but not by the proposed nitrogen oxides standards. Similarly, steam generating units firing only oil or natural gas would be subject to the proposed standard for nitrogen oxides, but not to the proposed standards for particulate matter emissions. Emissions of particulate matter from the combustion of natural gas are low and therefore the costs of further emission control would be unreasonably high. Control of particulate matter from oil-fired steam generating units will be considered in the development of the sulfur dioxide standards.

The proposed standards would cover only industrial-commercial-institutional steam generating units with heat input capacities of greater than 29 MW (100 million Btu/hour). Analyses of the projected new steam generating unit population indicate that nearly all new steam generating units larger than 29 MW (100 million Btu/hour) heat input capacity will be industrial-type steam generating units with only a few commercial and institutional steam generating units in this size range. The steam generating unit size limit of 29 MW (100 million Btu/hour) heat input capacity would, thus, include only the largest commercial and institutional steam generating units and would concentrate the scope of the proposed standards on industrial-type steam generating units.

In addition to differences in application, the type of steam generating unit fuels which are combusted in steam generating units above 29 MW (100 million Btu/hour) heat input capacity is markedly different from the type combusted in steam generating units below this size. Depending on future energy pricing scenarios, from 25 to 75 percent of all new steam generating units larger than 29 MW (100 million Btu/hour) heat input capacity are expected to combust coal as the primary steam generating unit fuel. For units less than 29 MW (100 million Btu/hour) up to 90 percent of the fuel is expected to be natural gas or fuel oil. Additionally, the use of firetube-type steam generating units becomes more common for units of 29 MW (100 million Btu/hour) heat input capacity or less. Watertube-type steam generating units predominate among steam generating units larger than 29 MW (100 million Btu/hour) heat input capacity.

Development of new source performance standards limiting emissions of sulfur oxides, nitrogen oxides, and particulate matter from steam generating units smaller than 29 MW (100 million Btu/hour) heat input capacity is planned. In this small steam generator size range, the type of unit used, the physical design characteristics of these units, the cost impacts of emission control systems on steam production costs, and the steam generation applications are often different than for larger steam generating units. Because these factors have been found to be materially different, a separate study for these smaller steam generating units is appropriate. This will assure that an adequate evaluation is conducted on the technical and economic factors associated with applying emission controls to smaller steam generating units.

C. Selection of Formats for Emission Limits

Three possible formats were considered for the emission limits in the proposed standards: (1) Concentration,

(2) emissions per unit of steam generating unit energy output, and (3) emissions per unit of steam generating unit heat input. The criteria used for selecting the format were: (1) The ability of the format chosen to reflect the application of the best system of emission reduction, and (2) the ease of monitoring and compliance testing.

A concentration format measures the ability of the control system to reduce the level of pollutants relative to the volume of flue gas and provides a direct measure of the performance of the control equipment. There is, however, the potential that the effectiveness of a concentration standard can be reduced by dilution of the exhaust gases discharged to the atmosphere with excess combustion air, thus lowering the concentration of pollutants emitted but not the total mass emitted. This problem can be corrected by using a concentration standard at a reference carbon dioxide or oxygen level. Use of such a correction, however, renders this format functionally equivalent to a mass per unit of heat input format with respect to measurements needed to determine compliance. Thus, a concentration format was not selcted for the proposed standards.

A format of emissions per unit of steam generating unit energy output would make the process of determining compliance with the proposed standards very complicated. A format of this type would require measurement of pollutant emissions followed by calculation of the steam generating unit energy output which would require measurements of the steam production rate, steam quality, and condensate return conditions. The cumulative effect of requiring all these measurements would be to complicate compliance testing and monitoring, increase the likelihood for error, and increase costs for compliance testing and monitoring without significant benefits.

It is suggested that this format would create an incentive to purchase more efficient steam generating units and to increase operational efficiency. However, an incentive to purchase more efficient steam generating units would exist in any case because less efficient steam generating units would have to combust more fuel and use a larger emission control device compared to more efficient steam generating units which would produce the same amount of steam while firing less fuel.

Using a mass per unit of energy output format, standards which are based on best systems of emissions reduction applied to less efficient steam generating units may not reflect the best system of emissions reduction when compared to more efficient steam generating units. This outcome may not be consistent with the basic requirements of section 111 of the Clean Air Act that standards of performance reflect the application to all affected facilities of the best systems of continuous emission reduction considering costs and other impacts. Adjusting standards in some manner to reflect application of the best systems of emission reduction on all steam generating units would render this format functionally equivalent to a mass per unit of heat input format. Therefore, a format of emissions per unit of energy output was not selected for the proposed standards; however, this would not in any way discourage the use of higher efficiency steam generating units.

A mass per unit of heat input format was selected for the proposed standards since this format directly relates the net quantity of pollutants emitted to the amount of fuel fired in the steam generating unit. Monitoring and emission testing used to determine compliance with standards written in this format would be based on established methods. Additionally, this format is consistent with other standards established for steam generators (Subparts D and Da of 40 CFR Part 60). The major feature of this format, however, is that the required degree of emission control would be the same for all similar steam generating units burning the same amounts of fuel.

Emission credits for cogeneration systems and for combined cycle units were also considered and are discussed under the *Cogeneration Steam Generators—Emission Credits* and the *Combined Cycle Steam Generators—Emission Credits* sections of this preamble (See **REQUEST FOR COMMENTS** section).

D. Selection of Demonstrated Emission Control Technology and Emission Limits Nitrogen Oxides

1. Introduction

Nitrogen oxides (NO_x) formed during fuel combustion are composed of thermal NO_x and fuel-nitrogen NO_x. Thermal NO_x is formed through a reaction between the nitrogen and oxygen present in the combustion air. In contrast, fuel-nitrogen NO_x is the result of a reaction between nitrogen present in the fuel and oxygen present in the combustion air.

Nitrogen and oxygen in the combustion air can combine to form thermal NO_x at the elevated temperatures found in steam generating unit flames. Increased formulation is due to two factors: high combustion temperatures and high concentrations of oxygen in the presence of nitrogen. Boiler operating and design conditions which elevate combustion temperatures include increasing design heat release rates, full load operation, and preheating combustion air. Fuel moisture, on the other hand, will lower combustion temperatures. This lower temperature is a result of the cooling effect created by the evaporation of the moisture as the fuel burns. High concentrations of oxygen in the presence of nitrogen exposed to the high combustion temperatures are generally associated with the use of large amounts of excess air introduced early in the combustion zone.

The fuel nitrogen component of NO_x emissions is generated by the reaction of nitrogen in the fuel with oxygen in the combustion air. The two steam generating unit operating conditions which contribute most to fuel-nitrogen NO_x formation are increased fuel nitrogen content and the presence of large amounts of excess air in the combustion region where the fuel nitrogen evolves from the fuel.

Because of the influence of fuel nitrogen content, various fuels fired in steam generating units have widely differing NO_x characteristics. For example, natural gas and distillate oils contain little, if any, fuel nitrogen. As a result, nearly all of the NO_x emissions produced by the combustion of these fuels is thermal NO_x. Accordingly, the uncontrolled emissions from firing these low nitrogen fuels are generally much lower than from firing residual oils and coal.

Residual oils and nonfossil fuels are characterized by varying, but generally greater, amounts of fuel nitrogen than natural gas or distillate oil. As a result of these higher fuel nitrogen levels, total NO_x emissions from firing residual oils are comprised of both thermal NO_x and fuel-nitrogen NO_x. Uncontrolled emissions from residual oil combustion are generally higher than for natural gas and distillate oil, but less than for coal. Nonfossil NO_x emissions are generally in the same range as those from gas and distillate oil fuels.

Coal contains a substantial amount of fuel nitrogen relative to natural gas and oil. Consequently, NO_x emissions resulting from coal combustion typically include both thermal NO_x and significant quantities of fuel-nitrogen NO_x. The level of NO_x emissions generated by coal combustion is also dependent on steam generating unit type. In order of increasing NO_x emissions, the three basic steam generating unit types used to fire coal

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

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FEB 26 1987
BAQM

FEB 23 1987

4APT/AP/ljf

Mr. Clair H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: Public Notice for The Proposed South Broward RRF
PSD-FL-105

Dear Mr. Fancy:

This is in regard to your January 26, 1987, letter transmitting the proposed public notice for the above-referenced facility to Mr. Thomas M. Henderson. The public notification requirements for a federal PSD permit will be fulfilled with this notice in conjunction with the power plant siting notice published earlier. However, we have no documentation of notification to the Federal Land Manager (FLM) of the Everglades PSD Class I area. Please provide this documentation, any comments from the FLM, and a certified copy of the public notice.

If you have any questions, please feel free to contact me or Mr. Wayne J. Aronson at (404) 347-2864.

Sincerely,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

cc: Mr. Thomas Henderson, Project Director
Broward County Resource Recovery Office

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ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

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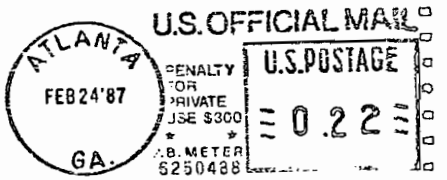

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Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

February 26, 1987

Mr. Bruce Miller
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-105) -- Comments on EPA proposed emission rates.

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SOUTH BROWARD RESOURCE RECOVERY PROJECT

Pollutant	State Permit 6/3/86	PSD Draft 12/23/86	County Proposal 1/14/87**	EPA Proposal 2/25/87
Particulate Matter	0.03gr/ dscf-12%	0.015 dscf-12%	0.015 dscf-12%	0.015 dscf-12%
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3	Brooklyn	0.52	4.7
4	Westchester	0.40	3.6
5	McKay Bay	0.38	3.4
6	Chicago	0.34	3.1
7	Braintree	0.34	3.1
8	73rd NY	0.33	3.0
9	Alhambra	0.27	2.4
10	Pinnellas	0.26	2.3
11	Baltimore	0.24	2.2
12	Saugus	0.22	2.0
13	Babylon	0.21	1.9
14	Harrisburg	0.19	1.7
15	Nashville	0.11	1.0
16	SW Brooklyn	0.09	0.8

*Based on 4500 Btu/lb MSW.

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MODIFIED EPA METHOD 6 OR 8

SAMPLE RUN	DATE 1984	BOILER NO	TEST RUN	SO2 PPM @12% CO2	LBS/ MMBTU
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4	4/26	3	3-7	221.50	0.581
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6	6/6	1	1-1	167.10	0.438
7	6/6	1	1-2	163.80	0.430
8	6/6	1	1-3	146.20	0.384
9	6/6	1	1-4	136.10	0.357
10	6/6	1	1-5	179.30	0.470
11	6/6	1	1-6	145.50	0.382
12	6/6	1	1-7	162.60	0.427
13	6/6	1	1-8	108.80	0.285
14	6/19	1	1-1	152.30	0.400
15	6/19	1	1-2	114.40	0.300
16	6/19	1	1-3	174.90	0.459
17	6/20	2	2-7	118.60	0.311
18	6/20	2	2-8	178.20	0.468
19	6/20	2	2-9	156.50	0.411
20	6/20	3	3-4	149.60	0.392
21	6/20	3	3-5	146.20	0.384
22	6/20	3	3-6	176.40	0.463
23	6/26	3	3-1	128.50	0.337
24	6/26	3	3-2	153.20	0.402
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31	6/28	1	1-9	130.30	0.342
32	7/09	1	1-1	128.30	0.337
33	7/09	1	1-2	144.30	0.379
34	7/09	1	1-3	140.20	0.368
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MAXIMUM EMISSION RATES*
SOUTH BROWARD RESOURCE RECOVERY PROJECT

Pollutant	State Permit 6/3/86	PSD Draft 12/23/86	County Proposal 1/14/87**	EPA Proposal 2/25/87
Particulate Matter	0.03gr/ dscf-12%	0.015 dscf-12%	0.015 dscf-12%	0.015 dscf-12%
Sulfur Dioxide	0.55	0.31	0.31 (124ppm-3 hr)	0.13 (50ppm-3 hr)
Nitrogen Dioxide	0.56	0.56	0.56 (350ppm-3 hr)	0.56 (350ppm-3 hr)
Carbon Monoxide	0.09	0.09	0.09 (400ppm-1 hr)	0.09 (400ppm-1 hr)
Lead	0.003	0.001	0.0015	0.001
Fluorides	0.018	0.0018	0.004	0.004
Beryllium	9.3×10^{-7}	9.3×10^{-7}	9.3×10^{-7}	9.3×10^{-7}
Mercury	9.2×10^{-4}	7.5×10^{-4}	9.2×10^{-4}	7.0×10^{-4}
Sulfuric Acid Mist	0.047	8.5×10^{-4}	Operating Practice	4.7×10^{-3}

* Values are in lb/MM Btu except as noted.

** Including ppm values from 2/9/87 letter.

Summary of Uncontrolled SO_2 Emissions from Resource Recovery Facilities

Rank	Name	SO_2 Emissions $lb/10^6$ Btu	lb/ton MSW*
1	Oceanside	0.72	6.5
2	Newport News	0.53	4.8
3	Brooklyn	0.52	4.7
4	Westchester	0.40	3.6
5	McKay Bay	0.38	3.4
6	Chicago	0.34	3.1
7	Braintree	0.34	3.1
8	73rd NY	0.33	3.0
9	Alhambra	0.27	2.4
10	Pinnellas	0.26	2.3
11	Baltimore	0.24	2.2
12	Saugus	0.22	2.0
13	Babylon	0.21	1.9
14	Harrisburg	0.19	1.7
15	Nashville	0.11	1.0
16	SW Brooklyn	0.09	0.8

*Based on 4500 Btu/lb MSW.

SUMMARY OF EMISSION TESTS
WESTCHESTER RESCO
SULFUR DIOXIDE
MODIFIED EPA METHOD 6 OR 8

SAMPLE RUN	DATE 1984	BOILER NO	TEST RUN	SO2 PPM @12% CO2	LBS/ MMBTU
1	4/24	2	2-1	163.80	0.430
2	4/24	2	2-2	215.50	0.565
3	4/25	2	2-3	167.90	0.440
4	4/26	3	3-7	221.50	0.581
5	4/26	3	3-8	186.40	0.489
6	6/6	1	1-1	167.10	0.438
7	6/6	1	1-2	163.80	0.430
8	6/6	1	1-3	146.20	0.384
9	6/6	1	1-4	136.10	0.357
10	6/6	1	1-5	179.30	0.470
11	6/6	1	1-6	145.50	0.382
12	6/6	1	1-7	162.60	0.427
13	6/6	1	1-8	108.80	0.285
14	6/19	1	1-1	152.30	0.400
15	6/19	1	1-2	114.40	0.300
16	6/19	1	1-3	174.90	0.459
17	6/20	2	2-7	118.60	0.311
18	6/20	2	2-8	178.20	0.468
19	6/20	2	2-9	156.50	0.411
20	6/20	3	3-4	149.60	0.392
21	6/20	3	3-5	146.20	0.384
22	6/20	3	3-6	176.40	0.463
23	6/26	3	3-1	128.50	0.337
24	6/26	3	3-2	153.20	0.402
25	6/26	3	3-3	215.00	0.564
26	6/27	2	2-4	167.40	0.439
27	6/27	2	2-5	169.40	0.444
28	6/27	2	2-6	187.40	0.492
29	6/28	1	1-7	188.30	0.494
30	6/28	1	1-8	143.90	0.378
31	6/28	1	1-9	130.30	0.342
32	7/09	1	1-1	128.30	0.337
33	7/09	1	1-2	144.30	0.379
34	7/09	1	1-3	140.20	0.368
35	7/09	2	2-1	135.50	0.355
36	7/10	2	2-4	137.90	0.362
37	7/10	2	2-5	137.50	0.361
38	7/10	3	3-1	148.60	0.390

39	7/10	3	3-2	143.70	0.377
40	7/10	3	3-3	121.80	0.320
AVERAGE (ARITHMETIC)				156.3	0.410
99% CONFIDENCE- UPPER LIMIT (STUDENT "T" STATISTIC, "ONE TAILED" TEST CRITERION)				221.5	0.581
AVERAGE (GEOMETRIC)				154.2	0.404
99% CONFIDENCE- UPPER LIMIT (STUDENT "T" STATISTIC, "ONE TAILED" TEST CRITERION)				232.0	0.609

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

MAR 2 1987

4 APT-AP/eaw

DER
MAR 5 1987
BAQM

Commissioner Chairman Howard Forman
115 Andrews Avenue
Room 410
Fort Lauderdale, Florida 33301

Dear Commissioner Forman:

As a followup to the December 16, 1986, Commissioners' meeting we attended, please find enclosed a copy of the report entitled "Analysis of Particulate Matter and Acid Gas Emissions and Control Costs for South Broward Resource Recovery Facility" prepared by our consultant, Pacific Environmental Services, Inc.

As indicated at the December 16th meeting and as outlined on page 7 of the report, the additional cost of adding the spray dryer (acid gas control) to the proposed control system would be approximately $3 million ($2,977,200) in annualized operating costs (initial cost plus annual operating costs) for the lifetime of the equipment (15 years). The initial capital cost of adding the acid gas control to the proposed control system would be $9,584,000 with an annual operating cost of $1,113,000 (lost revenue due to equipment downtime is not considered). This additional cost equates to $3.97/ton of refuse burned based on the facilities operating rate specified in the application.

Regarding the status of the federal PSD permit for the South Broward facility, we have been in communication with Mr. Thomas M. Henderson of your staff and we anticipate issuing the permit shortly after the public comment period ends on March 14, 1987.

If we can be of any further assistance, please feel free to contact me or Mr. Wayne J. Aronson of my staff at (404) 347-2864.

Sincerely yours,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

Enclosure

cc: Mr. Thomas M. Henderson
Project Director
Resource Recovery Office

Mr. Clair Fancy
Deputy Chief
Bureau of Air Quality Management

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

DER
MAY 6 1987
BAQM

April 30, 1987

Mr. Wayne Aronson
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-105) -- Furnace Design Specification.

Dear Mr. Aronson,

Enclosed you will find for your file record a copy of the Furnace Design for the South Broward Resource Recovery Project (Section 1.10.1 of Exhibit 1 to the Construction Contract dated August 19, 1986). You will note the Peak Steam Mass Flow Rate for each furnace is 192,000 pounds per hour.

If you have any questions concerning this specification, then please give me a telephone call.

Sincerely yours,

Thomas M. Henderson

Thomas M. Henderson
Project Director

cc: Celiene Bruce, County Administrator
Tim Smith, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.
Bruno Dunn, Signal Environmental Systems
Andy Szurgot, Signal Environmental Systems
Pat Patton, Waste Management, Inc.
Steve Smallwood, FDER Air Bureau
Clair Fancy, FDER Air Bureau
✓ Barry Andrews, FDER Air Bureau

1.9.5 Charging Hoppers and Chutes

Charging Hoppers: Charging hoppers shall be designed to withstand the impact of the fully loaded crane grapple.

Charging hoppers shall have a minimum dimension of 23 feet by 19 feet and be independently supported by the charging floor structure and shall be arranged so as to control spillage onto the charging floor.

Charging hopper discharge throat (exit) shall be smaller than furnace feed chute entrance to furnace/boiler and shall be adequately sized to accommodate individual furnace/boiler rated throughput capacity.

Chutes and Cut-Off Gates: Chutes connecting charging hoppers and furnace/boiler feed throat shall be either water cooled or refractory lined.

Between each charging hopper discharge and chute entrance there shall be a cut-off gate to control burnback during furnace/boiler shutdown.

1.10 Combustion Systems.

1.10.1 Furnace Design.

The Company shall provide three (3) independent Von Roll/Babcock & Wilcox mass-burn stocker-fired furnace with multiple pass waterwall type boilers. Each of the three (3) units will have a nameplate capacity of 750 tons per day or a total plant capacity of 2,250 tons per day. The hydraulic ram feeder/grate system shall be a Von Roll No. R-10078 system. The boilers shall be manufactured by Babcock & Wilcox with the following characteristics:

- Normal Steam Mass Flow Rate (lbs/hr)	167,000
- Peak Steam Mass Flow Rate (lbs/hr)	192,000
- Maximum Continuous Capacity (lbs/hr)	167,000
- Outlet Steam Conditions (psig/oF)	900/830
- Feedwater Temperature (oF)	300
- Gas Temperatures (oF):	
Entrance to Radiation Section	2200
Entrance to Convection Section	1150
Entrance to Superheater Section	1380
Entrance to Economizer Section	630
- Radiation Section:	
Wall Type	Membrane
Radiant Surface (ft^2/unit	7537
Tube Thickness (in.)	0.188

- Convection Section:

Convective Surface (ft^2/unit)	55,315
Tube Thickness (in)	0.180

- Superheat Section:

Convective Surface (ft^2/unit)	21,904
Tube Thickness	0.203/0.180
Material Type	SA210A/SA209 Incoloy

All Furnace, boiler and Auxiliary equipment shall be manufactured and constructed in accordance with ASME boiler and Furnace construction codes except where otherwise stated. All equipment shall be so stamped. All refractory shall meet minimum ASTM standards. A soot blowing system or tube rapping system shall be provided which will clean boiler tubes. An access door allowing for inspection and maintenance of the tubes and tube cleaning system shall be provided.

Boiler drums shall be Class 1 fusion welded construction, tested before shipment. The steam drums shall be fitted with steam separation baffles yielding dry steam with purity of one part per million (ppm) solids at maximum continuous steaming conditions, at the design pressure and Temperatures, when boiler water concentrations do not exceed standard ABMA limits. Each drums shall have two (2) manhole openings.

Superheaters shall be manufactured of SA210A and SA209 alloy. A bare tube economizer section shall be provided designed for forced circulation with a feed water temperature of 300oF and pressures at a minimum of 125% of the boiler design pressure.

1.10.2 Combustion Air System.

The distribution of primary and secondary air jets shall provide a furnace environment such that temperture and emission standards shall be achieved. Two forced draft fans shall be provided for each boiler with the the following test block capacities:

- Primary Air, ACFM/S.P. (in H2O) - 73,000/21.0
- Secondary Air, ACFM/S.P. (in H2O) - 49,000/36.0

Combustion air fans shall be mounted on vibration elimination bases with non-combustible flexible connections at the inlets and outlets of the fans. They shall be automatically controlled with manual override system in the control room. Fan drives shall have a minimum of 125% of maximum design brake horsepower (BHP).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

MAR 12 1987

4APT-AP/ljf/eaw

Mr. Clair H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Re: South Broward Resource Recovery Facility
PSD-Fl-105

Dear Mr. Fancy:

This is to acknowledge the receipt of the public notice published on February 12, 1987, regarding the above-referenced project and to provide specific comment in regard to the BACT for sulfur dioxide.

As you may know, on June 3, 1986, EPA Administrator Lee Thomas remanded a PSD permit decision involving the North County, California, Resource Recovery project to Region IX for their reconsideration. The remand strongly affirms that the permitting authority should take the toxic effects of unregulated pollutants, such as dioxins, furans, heavy metals, and acid gases, into account in making BACT decisions for regulated pollutants. Therefore, we feel that potential unregulated pollutant emissions of dioxins, furans, heavy metals, and acid gases should be considered in making the BACT determination for SO_2. In making that determination, the SO_2 emission limit should reflect the amount of control desired for reducing the unregulated gases by at least 90%. We believe that the installation of acid gas controls capable of achieving a 75% reduction of SO_2 emissions will achieve at least 90% reduction of these unregulated pollutants. Therefore, the SO_2 BACT emission limitation must take these control reductions into consideration.

The emission of sulfur dioxide from municipal incinerators is dependent upon three somewhat indeterminant factors. These are the fuel sulfur content, the extent of conversion of sulfur to sulfur dioxide, and the retention of sulfur dioxide in the ash. Apparently, the great variation in reported sulfur dioxide emissions appears to be due to the degree of sulfur dioxide retention in the ash which has been postulated to be from 33% to 75% of the converted sulfur. Using the data provided in the application, a municipal solid waste (MSW) fuel with an average sulfur content of 0.12% should produce approximately 4.8 pounds of sulfur dioxide per ton of MSW. At 4500 Btu's per pound of MSW (contained in South Broward's application) and a reduction of the SO_2 emissions by 75%, the emission rate for the proposed South Broward facility should be 0.133 pounds of sulfur dioxide per million Btu heat input. This limit equates to approximately 55 ppm of SO_2 on a dry basis corrected to 7% O_2.

In addition, we have analyzed uncontrolled SO_2 emissions data for several resource recovery facilities. This data, which was submitted by Mr. Thomas Henderson on February 26, 1987, represents uncontrolled SO_2 emissions from 16 facilities throughout the country. We specifically analyzed the data for the Westchester facility which Mr. Henderson feels is representative of the anticipated uncontrolled emissions that might be expected at the Broward County facility. We determined that at the 95% confidence level the uncontrolled SO_2 emissions would be .55 pounds of sulfur dioxide per million Btu's. By requiring 75% control of the SO_2 emissions, an emissions limitation of 0.1375 pounds of sulfur dioxide per million Btu's (.55 x .25 = .1375) would be achieved.

Therefore, based upon the foregoing, we are proposing SO_2 emission limitations of 0.014 pounds SO_2 per million Btu's and 60 ppm of SO_2 on a dry basis corrected to 7% O_2.

If you have any questions or comments, please contact Wayne Aronson of my staff at (404) 347-2864.

Sincerely,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
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MAR 12 1987

4APT-AP/ljf/eaw

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Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

Barry-
For File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

MAR 12 1987

4APT-AP/ljf/eaw

Mr. Clair H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

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PSD-Fl-105

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Sincerely,

Bruce P. Miller

Bruce P. Miller, Chief
Air Programs Branch
Air, Pesticides, and Toxics
Management Division

PM
3-13-87
Ft. Lauderdale, FL

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

DER

MAR 16 1987

BAQM

March 11, 1987

Mr. Bruce Miller
Air Programs Branch
Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Dear Mr. Miller,

Enclosed is a copy of the U. S. Department of the Interior's comments of the South Broward Resource Recovery Project (PSD-FL-105) from our files.

Yours very truly,

Thomas M. Henderson

Thomas M. Henderson
Project Director

TMH/bd
Enclosure
cc: Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau
Ron Mills, Malcolm Pirnie, Inc.

United States Department of the Interior

NATIONAL PARK SERVICE
SOUTHEAST REGIONAL OFFICE
75 Spring Street, S.W.
Atlanta, Georgia 30303

IN REPLY REFER TO:
N3615 (SER-OPS)

JUL 8 1985

Mr. Tom Rodgers
Bureau of Air Quality Management
State of Florida
Department of Environmental Regulation
Twin Towers Office Buildings
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Rodgers:

Thank you for sending us a copy of South Broward County Resource Recovery Project, Inc.'s power plant site certification application for a proposed resource recovery facility in Broward County, Florida, approximately 57 km northeast of Everglades National Park. Your early notification of this project is appreciated.

We have reviewed the information you sent to us and, based on that information, we would not expect emissions from the proposed facility to adversely impact the air quality or the air quality related values of Everglades National Park. However, we have several comments regarding the air quality and control technology analyses contained in the application. Responses to these comments could affect our recommendation. These comments are discussed in the enclosed technical review document. We ask that you consider these comments while performing your review of the application. We also ask that you forward us a copy of your preliminary determination document once your technical review of the project is completed. We will review your preliminary determination and submit any additional comments regarding the project during the 30-day public comment period.

If you have any questions regarding the enclosed comments, please contact Mark Scruggs of our Air Quality Division in Denver at (303) 236-8765.

Sincerely,

Regional Director
Southeast Region

Enclosure

Technical Review of
Power Plant Site Certification Application for
South Broward County Resource Recovery Project, Inc.
South Broward County, Florida

By

Permit Review and Technical Support Branch
Air Quality Division - Denver

South Broward County Resource Recovery Project, Inc. is proposing to construct a resource recovery facility in unincorporated Broward County, Florida, near the intersection of U.S. Route 441 and State Road 84. This location is approximately 57 km northeast of Everglades National Park, a PSD class I area administered by the National Park Service. The purpose of the facility is to dispose of solid waste generated predominantly within southern Broward County. The project will be a mass-burn facility with a maximum continuous design rated capacity of 3300 tons per day of solid waste and a maximum electrical generating capacity of approximately 96 megawatts. The emissions from the proposed facility are estimated as follows: 3491 tons per year (TPY) of nitrogen oxides, 3428 TPY of sulfur dioxide, 555 TPY of carbon monoxide, 461 TPY of particulate matter, 187 TPY of lead, 156 TPY of fluorides, 81 TPY of volatile organic compounds, 17.3 TPY of sulfuric acid mist, 1.6 TPY of mercury, 0.19 TPY of arsenic and 0.0058 TPY of beryllium.

These emission rates are all considered significant, and therefore, new source review is required for each listed pollutant except volatile organic compounds (VOC). Review for VOC is not required because Broward County is designated as not attaining the ozone national ambient air quality standard and new source review does not apply to nonattainment pollutants unless the emissions of the nonattainment pollutants are greater than 100 TPY. Following are our comments on the best available control technology, air quality, and air quality related values analyses with respect to the project's expected impacts on Everglades National Park.

BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

The major sources of emissions at the proposed facility are the four associated boilers. Therefore, our review will focus on emission controls on these units. Also, there is a relatively recent publication entitled, "Air Pollution Control at Resource Recovery Facilities" that discusses resource recovery facilities in detail. This document was published in May 1984 by the California Air Resources Board, and was summarized in a technical paper presented at the 77th annual meeting of the Air Pollution Control Association held in June 1984. As of 1984, all refuse-burning facilities with applications pending in California are proposing control technologies that are consistent with or more stringent than the guideline emission limits discussed in this report. We refer to this publication throughout our comments on the proposed air pollution control technology analysis.

Particulate Matter (PM)

Broward County proposes to use electrostatic precipitators (ESPs) to minimize PM emissions generated by combustion of the solid waste in the boilers. Each ESP will be capable of reducing the exhaust gas PM concentration to 0.03 grains per dry standard cubic foot (gr/dscf). Broward County claims that an ESP with an outlet grain loading of 0.03 gr/dscf is best available control technology (BACT) for the proposed facility.

We agree that high efficiency control devices such as ESPs or baghouses represent BACT for PM emissions from the proposed facility. However, based on information provided in the California Air Resources Board (CARB) document referenced above, an emission limit of 0.01 gr/dscf can be achieved with these devices. This is the guideline emission limit proposed by the CARB for new refuse recovery facilities in California and should be considered as the BACT limit.

Sulfur Dioxide (SO_2)

Broward County is proposing the firing of low sulfur refuse as BACT for the proposed facility. The resulting BACT limit proposed is 0.55 pounds per million Btu heat input ($lb/10^6$ Btu).

The emission guideline recommended in the CARB document is 30 ppm, which corresponds to an SO_2 emission rate of approximately 0.08 $lb/10^6$ Btu. To achieve this emission level, flue gas controls such as wet or dry scrubbing are required. Dry scrubbing processes have been effectively employed at pilot and full-scale refuse burning facilities in Europe, Japan, and the United States. Wet scrubbers have also been employed at full-scale refuse burning facilities. In light of this information, we recommend that Broward County re-evaluate flue gas scrubbing as BACT for SO_2 emissions from the proposed facility.

Nitrogen Oxide (NO_x) and Carbon Monoxide (CO)

The proposed BACT for NO_x and CO emissions is boiler design and good combustion practices. The resulting NO_x and CO emissions limits proposed are 0.56 and 0.089 $lb/10^6$ Btu, respectively. Based on information presented in the CARB report, combustion modifications such as staged combustion, low excess air, and flue gas recirculation can reduce NO_x emissions to between 140 to 200 ppm or 0.28 to 0.4 $lb/10^6$ Btu. We recommend this limit be specified as the BACT limit for the proposed facility. Regarding CO emissions, proper application of the above combustion modification techniques will also minimize CO emissions.

Other Pollutants

Other pollutants emitted from the proposed resource recovery facility requiring BACT review include lead, fluoride, beryllium, mercury, sulfuric acid mist, and inorganic arsenic. The proposed BACT for lead, beryllium and arsenic is the ESPs for the control of particulate matter emissions. These pollutants are emitted in the solid phase, therefore control of PM emissions will also control these pollutants. We agree that the proposed ESPs represent BACT for these pollutants.

Fluorides, sulfuric acid mist and mercury are emitted in small quantities primarily in the gaseous phase. No additional controls are proposed for these pollutants. However, if the wet or dry scrubbers recommended for SO_2 control were installed, the fluoride and sulfuric acid mist emissions could be reduced by over 90 percent.

AIR QUALITY ANALYSIS

General Comments

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Specific Comments

The following specific comments should also be addressed before the proposed project is granted a power plant siting certification.

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AIR QUALITY RELATED VALUES ANALYSIS

Due to the presently low, monitored SO_2 values occurring in Everglades National Park (NP) and the low SO_2 values predicted to occur in Everglades NP as a result of the proposed project, we would not anticipate any adverse impacts on air quality related values (AQRV's) in Everglades NP from SO_2. However, we wish to reconsider this finding when the cumulative modeling analyses are available.

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CONCLUSION

Based on the information provided, we would not expect emissions from the proposed facility to adversely impact the air quality or air quality related values of Everglades National Park. However, we have several comments regarding the proposed control technology and air quality analyses that should be addressed before the power plant site certification is granted for the proposed project.

PM
3-13-87
Ft. Lauderdale, FL

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

DER

MAR 16 1987

BAQM

March 11, 1987

Mr. Bruce Miller
Air Programs Branch
Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Dear Mr. Miller,

Enclosed is a copy of the U. S. Department of the Interior's comments of the South Broward Resource Recovery Project (PSD-FL-105) from our files.

Yours very truly,

Thomas M. Henderson

Thomas M. Henderson
Project Director

TMH/bd
Enclosure
cc: ✓Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau has rec'd his copy
Ron Mills, Malcolm Pirnie, Inc.
Tom Rogers 3-16-87 RAM

87-416

United States Department of the Interior

NATIONAL PARK SERVICE
SOUTHEAST REGIONAL OFFICE
75 Spring Street, S.W.
Atlanta, Georgia 30303

IN REPLY REFER TO:
N3615 (SER-OPS)

JUL 8 1985

Mr. Tom Rodgers
Bureau of Air Quality Management
State of Florida
Department of Environmental Regulation
Twin Towers Office Buildings
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Rodgers:

Thank you for sending us a copy of South Broward County Resource Recovery Project, Inc.'s power plant site certification application for a proposed resource recovery facility in Broward County, Florida, approximately 57 km northeast of Everglades National Park. Your early notification of this project is appreciated.

We have reviewed the information you sent to us and, based on that information, we would not expect emissions from the proposed facility to adversely impact the air quality or the air quality related values of Everglades National Park. However, we have several comments regarding the air quality and control technology analyses contained in the application. Responses to these comments could affect our recommendation. These comments are discussed in the enclosed technical review document. We ask that you consider these comments while performing your review of the application. We also ask that you forward us a copy of your preliminary determination document once your technical review of the project is completed. We will review your preliminary determination and submit any additional comments regarding the project during the 30-day public comment period.

If you have any questions regarding the enclosed comments, please contact Mark Scruggs of our Air Quality Division in Denver at (303) 236-8765.

Sincerely,

Regional Director
Southeast Region

Enclosure

Technical Review of
Power Plant Site Certification Application for
South Broward County Resource Recovery Project, Inc.
South Broward County, Florida

By

Permit Review and Technical Support Branch
Air Quality Division - Denver

South Broward County Resource Recovery Project, Inc. is proposing to construct a resource recovery facility in unincorporated Broward County, Florida, near the intersection of U.S. Route 441 and State Road 84. This location is approximately 57 km northeast of Everglades National Park, a PSD class I area administered by the National Park Service. The purpose of the facility is to dispose of solid waste generated predominantly within southern Broward County. The project will be a mass-burn facility with a maximum continuous design rated capacity of 3300 tons per day of solid waste and a maximum electrical generating capacity of approximately 96 megawatts. The emissions from the proposed facility are estimated as follows: 3491 tons per year (TPY) of nitrogen oxides, 3428 TPY of sulfur dioxide, 555 TPY of carbon monoxide, 461 TPY of particulate matter, 187 TPY of lead, 156 TPY of fluorides, 81 TPY of volatile organic compounds, 17.3 TPY of sulfuric acid mist, 1.6 TPY of mercury, 0.19 TPY of arsenic and 0.0058 TPY of beryllium.

These emission rates are all considered significant, and therefore, new source review is required for each listed pollutant except volatile organic compounds (VOC). Review for VOC is not required because Broward County is designated as not attaining the ozone national ambient air quality standard and new source review does not apply to nonattainment pollutants unless the emissions of the nonattainment pollutants are greater than 100 TPY. Following are our comments on the best available control technology, air quality, and air quality related values analyses with respect to the project's expected impacts on Everglades National Park.

BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

The major sources of emissions at the proposed facility are the four associated boilers. Therefore, our review will focus on emission controls on these units. Also, there is a relatively recent publication entitled, "Air Pollution Control at Resource Recovery Facilities" that discusses resource recovery facilities in detail. This document was published in May 1984 by the California Air Resources Board, and was summarized in a technical paper presented at the 77th annual meeting of the Air Pollution Control Association held in June 1984. As of 1984, all refuse-burning facilities with applications pending in California are proposing control technologies that are consistent with or more stringent than the guideline emission limits discussed in this report. We refer to this publication throughout our comments on the proposed air pollution control technology analysis.

Particulate Matter (PM)

Broward County proposes to use electrostatic precipitators (ESPs) to minimize PM emissions generated by combustion of the solid waste in the boilers. Each ESP will be capable of reducing the exhaust gas PM concentration to 0.03 grains per dry standard cubic foot (gr/dscf). Broward County claims that an ESP with an outlet grain loading of 0.03 gr/dscf is best available control technology (BACT) for the proposed facility.

We agree that high efficiency control devices such as ESPs or baghouses represent BACT for PM emissions from the proposed facility. However, based on information provided in the California Air Resources Board (CARB) document referenced above, an emission limit of 0.01 gr/dscf can be achieved with these devices. This is the guideline emission limit proposed by the CARB for new refuse recovery facilities in California and should be considered as the BACT limit.

Sulfur Dioxide (SO_2)

Broward County is proposing the firing of low sulfur refuse as BACT for the proposed facility. The resulting BACT limit proposed is 0.55 pounds per million Btu heat input ($lb/10^6$ Btu).

The emission guideline recommended in the CARB document is 30 ppm, which corresponds to an SO_2 emission rate of approximately 0.08 $lb/10^6$ Btu. To achieve this emission level, flue gas controls such as wet or dry scrubbing are required. Dry scrubbing processes have been effectively employed at pilot and full-scale refuse burning facilities in Europe, Japan, and the United States. Wet scrubbers have also been employed at full-scale refuse burning facilities. In light of this information, we recommend that Broward County re-evaluate flue gas scrubbing as BACT for SO_2 emissions from the proposed facility.

Nitrogen Oxide (NO_x) and Carbon Monoxide (CO)

The proposed BACT for NO_x and CO emissions is boiler design and good combustion practices. The resulting NO_x and CO emissions limits proposed are 0.56 and 0.089 $lb/10^6$ Btu, respectively. Based on information presented in the CARB report, combustion modifications such as staged combustion, low excess air, and flue gas recirculation can reduce NO_x emissions to between 140 to 200 ppm or 0.28 to 0.4 $lb/10^6$ Btu. We recommend this limit be specified as the BACT limit for the proposed facility. Regarding CO emissions, proper application of the above combustion modification techniques will also minimize CO emissions.

Other Pollutants

Other pollutants emitted from the proposed resource recovery facility requiring BACT review include lead, fluoride, beryllium, mercury, sulfuric acid mist, and inorganic arsenic. The proposed BACT for lead, beryllium and arsenic is the ESPs for the control of particulate matter emissions. These pollutants are emitted in the solid phase, therefore control of PM emissions will also control these pollutants. We agree that the proposed ESPs represent BACT for these pollutants.

Fluorides, sulfuric acid mist and mercury are emitted in small quantities primarily in the gaseous phase. No additional controls are proposed for these pollutants. However, if the wet or dry scrubbers recommended for SO_2 control were installed, the fluoride and sulfuric acid mist emissions could be reduced by over 90 percent.

AIR QUALITY ANALYSIS

General Comments

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3/25/87
Received Bruce Miller

DER

MAR 30 1987

BAQM

AGREEMENT IN PRINCIPLE - SO_2 EMISSIONS

(1) The SO_2 emission limit in the permit shall take the form of the following:

a) In no event shall emissions exceed 0.31 lbs of SO_2 (124 ppm) per million BTU corrected to 7% O_2.

b) Independent of the requirement in a) above, a 65% reduction of the inlet Sulfur emissions to the acid gas controls shall be achieved at all times unless the outlet emissions from the acid gas controls are lower than 0.14 lbs of SO_2 (60 ppm) per million BTU in which case the 65% removal efficiency is no longer required.

(2) Continuous emission monitors shall be installed for SO_2 emissions and the permit shall take the form of the following:

a) Initially SO_2 emissions shall not exceed 124 ppm.

b) After the initial and subsequent compliance tests to demonstrate compliance with the emission limitation in 1 b) above, a new continuous emission limitation for the CEM will be established. The new CEM emission limit will be established by employing the outlet emissions measured during each compliance test runs and an equation to calculate the 95% confidence limit of compliance employing that compliance test data set. In no event shall it be greater than 124 ppm.

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

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Mr. Steve Smallwood, Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

April 2, 1987

Mr. Bruce Miller
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-105) -- Follow-up To Meeting of March 25, 1987.

Dear Mr. Miller,

I would like to thank you again for the time you, Lee DeHihns, Winston Smith, Wayne Aronson and Loretta Hanks spent with Mark Fisher, Ron Mills and myself on Wednesday, March 25, 1987, discussing Broward County's resource recovery PSD Permits. I believe we have resolved the Sulfur Dioxide issue and are very close on the remaining issues.

As promised, I will provide below some specific comments relating to use of Continuous Emission Monitors (CEMs) and the proposed 8-hour Carbon Monoxide and not-to-exceed Sulfuric Acid Mist emission limits. We will forward under separate cover revised Tables V-1, V-2, V-3, V-5 and V-6 for inclusion in the Final Determination. These Tables will reflect the emission limitations summarized on the attached table which reflects our current understanding of draft permit. If our understanding is incorrect as to your intended emission limitations, then give me a call so the Tables can be prepared correctly.

CONTINUOUS EMISSION MONITORS

It is our understanding that CEMs will be required for O, CO, SO_2, NO_x and Opacity. Specific emission limits would be established in parts per million (ppm) for SO_2, NO_x and CO. It would be our intent to also install a CO_2 monitor to provide data for the correction of data from other CEMs to 12% CO_2. We prefer to continue to use 12% CO_2 instead of 7% O because all of our work to date has been to this correction standard and the 7% O correction factor would apparently be between 8 to 10 percent more stringent.

As we discussed last week, we are concerned about your earlier proposal to use CEMs to enforce permit conditions.Recent

studies have shown that high CEM readings can result from drift or other instrument problems as well as high emissions. We would, therefore, suggest the following language which is consistent with 40 CFR 60 Subpart D New Source Performance Standards for other large steam generators be included in the Permit:

> "Continuous emission monitoring for CO, SO_2, NO_x and Opacity shall be used as an indication of continuous compliance. In the event CEM data indicates noncompliance five percent (5%) or more of total CEM operating time during any month, the Agency may require manual emission testing to be performed to verify CEM data using reference methods specified in this Permit. CEM data recorded during periods of startup and shutdown shall be reported but excluded from compliance averaging periods for CO, SO_2 and Opacity but not for NO_x."

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As I was leaving our meeting last week, Wayne Aronson indicated to me that you were looking at adding an 8-hour CO limit. We have already agreed on a 1-hour 400 ppm and 30-day 81 ppm limits. We feel that this should be more than sufficient but if an intermediate 8-hour rolling average limit is absolutely necessary it should be set at 200 ppm. This represents a combustion efficiency of greater than 99.8%. Alternatively, we would accept a 100 ppm 4-day rolling average as has been used in a number of permits and I believe in EPA guidance documents. An intermediate 8-hour 88 ppm limit would require a 7-hour average of less than 44 ppm during any period when the 1-hour average limit is reached. Such a limit would not recognize the need for reasonable averaging periods.

Attached to this letter is CO data from the Westchester County, New York, Plant for August 1986. A new CEM was installed at the plant in mid-1986 and certified in July 1986 so we believe the data to be relatively accurate. Our recommended 1-hour, 8-hour, 4-day and 30-day averages are supported by this data. You will also note the data reflects drastic short term spikes in values which are characteristic of waste burning plants. The reality of such spikes needs to be recognized in setting averaging period limits.

SULFURIC ACID MIST

We again ask for an Operating Practice and not a numeric limitation be placed in the Permit for H_2SO_4. As you know, very little is known as to the actual quantity of H_2SO_4 which can be anticipated from waste burning facilities. There is also great difficulty in accurately measuring this pollutant at the emission limit requested which is between 1 and 2 ppm. With the County's agreement to reduce SO_2 emissions by at least 65% down to the 60

ppm range, I believe you have adequate assurance that H_2SO_4 emissions will be limited to the extent possible. We, therefore, would once again request you specify in the Permit an Operating Practice for H_2SO_4 of 65% SO_2 removal to the 60 ppm range.

We look forward to reviewing the draft Final Determination and Permit and will provide you with any specific comments.

Sincerely yours,

Thomas M. Henderson

Thomas M. Henderson
Project Director

cc: Celiene Bruce, County Administrator
Mark Fisher, Senitor Chiles' Office
Wendy Strong, Rep. Shaw's Office
Cliff Schulman, Greenberg Traurig Askew
Tim Smith, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.
Bruno Dunn, Signal Environmental Systems
Andy Zergot, Signal Environmental Systems
Jerry W. Whitt, Waste Management, Inc.
Dale Twachtmann, FDER Secretary
Steve Smallwood, FDER Air Bureau
Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau
Julia C. Costas, FDER Assistant General Counsel
Lee DeHihns, EPA Deputy Region IV Administrator
Winston Smith, EPA Air, Pesticides & Toxics Division
Wayne Aronson, EPA Air Program Branch
Jewell Harper, EPA Assistant General Counsel
Loretta Hanks, EPA Region IV Congressional Office

MAXIMUM EMISSION RATES
SOUTH BROWARD RESOURCE RECOVERY PROJECT

Proposed Emission Rates

	County		Environmental Protection Agency	
Pollutant	lb/MMBtu[1]	ppm[2]	lb/MMBtu[1]	ppm[2]
Particulate Matter	0.015gr/ dscf-12%CO_2	--	0.015gr/ dscf-12%CO_2	--
Sulfur Dioxide	0.31	124-60ppm[3]	0.31	124-60 ppm[3]
Nitrogen Dioxides	0.56	350ppm[3]	0.56	350 ppm[3]
Carbon Monoxide	0.09	400ppm[4] 200ppm[5] 81ppm[6]	0.09	400ppm[4] 88ppm[5] 81ppm[6]
Lead	0.0015	--	0.0015	--
Fluorides	0.004	--	0.004	--
Beryllium	9.3×10^{-7}	--	9.3×10^{-7}	--
Mercury	7.5×10^{-4}	--	7.5×10^{-4}	--
Sulfuric Acid Mist	Operating Practice - 65% SO_2 Removal to 60 ppm[2]		0.0047	--

NOTES:

1 All pollutants except Particulate Matter are expressed in Pounds per Million British Thermal Units (lb/MMBtu)

2 All Emission Rates in Parts per Million (ppm) corrected to 12% CO_2.

3 Maximum 3-hour rolling average. 65% removal efficiency required to 60 ppm level.

4 Maximum 1-hour average.

5 Maximum 8-hour rolling average.

6 Maximum 30-day average

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

April 2, 1987

DER
APR 3 1987
BAQM

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Environmental Protection Agency, Region IV
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Proposed Emission Rates

	County		Environmental Protection Agency	
Pollutant	lb/MMBtu[1]	ppm[2]	lb/MMBtu[1]	ppm[2]
Particulate Matter	0.015gr/ dscf-12%CO_2	--	0.015gr/ dscf-12%CO_2	--
Sulfur Dioxide	0.31	124-60ppm[3]	0.31	124-60 ppm[3]
Nitrogen Dioxides	0.56	350ppm[3]	0.56	350 ppm[3]
Carbon Monoxide	0.09	400ppm[4] 200ppm[5] 81ppm[6]	0.09	400ppm[4] 88ppm[5] 81ppm[6]
Lead	0.0015	--	0.0015	--
Fluorides	0.004	--	0.004	--
Beryllium	9.3×10^{-7}	--	9.3×10^{-7}	--
Mercury	7.5×10^{-4}	--	7.5×10^{-4}	--
Sulfuric Acid Mist	Operating Practice - 65% SO_2 Removal to 60 ppm[2]		0.0047	--

NOTES:

1 All pollutants except Particulate Matter are expressed in Pounds per Million British Thermal Units (lb/MMBtu)

2 All Emission Rates in Parts per Million (ppm) corrected to 12% CO_2.

3 Maximum 3-hour rolling average. 65% removal efficiency required to 60 ppm level.

4 Maximum 1-hour average.

5 Maximum 8-hour rolling average.

6 Maximum 30-day average

WESTCHESTER CARBON MONOXIDE DATA
ADJUSTED DRY BASIS
AUGUST 1 TO AUGUST 31 1986 *
(REVERSE CHRONOLOGICAL ORDER)

	DRY CO PPM 1-HR AVG	%O2 DRY (13% H2O)	ACTUAL %O2 MEAS.	EMISSIONS LB/ MMBTU	PPM @12% CO2	PPM @7% O2	8-HOUR AVGS @12% CO2
AUGUST 31 TO 23	4.3	9.5	8.3	0.006	5	5	
	27.4	11.1	9.7	0.041	36	39	
	26.4	11.0	9.6	0.039	34	37	
	27.0	11.1	9.7	0.041	35	38	
	25.0	11.5	10.0	0.039	34	37	
	43.3	12.6	11.0	0.077	67	73	
	19.8	11.1	9.7	0.030	26	28	
	21.1	12.5	10.9	0.037	32	35	33.7
	24.3	10.7	9.3	0.035	30	33	
	15.4	10.6	9.2	0.022	19	21	
	15.1	10.3	9.0	0.021	18	20	
	16.4	11.0	9.6	0.024	21	23	
	12.8	10.8	9.4	0.019	16	18	
	12.2	10.9	9.5	0.018	16	17	
	14.2	10.5	9.1	0.020	17	19	
	15.8	11.0	9.6	0.024	20	22	19.9
	9.4	10.3	9.0	0.013	11	12	
	34.9	12.3	10.7	0.060	52	56	
	95.2	15.1	13.1	0.239	208	226	
	95.7	14.8	12.9	0.232	202	219	
	49.3	13.1	11.4	0.093	81	88	
	34.7	12.0	10.4	0.057	50	54	
	29.5	11.3	9.8	0.045	39	43	
	27.7	11.1	9.7	0.042	36	39	84.9
	26.1	11.0	9.6	0.039	34	37	
	29.8	11.6	10.1	0.047	41	45	
	26.5	12.0	10.4	0.044	38	41	
	32.3	11.7	10.2	0.052	45	49	
	27.2	11.4	9.9	0.042	37	40	
	33.6	11.6	10.1	0.053	46	50	
	26.3	11.4	9.9	0.041	35	38	
	23.1	11.0	9.6	0.034	30	33	38.2
	25.3	10.8	9.4	0.037	32	35	
	36.4	12.0	10.4	0.060	52	57	
	24.7	10.9	9.5	0.036	32	34	
	26.6	11.3	9.8	0.041	35	38	
	22.0	10.8	9.4	0.032	28	30	
	27.1	10.9	9.5	0.040	35	38	
	27.3	11.3	9.8	0.042	36	39	
	32.3	11.3	9.8	0.049	43	47	36.6
	32.6	10.6	9.2	0.046	40	44	
	36.2	11.0	9.6	0.054	47	51	
	28.7	11.4	9.9	0.044	39	42	
	35.0	10.9	9.5	0.052	45	49	
	32.8	11.3	9.8	0.050	44	47	
	27.8	10.9	9.5	0.041	36	39	
	26.3	11.1	9.7	0.040	35	37	

*NOTE: (1) DATA EXCLUDED
8/28 - 4HRS MISSING
8/25 - 5HRS MISSING
(2) HRS WITH EXCESS O2
TRANSFERRED TO
UNADJUSTED
DATA FILE

24.3	11.0	9.6	0.036	32	34	39.5
28.1	11.1	9.7	0.042	37	40	
24.2	11.0	9.6	0.036	31	34	
25.5	10.9	9.5	0.038	33	36	
36.8	11.7	10.2	0.059	51	56	
28.9	11.4	9.9	0.045	39	42	
21.4	11.5	10.0	0.033	29	32	
24.6	11.3	9.8	0.038	33	35	
33.2	12.6	11.0	0.059	51	56	38.0
31.4	12.0	10.4	0.052	45	49	
30.1	10.5	9.1	0.042	37	40	
27.6	11.8	10.3	0.045	39	42	
29.6	12.2	10.6	0.050	43	47	
31.8	11.5	10.0	0.050	43	47	
32.9	11.5	10.0	0.051	45	49	
31.9	11.3	9.8	0.049	42	46	
29.6	12.5	10.9	0.052	45	49	42.5
24.2	11.1	9.7	0.036	32	34	
28.6	12.3	10.7	0.049	43	46	
25.8	11.7	10.2	0.041	36	39	
24.7	12.1	10.5	0.041	36	39	
31.2	11.6	10.1	0.049	43	47	
23.2	11.1	9.7	0.035	30	33	
32.3	11.0	9.6	0.048	42	46	
27.7	12.0	10.4	0.045	40	43	37.6
22.3	11.0	9.6	0.033	29	31	
24.4	11.6	10.1	0.039	34	37	
19.7	11.0	9.6	0.029	26	28	
27.1	11.4	9.9	0.042	36	40	
19.7	10.8	9.4	0.029	25	27	
26.4	11.6	10.1	0.042	36	39	
26.8	11.4	9.9	0.041	36	39	
22.6	10.9	9.5	0.033	29	31	31.4
29.5	12.0	10.4	0.048	42	46	
21.8	10.8	9.4	0.032	28	30	
23.2	11.5	10.0	0.036	32	34	
26.4	12.5	10.9	0.046	40	44	
31.1	11.7	10.2	0.050	43	47	
22.2	10.6	9.2	0.032	28	30	
24.7	11.3	9.8	0.038	33	36	
20.9	12.3	10.7	0.036	31	34	34.6
73.6	14.9	13.0	0.182	158	172	
62.2	14.7	12.8	0.148	129	140	
42.5	12.4	10.8	0.074	64	70	
52.9	12.9	11.2	0.097	84	92	
15.9	10.3	9.0	0.022	19	21	
19.8	11.0	9.6	0.029	26	28	
23.5	11.1	9.7	0.035	31	34	
23.4	11.0	9.6	0.035	30	33	67.7
24.2	10.9	9.5	0.036	31	34	
24.5	11.5	10.0	0.038	33	36	
21.4	10.5	9.1	0.030	26	28	
24.4	10.7	9.3	0.035	31	33	
24.3	10.9	9.5	0.036	31	34	
19.8	10.5	9.1	0.028	24	26	
24.8	10.3	9.0	0.035	30	33	
32.2	10.6	9.2	0.046	40	43	30.8
33.7	10.5	9.1	0.047	41	45	
51.5	12.2	10.6	0.087	76	82	
35.0	11.4	9.9	0.054	47	51	
33.5	10.5	9.1	0.047	41	45	
31.1	11.4	9.9	0.048	42	45	
31.2	11.4	9.9	0.048	42	46	
31.3	11.3	9.8	0.048	42	45	
35.9	12.9	11.2	0.066	57	62	48.4
35.6	12.9	11.2	0.065	57	62	

31.5	11.6	10.1	0.050	43	47	
32.7	12.0	10.4	0.054	47	51	
29.8	11.7	10.2	0.048	42	45	
32.9	12.4	10.8	0.057	50	54	
41.5	12.6	11.0	0.074	64	70	
33.6	11.0	9.6	0.050	44	47	
30.3	12.9	11.2	0.055	48	52	49.3
29.3	10.5	9.1	0.041	36	39	
26.0	10.2	8.9	0.036	31	34	
23.1	10.9	9.5	0.034	30	32	
20.6	10.6	9.2	0.029	26	28	
31.3	10.2	8.9	0.043	38	41	
37.4	12.1	10.5	0.062	54	59	
39.5	15.5	13.5	0.108	94	102	
23.6	19.7	17.1	0.279	243	264	68.8
69.9	16.0	13.9	0.209	182	197	
29.4	13.1	11.4	0.055	48	52	
21.1	11.5	10.0	0.033	29	31	
31.9	10.6	9.2	0.045	40	43	
26.2	10.5	9.1	0.037	32	35	
14.8	10.3	9.0	0.021	18	19	
24.4	10.2	8.9	0.034	29	32	
21.0	10.1	8.8	0.029	25	27	50.3
18.0	9.8	8.5	0.024	21	22	
20.8	10.0	8.7	0.028	24	27	
20.3	9.9	8.6	0.027	24	26	
19.6	10.1	8.8	0.027	23	25	
19.2	9.9	8.6	0.026	22	24	
21.4	10.1	8.8	0.029	25	28	
15.7	10.1	8.8	0.021	19	20	
19.0	10.6	9.2	0.027	24	26	22.7
18.0	10.7	9.3	0.026	23	25	
19.4	10.6	9.2	0.028	24	26	
18.7	9.2	8.0	0.023	20	22	
17.7	9.5	8.3	0.023	20	22	
17.8	9.5	8.3	0.023	20	22	
52.2	12.2	10.6	0.088	77	83	
32.6	11.3	9.8	0.050	43	47	
23.9	10.9	9.5	0.035	31	33	32.2
20.1	10.6	9.2	0.029	25	27	
22.9	10.7	9.3	0.033	29	31	
19.4	10.7	9.3	0.028	24	26	
26.7	11.6	10.1	0.042	37	40	
39.1	13.1	11.4	0.074	64	70	
32.1	13.4	11.7	0.063	55	60	
31.1	13.3	11.6	0.060	53	57	
49.9	13.4	11.7	0.098	86	93	46.5
26.7	12.5	10.9	0.047	41	44	
28.8	10.7	9.3	0.041	36	39	
28.7	10.9	9.5	0.042	37	40	
27.6	10.7	9.3	0.040	35	38	
33.7	10.6	9.2	0.048	42	45	
24.4	10.6	9.2	0.035	30	33	
23.6	10.6	9.2	0.034	29	32	
20.7	10.6	9.2	0.029	26	28	34.4
24.0	10.1	8.8	0.033	28	31	
22.9	10.1	8.8	0.031	27	30	
20.8	10.9	9.5	0.031	27	29	
29.1	12.3	10.7	0.050	43	47	
19.5	10.6	9.2	0.028	24	26	
51.0	12.6	11.0	0.091	79	86	
93.8	14.8	12.9	0.227	198	215	
86.4	16.2	14.1	0.270	236	256	82.8
28.3	17.8	15.5	0.135	117	128	
26.4	18.4	16.0	0.155	135	146	
19.8	18.5	16.1	0.122	106	115	

AUGUST 22 TO 16

19.2	18.7	16.3	0.130	114	123	
18.0	19.4	16.9	0.179	156	170	
16.5	19.7	17.1	0.195	170	184	
47.3	16.9	14.7	0.174	151	164	
27.2	13.7	11.9	0.055	48	52	124.6
15.8	12.8	11.1	0.029	25	27	
28.5	12.0	10.4	0.047	41	44	
17.1	10.9	9.5	0.025	22	24	
12.6	10.5	9.1	0.018	15	17	
50.4	12.4	10.8	0.087	76	83	
26.7	11.7	10.2	0.043	37	40	
14.1	9.5	8.3	0.018	16	17	
21.5	11.0	9.6	0.032	28	30	32.5
16.3	11.3	9.8	0.025	22	24	
18.3	11.1	9.7	0.028	24	26	
15.2	10.8	9.4	0.022	19	21	
11.8	9.9	8.6	0.016	14	15	
12.7	10.1	8.8	0.017	15	16	
14.5	10.2	8.9	0.020	17	19	
13.7	10.3	9.0	0.019	17	18	
14.5	10.3	9.0	0.020	18	19	18.2
16.5	10.5	9.1	0.023	20	22	
22.2	10.8	9.4	0.032	28	31	
14.8	10.2	8.9	0.020	18	19	
11.8	9.5	8.3	0.015	13	14	
16.1	10.5	9.1	0.023	20	21	
18.3	10.2	8.9	0.025	22	24	
23.8	11.1	9.7	0.036	31	34	
17.3	9.7	8.4	0.023	20	21	21.5
13.5	9.7	8.4	0.018	15	17	
12.8	10.1	8.8	0.017	15	16	
9.4	10.3	9.0	0.013	11	12	
12.5	10.6	9.2	0.018	15	17	
52.0	13.4	11.7	0.103	89	97	
45.3	13.0	11.3	0.084	73	80	
13.6	11.0	9.6	0.020	18	19	
15.0	11.1	9.7	0.023	20	21	32.2
24.8	11.3	9.8	0.038	33	36	
81.4	13.7	11.9	0.166	144	157	
95.5	15.2	13.2	0.245	213	232	
77.5	13.8	12.0	0.160	140	152	
56.6	13.9	12.1	0.119	104	113	
21.1	11.8	10.3	0.034	30	32	
21.0	11.6	10.1	0.033	29	31	
30.8	12.1	10.5	0.051	45	48	92.1
16.5	10.6	9.2	0.023	20	22	
27.7	11.4	9.9	0.043	37	40	
18.8	11.1	9.7	0.028	25	27	
28.9	11.4	9.9	0.045	39	42	
20.0	12.5	10.9	0.035	31	33	
27.4	11.5	10.0	0.043	37	40	
15.6	10.8	9.4	0.023	20	21	
25.8	11.1	9.7	0.039	34	37	30.3
26.1	11.1	9.7	0.039	34	37	
23.9	11.0	9.6	0.036	31	34	
27.1	10.1	8.8	0.037	32	35	
26.9	10.7	9.3	0.039	34	37	
19.5	10.0	8.7	0.026	23	25	
19.2	10.0	8.7	0.026	23	24	
23.4	10.1	8.8	0.032	28	30	
23.7	10.2	8.9	0.033	28	31	29.1
20.4	10.2	8.9	0.028	24	27	
21.5	10.5	9.1	0.030	26	29	
11.4	9.8	8.5	0.015	13	14	
21.2	9.4	8.2	0.027	24	26	
31.2	10.8	9.4	0.045	40	43	

24.4	10.0	8.7	0.033	29	31	
24.4	10.7	9.3	0.035	31	33	
17.9	10.1	8.8	0.024	21	23	25.9
24.6	10.1	8.8	0.034	29	32	
20.2	10.3	9.0	0.028	24	27	
22.9	11.0	9.6	0.034	30	32	
22.7	10.7	9.3	0.033	28	31	
29.7	11.4	9.9	0.046	40	43	
24.2	10.9	9.5	0.036	31	34	
22.3	10.7	9.3	0.032	28	30	
19.2	10.6	9.2	0.027	24	26	29.3
16.7	10.5	9.1	0.024	20	22	
28.3	10.7	9.3	0.041	35	39	
19.1	10.5	9.1	0.027	23	25	
18.7	9.5	8.3	0.024	21	23	
22.1	10.1	8.8	0.030	26	28	
30.8	11.5	10.0	0.048	42	46	
26.9	12.5	10.9	0.047	41	45	
22.2	11.0	9.6	0.033	29	31	29.8
8.6	10.6	9.2	0.012	11	12	
16.3	10.8	9.4	0.024	21	22	
11.3	10.6	9.2	0.016	14	15	
11.0	10.6	9.2	0.016	14	15	
11.8	10.7	9.3	0.017	15	16	
16.3	10.6	9.2	0.023	20	22	
17.3	10.5	9.1	0.024	21	23	
14.2	10.3	9.0	0.020	17	19	16.5
16.6	10.6	9.2	0.024	21	22	
17.9	10.7	9.3	0.026	22	24	
13.3	10.2	8.9	0.018	16	17	
9.4	10.6	9.2	0.013	12	13	
12.3	10.3	9.0	0.017	15	16	
9.1	10.5	9.1	0.013	11	12	
23.0	9.5	8.3	0.030	26	28	
22.9	10.5	9.1	0.032	28	30	18.8
19.6	10.2	8.9	0.027	24	26	
29.4	10.7	9.3	0.042	37	40	
23.0	11.1	9.7	0.035	30	33	
23.6	10.3	9.0	0.033	29	31	
26.4	10.8	9.4	0.038	33	36	
25.6	10.9	9.5	0.038	33	36	
27.8	9.9	8.6	0.037	32	35	
25.8	10.3	9.0	0.036	31	34	31.1
27.9	11.7	10.2	0.045	39	42	
19.2	12.2	10.6	0.032	28	31	
25.1	13.0	11.3	0.047	41	44	
48.3	13.3	11.6	0.094	82	89	
33.1	12.8	11.1	0.060	52	57	
19.7	11.6	10.1	0.031	27	29	
18.5	10.2	8.9	0.025	22	24	
22.6	10.5	9.1	0.032	28	30	39.8
25.2	10.2	8.9	0.035	30	33	
27.8	10.6	9.2	0.040	34	37	
29.4	11.0	9.6	0.044	38	41	
30.8	10.8	9.4	0.045	39	42	
26.0	11.3	9.8	0.040	35	38	
19.4	10.6	9.2	0.028	24	26	
12.7	10.3	9.0	0.018	15	17	
11.8	10.6	9.2	0.017	15	16	28.8
12.2	11.8	10.3	0.020	17	19	
6.5	10.9	9.5	0.010	8	9	
8.7	10.2	8.9	0.012	10	11	
79.0	13.3	11.6	0.153	134	145	
96.3	14.8	12.9	0.233	203	220	
96.3	15.3	13.3	0.252	220	238	
40.1	12.6	11.0	0.071	62	68	

AUGUST 15 TO 9

17.1	10.7	9.3	0.025	21	23	84.5
25.8	11.0	9.6	0.038	33	36	
21.2	10.8	9.4	0.031	27	29	
19.4	10.9	9.5	0.029	25	27	
15.8	10.8	9.4	0.023	20	22	
13.6	10.9	9.5	0.020	17	19	
23.6	10.8	9.4	0.034	30	32	
18.1	10.6	9.2	0.026	22	24	
16.4	10.8	9.4	0.024	21	23	24.5
18.3	10.2	8.9	0.025	22	24	
25.7	11.6	10.1	0.041	35	38	
17.8	12.0	10.4	0.029	25	28	
13.4	11.5	10.0	0.021	18	20	
20.6	10.7	9.3	0.030	26	28	
23.4	10.9	9.5	0.034	30	33	
20.2	10.8	9.4	0.029	26	28	
18.9	11.1	9.7	0.028	25	27	25.9
26.2	11.5	10.0	0.041	36	39	
24.5	11.0	9.6	0.036	32	35	
42.5	11.6	10.1	0.067	59	64	
80.7	13.3	11.6	0.157	136	148	
79.6	14.1	12.3	0.173	151	164	
96.2	14.5	12.6	0.220	192	208	
93.7	15.2	13.2	0.240	209	227	
89.4	14.7	12.8	0.212	185	201	124.9
52.6	12.8	11.1	0.095	83	90	
30.2	12.0	10.4	0.050	43	47	
31.2	11.4	9.9	0.048	42	46	
28.4	12.1	10.5	0.047	41	45	
36.0	12.0	10.4	0.059	51	56	
35.0	12.2	10.6	0.059	51	56	
26.2	11.3	9.8	0.040	35	38	
25.4	11.3	9.8	0.039	34	37	47.5
29.1	12.0	10.4	0.048	42	45	
25.5	12.4	10.8	0.044	38	42	
20.1	11.4	9.9	0.031	27	29	
18.6	10.8	9.4	0.027	24	26	
19.3	10.6	9.2	0.027	24	26	
23.4	10.9	9.5	0.034	30	33	
23.5	11.0	9.6	0.035	30	33	
20.2	10.5	9.1	0.028	25	27	30.0
27.6	9.9	8.6	0.037	32	35	
25.5	10.5	9.1	0.036	31	34	
22.7	10.8	9.4	0.033	29	31	
20.8	10.3	9.0	0.029	25	27	
25.4	10.3	9.0	0.035	31	33	
30.3	10.1	8.8	0.041	36	39	
28.1	10.6	9.2	0.040	35	38	
26.1	10.1	8.8	0.036	31	34	31.2
24.7	10.6	9.2	0.035	31	33	
37.7	12.2	10.6	0.064	55	60	
38.6	11.0	9.6	0.057	50	54	
31.2	11.0	9.6	0.046	40	44	
28.9	10.9	9.5	0.043	37	40	
38.2	10.9	9.5	0.056	49	53	
26.1	10.7	9.3	0.038	33	36	
21.8	10.6	9.2	0.031	27	29	40.3
23.8	10.3	9.0	0.033	29	31	
24.5	10.2	8.9	0.034	29	32	
22.1	9.9	8.6	0.029	26	28	
22.7	10.2	8.9	0.031	27	30	
19.9	10.9	9.5	0.029	26	28	
19.7	10.2	8.9	0.027	24	26	
45.3	12.9	11.2	0.083	72	78	
20.6	13.7	11.9	0.042	36	40	33.6
34.2	12.8	11.1	0.062	54	58	

33.5	13.0	11.3	0.062	54	59	
59.0	14.8	12.9	0.143	124	135	
54.7	14.3	12.4	0.121	105	114	
40.3	13.4	11.7	0.079	69	75	
82.1	14.0	12.2	0.175	153	166	
96.1	14.8	12.9	0.233	202	220	
92.2	14.8	12.9	0.223	194	211	119.5
64.6	13.7	11.9	0.131	114	124	
96.1	15.5	13.5	0.262	228	248	
72.1	13.4	11.7	0.142	124	134	
51.2	12.4	10.8	0.089	77	84	
41.1	11.7	10.2	0.066	57	62	
27.9	11.4	9.9	0.043	37	41	
26.1	11.3	9.8	0.040	35	38	
30.4	10.8	9.4	0.044	39	42	89.0
21.0	10.1	8.8	0.029	25	27	
29.7	9.9	8.6	0.040	35	37	
40.8	12.0	10.4	0.067	58	63	
33.6	11.8	10.3	0.054	47	52	
33.7	10.8	9.4	0.049	43	46	
37.8	11.4	9.9	0.058	51	55	
33.6	11.4	9.9	0.052	45	49	
31.6	11.3	9.8	0.048	42	46	43.2
34.7	11.4	9.9	0.054	47	51	
30.2	10.8	9.4	0.044	38	42	
24.9	10.3	9.0	0.035	30	33	
30.3	10.3	9.0	0.042	37	40	
29.1	10.7	9.3	0.042	36	40	
28.5	10.9	9.5	0.042	37	40	
26.7	10.3	9.0	0.037	32	35	
96.1	14.8	12.9	0.233	202	220	57.5
75.9	13.7	11.9	0.154	134	146	
58.9	13.4	11.7	0.116	101	110	
87.0	14.4	12.5	0.196	170	185	
72.1	12.8	11.1	0.130	113	123	
83.2	14.4	12.5	0.187	163	177	
74.5	14.5	12.6	0.171	149	161	
18.7	12.0	10.4	0.031	27	29	
14.6	11.7	10.2	0.023	20	22	109.7
15.9	11.6	10.1	0.025	22	24	
28.2	12.0	10.4	0.046	40	44	
30.0	12.3	10.7	0.051	45	48	
25.5	12.1	10.5	0.042	37	40	
23.6	12.2	10.6	0.040	35	38	
56.2	12.9	11.2	0.103	90	97	
93.6	14.8	12.9	0.226	197	214	
42.0	12.8	11.1	0.076	66	72	66.4
25.4	11.8	10.3	0.041	36	39	
23.5	10.0	8.7	0.032	28	30	
19.2	9.5	8.3	0.025	22	23	
24.5	10.0	8.7	0.033	29	31	
21.4	9.8	8.5	0.028	25	27	
20.3	10.1	8.8	0.028	24	26	
21.5	10.0	8.7	0.029	25	27	
28.6	10.8	9.4	0.042	36	39	28.0
16.9	10.3	9.0	0.024	20	22	
25.0	10.5	9.1	0.035	31	33	
47.4	12.5	10.9	0.083	72	79	
23.0	12.8	11.1	0.042	36	39	
32.7	13.6	11.8	0.065	57	62	
24.3	12.3	10.7	0.042	36	39	
23.3	12.6	11.0	0.041	36	39	
25.0	10.2	8.9	0.034	30	33	39.9
26.6	10.5	9.1	0.037	33	35	
16.5	10.5	9.1	0.023	20	22	
24.9	10.2	8.9	0.034	30	32	

AUGUST 8 TO 1

25.4	10.9	9.5	0.037	33	35	
16.1	10.1	8.8	0.022	19	21	
25.6	10.2	8.9	0.035	31	33	
21.4	10.0	8.7	0.029	25	27	
12.9	10.2	8.9	0.018	15	17	25.7
17.9	9.7	8.4	0.023	20	22	
23.9	11.3	9.8	0.036	32	34	
27.0	12.9	11.2	0.049	43	47	
21.3	10.6	9.2	0.030	26	29	
18.7	10.3	9.0	0.026	23	25	
20.7	10.7	9.3	0.030	26	28	
73.4	13.7	11.9	0.149	130	141	
89.7	16.8	14.6	0.320	279	303	72.4
96.1	19.1	16.6	0.776	676	734	
76.3	17.4	15.1	0.316	276	299	
58.6	13.6	11.8	0.117	102	111	
44.7	13.4	11.7	0.088	77	83	
57.8	13.2	11.5	0.111	96	105	
95.0	14.3	12.4	0.210	183	199	
58.2	13.8	12.0	0.120	105	114	
31.3	12.3	10.7	0.053	47	51	195.1
22.3	9.7	8.4	0.029	25	28	
28.8	10.8	9.4	0.042	37	40	
16.0	10.0	8.7	0.022	19	20	
25.0	10.6	9.2	0.036	31	34	
28.5	9.8	8.5	0.038	33	36	
26.9	10.8	9.4	0.039	34	37	
20.3	10.7	9.3	0.029	25	28	
21.1	10.7	9.3	0.030	26	29	28.8
25.9	10.8	9.4	0.038	33	36	
26.5	11.4	9.9	0.041	36	39	
27.0	11.4	9.9	0.042	36	39	
29.5	11.1	9.7	0.044	39	42	
32.3	11.7	10.2	0.052	45	49	
91.5	16.1	14.0	0.280	244	265	
83.5	16.4	14.3	0.275	239	260	
96.1	16.4	14.3	0.316	276	299	118.4
66.6	14.9	13.0	0.164	143	155	
66.7	14.3	12.4	0.147	128	139	
51.4	13.4	11.7	0.101	88	96	
16.6	11.3	9.8	0.025	22	24	
15.8	10.6	9.2	0.022	20	21	
16.0	11.1	9.7	0.024	21	23	
13.7	9.4	8.2	0.018	15	17	
21.8	10.2	8.9	0.030	26	28	58.0
38.0	13.3	11.6	0.074	64	70	
50.3	13.7	11.9	0.102	89	97	
85.1	13.3	11.6	0.165	144	156	
96.0	14.9	13.0	0.237	206	224	
84.2	14.4	12.5	0.189	165	179	
76.1	14.1	12.3	0.165	144	156	
31.4	12.2	10.6	0.053	46	50	
24.8	11.0	9.6	0.037	32	35	111.3
25.3	10.7	9.3	0.036	32	34	
21.6	10.6	9.2	0.031	27	29	
20.2	10.3	9.0	0.028	24	27	
29.7	11.5	10.0	0.046	40	44	
24.0	11.0	9.6	0.036	31	34	
22.0	11.4	9.9	0.034	30	32	
19.4	11.1	9.7	0.029	25	28	
15.0	10.5	9.1	0.021	18	20	28.5
21.0	10.7	9.3	0.030	26	29	
23.7	10.3	9.0	0.033	29	31	
23.0	10.5	9.1	0.032	28	31	
21.5	10.7	9.3	0.031	27	29	
24.5	11.3	9.8	0.037	33	35	

37.1	12.9	11.2	0.068	59	64	
24.2	12.4	10.8	0.042	36	40	
13.0	11.4	9.9	0.020	17	19	32.0
26.3	12.8	11.1	0.047	41	45	
17.6	11.5	10.0	0.027	24	26	
24.3	12.1	10.5	0.040	35	38	
30.9	12.5	10.9	0.054	47	51	
23.0	12.1	10.5	0.038	33	36	
28.5	12.1	10.5	0.047	41	45	
31.7	12.4	10.8	0.055	48	52	
24.2	11.7	10.2	0.039	34	37	38.0
21.3	11.8	10.3	0.035	30	33	
31.6	12.1	10.5	0.053	46	50	
48.5	13.1	11.4	0.091	80	86	
41.2	13.7	11.9	0.084	73	79	
17.7	10.9	9.5	0.026	23	25	
18.1	10.3	9.0	0.025	22	24	
15.3	10.7	9.3	0.022	19	21	
24.0	10.8	9.4	0.035	30	33	40.3
16.7	10.5	9.1	0.024	20	22	
20.3	10.0	8.7	0.027	24	26	
28.6	10.9	9.5	0.042	37	40	
26.1	12.6	11.0	0.046	40	44	
40.2	12.8	11.1	0.073	63	69	
27.2	11.5	10.0	0.042	37	40	
47.8	11.5	10.0	0.075	65	71	
88.2	14.7	12.8	0.209	182	198	58.6
88.8	16.1	14.0	0.271	236	257	
45.9	18.4	16.0	0.269	234	254	
8.3	19.7	17.1	0.098	85	93	
9.5	19.5	17.0	0.103	89	97	
9.1	19.4	16.9	0.091	79	86	
67.3	14.8	12.9	0.163	142	154	
50.7	14.0	12.2	0.108	94	102	
23.1	19.0	16.5	0.175	153	166	139.1
33.9	18.7	16.3	0.230	200	218	
90.4	18.5	16.1	0.555	483	525	
85.1	18.2	15.8	0.456	398	432	
50.0	17.9	15.6	0.247	215	234	
53.8	18.3	15.9	0.301	262	285	
56.8	16.9	14.7	0.208	182	197	
88.5	14.4	12.5	0.199	173	188	
92.6	15.4	13.4	0.247	216	234	266.2
54.1	14.7	12.8	0.128	112	122	
36.4	13.8	12.0	0.075	66	71	
41.8	13.1	11.4	0.079	69	75	
20.0	10.6	9.2	0.028	25	27	
20.3	9.9	8.6	0.027	24	26	
18.7	9.8	8.5	0.025	21	23	
19.4	9.9	8.6	0.026	23	24	
17.4	10.1	8.8	0.024	21	22	44.9
14.9	9.7	8.4	0.019	17	18	
18.3	9.4	8.2	0.023	20	22	
24.7	10.9	9.5	0.036	32	34	
21.3	10.3	9.0	0.030	26	28	
15.5	10.1	8.8	0.021	18	20	
20.7	10.2	8.9	0.029	25	27	
22.7	12.6	11.0	0.040	35	38	
14.1	12.1	10.5	0.023	20	22	24.2
24.2	12.8	11.1	0.044	38	41	
17.5	10.3	9.0	0.024	21	23	
15.6	9.9	8.6	0.021	18	20	
20.8	10.5	9.1	0.029	25	28	
21.9	10.3	9.0	0.030	27	29	
16.4	10.1	8.8	0.022	19	21	
16.4	10.1	8.8	0.022	19	21	

	20.6	10.0	8.7	0.028	24	26	24.1
	19.4	10.6	9.2	0.028	24	26	
	21.1	10.9	9.5	0.031	27	29	
	22.9	10.7	9.3	0.033	29	31	
	21.2	10.2	8.9	0.029	25	28	
	20.4	10.3	9.0	0.028	25	27	
	23.5	10.9	9.5	0.035	30	33	
	27.6	10.3	9.0	0.038	33	36	
	24.3	10.2	8.9	0.033	29	32	27.8
	14.3	10.0	8.7	0.019	17	18	
	19.7	9.8	8.5	0.026	23	25	
	21.8	10.8	9.4	0.032	28	30	
	20.6	10.0	8.7	0.028	24	26	
	29.0	10.6	9.2	0.041	36	39	
	47.4	12.5	10.9	0.083	72	79	
	18.4	10.7	9.3	0.026	23	25	
	22.3	10.1	8.8	0.030	26	29	31.1
	35.6	10.6	9.2	0.051	44	48	
	26.7	9.9	8.6	0.036	31	34	
	25.8	11.0	9.6	0.038	33	36	
	22.6	10.6	9.2	0.032	28	30	
	27.6	11.5	10.0	0.043	38	41	
	15.3	10.3	9.0	0.021	19	20	
	18.7	10.5	9.1	0.026	23	25	
	32.4	11.5	10.0	0.051	44	48	32.5
	32.8	11.8	10.3	0.053	46	50	
	18.7	11.3	9.8	0.029	25	27	
	21.5	10.3	9.0	0.030	26	28	
	25.1	11.3	9.8	0.038	33	36	
	21.9	11.1	9.7	0.033	29	31	
	17.1	10.6	9.2	0.024	21	23	
	18.3	10.8	9.4	0.027	23	25	
	28.0	11.5	10.0	0.044	38	41	30.2
	41.1	11.6	10.1	0.065	57	61	
	35.2	12.4	10.8	0.061	53	58	
	24.7	10.9	9.5	0.036	32	34	
COUNT	611	611	611	611	611	611	76
DEGREES OF FREEDOM	610	610	610	610	610	610	75
AVERAGE (ARITHMETIC)	30.7	11.7	10.2	0.1	52.5	57.1	52.6
AVERAGE (GEOMETRIC)	26.8	11.6	10.0	0.044	38.5	41.8	43.1
MAXIMUM VALUE	96.3	19.7	17.1	0.8	675.8	734.1	266.2
STANDARD DEV. (GEOMETRIC)	0.495	0.144	0.144	0.691	0.691	0.691	0.581
STUDENT T-VALUE	2.326	2.326	2.326	2.326	2.326	2.326	2.382
99% CONFIDENCE- UPPER LIMIT (GEOMETRIC) (STUDENT "T" STATISTIC, "ONE TAILED" TEST CRITERION)	84.7	16.1	14.0	0.2	192.2	208.7	172.0

PM
4-13-87
Ft. Lauderdale, FL

Barry
Ft. Lauderdale

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

DER
APR 15 1987
BAQM

April 9, 1987

Mr. Wayne Aronson
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-105) -- Follow-up To Meeting of March 25, 1987.

Dear Mr. Aronson,

I am enclosing the revised Final Determination Tables V-1, V-2, V-3, V-5, and V-6 which we agreed to provide at our meeting on March 25, 1987. If you have any questions concerning these Tables, then please telephone directly to Ken Kosky or Bob McCann of KBN Engineering at (904)375-8000.

I would also appreciate your sending Ken a copy of the draft Final Determination and Permit. Because of an insufficient address which was apparently used on Bruce Miller's transmittal letter to me, we have not yet received this material. I will be out of the office most of next week but I will be in contact with Ken. I would, therefore, appreciate your getting him a copy overnight. Please send the copy by Federal Express and charge it to my account number (1109-9482-6).

Thank you for your assistance.

Sincerely yours,

Thomas M. Henderson

Thomas M. Henderson
Project Director

cc: Celiene Bruce, County Administrator
Cliff Schulman, Greenberg Traurig Askew
Tim Smith, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.

Bruno Dunn, Signal Environmental Systems
Andy Zergot, Signal Environmental Systems
Jerry W. Whitt, Waste Management, Inc.
Steve Smallwood, FDER Air Bureau
Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau

Table V-1. Broward County Resource Recovery Facility Source Parameters

Source (1)	UTM - E (km)	UTM - N (km)	Stack Height (M)	Exit Temp. (K)	Exit Velocity (M/S)	Stack Diameter (M)
Unit 1	579.6	2883.3	59.4	381	18.0 (2)	2.29
Unit 2	579.6	2883.3	59.4	381	18.0 (2)	2.29
Unit 3	579.6	2883.3	59.4	381	18.0 (2)	2.29

(1) Three 750 TPD MSW fired boilers, each with a flue to a common stack. For modeling purposes, the common stack was given a stack diameter of 5.03 m and an exit velocity of 11.2 m/s, providing for a minimum flow rate.

(2) Estimated by using flow rate of 157,200 ACFM and calculating with given diameters.

Table V-2. Broward County Resource Recovery Facility Maximum Emission Rates[a]

Pollutant	(lb/MMBTU)	(PPM)	(lb/hr)	(ton/yr)
PM	0.038[b]	--	37	162
SO_2	0.31	124-60[c]	301	1318[c]
NO_x	0.56	350[d]	615.6	2380
CO	0.089	e	425.6	378
VOC	0.013[f]	--	12.6	55.2
Pb	0.0015	--	1.46	6.4
F^-	0.004	--	3.88	17.0
H_2SO_4 Mist	g	--	g	g
Be	9.3×10^{-7}	--	0.0009	0.004
Hg	7.5×10^{-4}	--	0.73	3.2
As	0.000031	--	0.030	0.13

a. Based on facility capacity of 970.5 MMBTU/hr firing MSW. Maximum emissions in lb/hr calculated based on maximum ppm level if applicable. Maximum tons per year based on maximum lb/hr emission rate except for NO_x and CO; these are based on maximum lb/MMBTU level.

b. Based on 0.015 gr/dscf corrected to 12% CO_2.

c. A maximum 3-hour rolling average corrected to 12% CO_2. A removal efficiency of 65% required. Actual tons per year will be between 1318 and 639 depending on actual sulfur in MSW.

d. A maximum 3-hour rolling average corrected to 12% CO_2.

e. Maximum 1-hour average of 400 ppm, maximum 8-hour rolling average of 200 ppm and maximum 30 day rolling average of 81 ppm; corrected to 12% CO_2.

f. Covered under nonattainment provisions for O_3 and not applicable for PSD review.

g. Operating practice to reduce SO_2 (see c).

Table V-3. Broward County Resource Recovery Facility Maximum Air Quality Impacts Compared to the De Minimis Ambient Levels

Pollutant and Averaging Time	Predicted Impact (ug/m^3)	De Minimis Ambient Impact Level (ug/m^3)
SO_2 (24-hour)	6.2	13
PM (24-hour)	0.8	10
NO_2 (Annual)	1.4	14
CO (8-hour)	11.8	575
Pb (24-hour)	0.03	0.1
F^- (24-hour)	0.081	0.25
Be (24-hour)	0.00002	0.0005
Hg (24-hour)	0.015	0.025

Table V-5. Broward County Resource Recovery Facility Comparison of New Source Impacts with PSD Increments

Pollutant and Averaging Time	PSD Class II Increment (ug/m^3)	Predicted Increased Concentration (ug/m^3)	Percent Increment Consumed	PSD Class I Increment (ug/m^3)	Predicted Increased Concentration (ug/m^3)	Percent Increment Consumed
SO_2*						
3-hour	512	26	5	25	4	16
24-hour	91	6	7	5	1	20
Annual	20	<1	<5	2	<1	<50
PM						
24-hour	37	<1	<3	10	<1	<10
Annual	19	<<1	<<5	5	<<1	<<20

* Based on a maximum emission of 301 lb/hr; actual emissions would likely be much lower based on 65% SO_2 removal efficiency.

Table V-6. Broward County Resource Recovery Facility Comparison of Total Impact with the AAQS

Pollutant and Averaging Time	Maximum Impact Project (ug/m^3)	Maximum Impact (1) All Sources (ug/m^3)	Existing Background (2) (ug/m^3)	Maximum Total Impact (ug/m^3)	Florida AAQS (ug/m^3)
SO_2					
3-hour	26	625	63 (3)	688	1300
24-hour	6	216	28	244	260
Annual	<1 (4)	-	4	-	60
PM					
24-hour	<1 (4)	-	93	-	150
Annual	<<1 (4)	-	59	-	60
NO_2					
Annual	1.4	-	42	43	100
CO					
1-hour	64 (4)	-	17,000	-	40,000
8-hour	12 (4)	-	10,000	-	10,000
Pb					
3-months	<0.1	-	0.9	1	1.5

(1) Maximum impact includes the FPL Port Everglades and Fort Lauderdale power plants.

(2) Existing background is estimated using the highest monitored concentrations in the area near the proposed facility.

(3) The 3-hour background is estimated by multiplying the 24-hour background by 2.25.

(4) Less than significant, no further analysis completed.

DER

APR 17 1987

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Barry

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

April 9, 1987

Mr. Wayne Aronson
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-105) --
Follow-up To Meeting of March 25, 1987.

Dear Mr. Aronson,

I am enclosing the revised Final Determination Tables V-1, V-2, V-3, V-5, and V-6 which we agreed to provide at our meeting on March 25, 1987. If you have any questions concerning these Tables, then please telephone directly to Ken Kosky or Bob McCann of KBN Engineering at (904)375-8000.

I would also appreciate your sending Ken a copy of the draft Final Determination and Permit. Because of an insufficient address which was apparently used on Bruce Miller's transmittal letter to me, we have not yet received this material. I will be out of the office most of next week but I will be in contact with Ken. I would, therefore, appreciate your getting him a copy overnight. Please send the copy by Federal Express and charge it to my account number (1109-9482-6).

Thank you for your assistance.

Sincerely yours,

Thomas M. Henderson

Thomas M. Henderson
Project Director

cc: Celiene Bruce, County Administrator
Cliff Schulman, Greenberg Traurig Askew
Tim Smith, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.

Bruno Dunn, Signal Environmental Systems
Andy Zergot, Signal Environmental Systems
Jerry W. Whitt, Waste Management, Inc.
Steve Smallwood, FDER Air Bureau
Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau

Table V-1. Broward County Resource Recovery Facility Source Parameters

Source (1)	UTM - E (km)	UTM - N (km)	Stack Height (M)	Exit Temp. (K)	Exit Velocity (M/S)	Stack Diameter (M)
Unit 1	579.6	2883.3	59.4	381	18.0 (2)	2.29
Unit 2	579.6	2883.3	59.4	381	18.0 (2)	2.29
Unit 3	579.6	2883.3	59.4	381	18.0 (2)	2.29

(1) Three 750 TPD MSW fired boilers, each with a flue to a common stack. For modeling purposes, the common stack was given a stack diameter of 5.03 m and an exit velocity of 11.2 m/s, providing for a minimum flow rate.

(2) Estimated by using flow rate of 157,200 ACFM and calculating with given diameters.

Table V-2. Broward County Resource Recovery Facility Maximum Emission Rates[a]

Pollutant	(lb/MMBTU)	(PPM)	(lb/hr)	(ton/yr)
PM	0.038[b]	--	37	162
SO_2	0.31	124-60[c]	301	1318[c]
NO_x	0.56	350[d]	615.6	2380
CO	0.089	e	425.6	378
VOC	0.013[f]	--	12.6	55.2
Pb	0.0015	--	1.46	6.4
F^-	0.004	--	3.88	17.0
H_2SO_4 Mist	g	--	g	g
Be	9.3×10^{-7}	--	0.0009	0.004
Hg	7.5×10^{-4}	--	0.73	3.2
As	0.000031	--	0.030	0.13

a. Based on facility capacity of 970.5 MMBTU/hr firing MSW. Maximum emissions in lb/hr calculated based on maximum ppm level if applicable. Maximum tons per year based on maximum lb/hr emission rate except for NO_x and CO; these are based on maximum lb/MMBTU level.

b. Based on 0.015 gr/dscf corrected to 12% CO_2.

c. A maximum 3-hour rolling average corrected to 12% CO_2. A removal efficiency of 65% required. Actual tons per year will be between 1318 and 639 depending on actual sulfur in MSW.

d. A maximum 3-hour rolling average corrected to 12% CO_2.

e. Maximum 1-hour average of 400 ppm, maximum 8-hour rolling average of 200 ppm and maximum 30 day rolling average of 81 ppm; corrected to 12% CO_2.

f. Covered under nonattainment provisions for O_3 and not applicable for PSD review.

g. Operating practice to reduce SO_2 (see c).

Table V-3. Broward County Resource Recovery Facility Maximum Air Quality Impacts Compared to the De Minimis Ambient Levels

Pollutant and Averaging Time	Predicted Impact (ug/m^3)	De Minimis Ambient Impact Level (ug/m^3)
SO_2 (24-hour)	6.2	13
PM (24-hour)	0.8	10
NO_2 (Annual)	1.4	14
CO (8-hour)	11.8	575
Pb (24-hour)	0.03	0.1
F^- (24-hour)	0.081	0.25
Be (24-hour)	0.00002	0.0005
Hg (24-hour)	0.015	0.025

Table V-5. Broward County Resource Recovery Facility Comparison of New Source Impacts with PSD Increments

Pollutant and Averaging Time	PSD Class II Increment (ug/m^3)	Predicted Increased Concentration (ug/m^3)	Percent Increment Consumed	PSD Class I Increment (ug/m^3)	Predicted Increased Concentration (ug/m^3)	Percent Increment Consumed
SO_2*						
3-hour	512	26	5	25	4	16
24-hour	91	6	7	5	1	20
Annual	20	<1	<5	2	<1	<50
PM						
24-hour	37	<1	<3	10	<1	<10
Annual	19	<<1	<<5	5	<<1	<<20

* Based on a maximum emission of 301 lb/hr; actual emissions would likely be much lower based on 65% SO_2 removal efficiency.

Table V-6. Broward County Resource Recovery Facility Comparison of Total Impact with the AAQS

Pollutant and Averaging Time	Maximum Impact Project (ug/m^3)	Maximum Impact (1) All Sources (ug/m^3)	Existing Background (2) (ug/m^3)	Maximum Total Impact (ug/m^3)	Florida AAQS (ug/m^3)
SO_2					
3-hour	26	625	63 (3)	688	1300
24-hour	6	216	28	244	260
Annual	<1 (4)	-	4	-	60
PM					
24-hour	<1 (4)	-	93	-	150
Annual	<<1 (4)	-	59	-	60
NO_2					
Annual	1.4	-	42	43	100
CO					
1-hour	64 (4)	-	17,000	-	40,000
8-hour	12 (4)	-	10,000	-	10,000
Pb					
3-months	<0.1	-	0.9	1	1.5

(1) Maximum impact includes the FPL Port Everglades and Fort Lauderdale power plants.

(2) Existing background is estimated using the highest monitored concentrations in the area near the proposed facility.

(3) The 3-hour background is estimated by multiplying the 24-hour background by 2.25.

(4) Less than significant, no further analysis completed.

Barry

BROWARD COUNTY, FLORIDA
Office of Resource Recovery
115 South Andrews Avenue
Fort Lauderdale, Florida 33301
305-357-6458

DER

MAY 6 1987

BAQM

April 27, 1987

Mr. Wayne Aronson
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-105) -- Comments on draft Final Determination and Permit sent under April 17, 1987 cover.

Dear Mr. Aronson,

Enclosed you will find our comments on the draft Final Determination and Permit sent to me under Bruce Miller's cover dated April 17, 1987.

I have marked the changes we would suggest in the margins on the affected pages and placed any comments or explanations in brackets "[ ]". Most of our suggestions are only editorial. I believe the others involve issues we have discussed in the past.

I will be out of town on Tuesday, April 28, 1987, but I will give you a telephone call on Wednesday so we can discuss any question you might have concerning our comments.

Thank you for your consideration of our comments.

Sincerely yours,

Thomas M. Henderson
Project Director

cc: Celiene Bruce, County Administrator
Tim Smith, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.
Bruno Dunn, Signal Environmental Systems
Andy Zergot, Signal Environmental Systems

Jerry W. Whitt, Waste Management, Inc.
Steve Smallwood, FDER Air Bureau
Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau

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I. INTRODUCTION

Pursuant to Section 403.505, Florida Statutes, South Broward Resource Recovery Project, Inc. (County), applied to the Florida Department of Environmental Regulation (DER) in April 1985 for certification of a steam electric generating, solid waste energy recovery facility at a site near the intersection of the U.S. Route 441 and State Road 84 in Broward County, Florida. After a thorough review by DER, including public hearings, the Florida Power Plant Siting Board issued a site certification to the County. At the time, FDER believed that such a site certification constituted a legal prevention of significant deterioration (PSD) permit under Chapter 17-2.500 of the Florida air pollution regulations which had been approved by the U.S. Environmental Protection Agency (EPA) on December 22, 1983. In the summer of 1985, EPA became aware that the Florida Electrical Power Plant Siting Act (PPSA), under which the site certification was issued, restricts the authority of the State of Florida to implement any regulation (i.e., PSD Regulations) pertaining to power plants other than those in the Act. Consequently, EPA determined that the Florida PSD regulations were superseded by the PPSA, and that the PPSA could not legally be approved by EPA as part of the State Implementation Plan (SIP) since it did not comply with EPA PSD regulations both procedurally and substantively. Thus, EPA concluded that the proposed South Broward County Resource Recovery Facility (RRF) [redacted] a valid PSD permit under the PPSA. EPA subsequently remanded PSD authority for sources subject to the PPSA while delegating responsibility for the technical and administrative portions of the PSD review to the FDER. The following final determination and permit constitute the culmination of those activities delegated to the FDER by EPA.

of the County's application

could not be issued

EPA's Final action as well as

The applicant plans to construct a 2250 tons per day (TPD) solid waste-to-energy facility to be located near the intersection of the U.S. Route 441 and State Road 84 in Broward County, Florida. Municipal solid waste (MSW) will be combusted to produce steam for power generation. The present plans are to construct three 750 TPD MSW incinerators. An ultimate maximum capacity of 3300 TPD is anticipated in the future which will require the addition of a fourth incinerator. The Broward County Resource Recovery Office will need to submit an application to construct the fourth unit at a future date. The applicant requests that each unit be permitted at 115% of its rated capacity. At 115% capacity, each of the three energy recovery units will have an approximate heat input of 323.6 million Btu per hour based on a heat content of 4500 Btu/lb for MSW. Each incinerator will be [redacted] to operate 8760 hours per year. The yearly tonnage of the various air pollutants emitted were calculated on this basis.

allowed

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IV. BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

A. Particulate Matter

New Source performance standards for incinerators limit particulate emissions from these units to 0.08 grains per dry standard cubic foot (gr/dscf) based on a 12% flue gas concentration of carbon dioxide. NSPS for industrial-commercial-institutional steam generating units limit particulate emissions from these units to 0.10 lb/mmBtu or approximately 0.05 gr/dscf. However, BACT clearinghouse reports incinerators emission limits to be from 0.01 to 0.03 gr/dscf.

In making the BACT determination, an emissions limit was selected to ensure that hazardous yet unregulated pollutants are controlled in accordance with the North County incinerator PSD remand. The control of dioxins, furans, and other condensible organics is hypothesized to occur due to their condensation and adsorption on particulate matter. As the collective surface area of fine particulate matter is greater than that of larger particles per mass unit and fine particulate matter consists of a significant portion of the total particulate matter, control equipment should be selected which ensures [redacted] degree of control for fine particulates. [redacted] EPA has [redacted] to the use of an ESP, [redacted]. The limit which was determined to be BACT is 0.015 gr/dscf and represents an approximate increase in ESP anualized costs of $134,000 per year or a cost of $1,035 per ton of additional particulate removed. However, the applicant may install either baghouse or an ESP to meet this limitation.

Energy impacts are considered to be insignificantly affected by the increase in removal efficiency, and environmental benefit due to decreased emissions of unregulated hazardous pollutants is not assessable at this time [redacted].

B. Sulfur Dioxide

The emissions of sulfur dioxide from municipal solid waste incinerators [redacted] depend [redacted] on three factors. These factors are: the sulfur content of the waste, the conversion of organic and inorganic sulfur compounds to sulfur dioxide, and the retention of the sulfur dioxide in the ash. This determination assumes that all combined sulfur is converted and none is retained in the ash.

The applicant has reported the sulfur content of the waste to be 0.19 wt% maximum and 0.12 wt% average. This results in SO_2 emission rates of 7.6 to 4.8 lb/ton of MSW fired, or, at 4500 Btu/lb, 0.840 to 0.530 lb/mmBtu, respectively. Taking into account the selection of acid gas control devices (explained under acid gas BACT), the resultant emissions of sulfur dioxide

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should be reduced by at least 65% [redacted]. EPA and the applicant have agreed that 65% control of sulfur dioxide is BACT and should result in an emissions rate range of 0.290 lb/mmBtu to 0.186 lb/mmBtu. The emissions limit stipulated as BACT in the permit is a 65% reduction of sulfur dioxide emissions, not to exceed 0.310 lb/mmBtu. This limit was based on [redacted] the emissions limits at other facilities and the variability of fuel sulfur content. Economic and environmental considerations are included under the acid gas BACT section.

C. Acid Gases

Acid gases consist primarily of sulfuric acid mist, hydrogen fluoride, and the unregulated pollutant hydrogen chloride. BACT for acid gas control was selected based on the North County remand which allows the consideration of unregulated pollutants in the assessment of BACT for regulated pollutants. The selection of 90% acid gas control includes the reduction of hydrogen chloride emissions in the economic analysis and the reduction of condensible unregulated organic emissions (i.e., dioxins, furans) and heavy metals, due to the gas cooling effects of the acid gas control system proposed, in the environmental benefit analysis.

possible

Sulfuric acid mist is generated as a result of the oxidation of sulfur dioxide to sulfur trioxide in the flue gas. Combination of sulfur trioxide and water results in the formation of sulfuric acid mists. The uncontrolled emissions of this pollutant are estimated to be as high as 200 TPY. BACT of 90% control of these emissions results in an emissions reduction of 180 TPY.

Hydrogen fluoride is created through the combustion of waste materials containing fluorine. Although the reported emissions of hydrogen fluoride vary greatly, the emissions have been reported to be as high as 0.02 lb/mmBtu. However, the applicant predicts an uncontrolled emission rate of 0.04 lb/mmBtu or 170 TPY at this [redacted] facility. A 90% control efficiency for this pollutant results in the control of 153 TPY based on the agreed emission rate of 0.004 lb/mmBtu and is considered BACT.

at other facilities

The formation of hydrogen chloride emissions is due primarily to the combustion of plastics containing chlorine. [redacted] The expected uncontrolled emissions from this facility are 0.47 lb/mmBtu or 2013 tons per year. Acid gas control will provide control of 90% of these emissions of hydrogen chloride or 1993 TPY.

BACT is to be based upon today's conditions not the year 2000.

In assessing the economic impacts, 240 TPY of sulfur dioxide, 180 TPY of sulfuric acid mist, 153 TPY of hydrogen fluoride, and 1994 TPY of hydrogen chloride were used in determining the cost effectiveness of acid gas control. EPA studies have estimated that the cost of acid gas control for this facility to be approximately 3 million dollars in annualized costs. This results in a cost of $1169 per ton of total pollutants (listed above) and is considered reasonable.

The environmental benefits due to application of acid gas control are the reduction of the flue gas temperature for the condensation of dioxins, furans, pyrenes, biphenyls, and mercury which may then be removed by a high efficiency particulate control device. Even though the formation of the toxic organic compounds ~~is~~ due to the design and operation of the combustion device, studies show that the use of acid gas control and high efficiency particulate removal equipment is capable of achieving a 99+% reduction of the compounds formed. No acceptable levels of exposure to these compounds have been ~~established~~ and EPA is ~~[illegible]~~ obligated to ensure the public a minimal exposure to them.

may be

established by EPA ;

therefore

D. Nitrogen Oxides

During combustion of municipal solid waste, NO_x is formed in high temperature zones in and around the furnace flame by the oxidation of atmospheric nitrogen and nitrogen in the waste. The two primary variables that affect the formation of NO_x are the combustion temperatures and the concentration of oxygen. Techniques such as the method of fuel firing, correct distribution of combustion air between overfire and underfire air, exhaust gas recirculation, and decreased heat release rates have been used to reduce NO_x emission. A few add-on control techniques such as catalytic reduction with ammonia and thermal de-NO_x are still experimental and not considered to be demonstrated technology for the proposed project. State-of-the-art control of the combustion variables will be used to limit NO_x emissions at 0.54 lb/mmBtu. This level of control is judged to represent BACT.

NSPS for industrial-commercial-institutional steam generating units regulates nitrogen oxide emissions for this facility if auxiliary fuels exceed 10% of the fuel input. Permit limits have been stipulated to ensure that auxiliary fuel input at each of the units will be less than 10%.

E. Carbon Monoxide

Incomplete combustion causes the emissions of solid carbon particles (e.g., smoke or soot) unburned and/or partially oxidized hydrocarbons and carbon monoxide, as well as resulting in the loss of heat energy. The applicant proposes that good equipment design and operation are BACT for carbon monoxide. Based on technical information relating good combustion practices and BACT determinations from other states, a limit of 0.090 lb/mmBtu is judged to represent BACT for carbon monoxide emissions.

Table V-3

Broward County Resource Recovery Facility
Maximum Air Quality Impacts of the RRF
For Comparison to the De minimus Ambient Levels

Pollutant and Averaging Time	Predicted Impact (ug/m^3)	De minimus Ambient Impact Level (ug/m^3)
SO_2 (24-hour)	6.2	13
PM (24-hour)	0.8	10
NO_2 (Annual)	1.4	14
CO (8-hour) *	11.8	575
Pb (24-hour)	0.03	0.1 (quarterly)
F^- (24-hour)	0.081	0.25
Be (24-hour)	0.00002	0.0005
Hg (24-hour)	0.015	0.025

* Based on an assumed maximum of 200 ppm, 8-hour average.

Table V-6

Broward County Resource Recovery Facility
Comparison of Total Impact with the AAQS

Pollutant and Averaging Time	Maximum Impact Project (ug/m^3)	Maximum Impact (1) All Sources (ug/m^3)	Existing Background (2) (ug/m^3)	Maximum Total Impact (ug/m^3)	National Ambient Air Quality Standard (ug/m^3)
SO_2					
3-hour	26	625	63 (3)	688	1300
24-hour	6	216	28	244	260
Annual	<1 (4)	-	4	-	60
PM					
24-hour	<1 (4)	-	93	-	150
Annual	<<1 (4)	-	59	-	60
NO_2					
Annual	1.4 (4)	-	42	43	100
CO					
1-hour	64 (4)	-	17,000	-	40,000
8-hour	12 (4)	-	10,000	-	10,000
Pb					
3-months	<0.1	-	0.9	1	1.5

(1) Maximum impact includes the FPL Port Everglades and Fort Lauderdale power plants.

(2) Existing background is estimated using the highest monitored concentrations in the area near the proposed facility.

(3) The 3-hour background is estimated by multiplying the 24-hour background by 2.25.

(4) Less than significant, no further analysis completed. For CO, analysis based on 400 ppm, 1 hour maximum and an assumed maximum of 200 ppm, 8-hour average.

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Specific Conditions

1. Emission Limitations

a. Stack emissions from each unit shall not exceed the following:

Particulate: 0.0150 gr/dscf dry volume corrected to 12% CO_2.

Sulfur Dioxide: 0.140 lb/mmBtu heat input and 60 ppm (3-hr rolling average, dry volume, corrected to 12% CO_2), or 65% control of total SO_2 emissions.* In no case shall the SO_2 emissions exceed 0.310 lb/mmBtu heat input and 124 ppm (3-hr rolling average, dry volume, corrected to 12% CO_2).

Initial and subsequent compliance tests shall determine the actual emission limit (in ppm) from the control device at 65% control efficiency. The observed average emission rate from compliance testing will be statistically analyzed using a 95% probability level to derive a hypothetical emission rate. The final operating SO_2 emission limit (in ppm) shall be based on this hypothetical emission rate (3-hr rolling average, dry volume, corrected to 12% CO_2).

but no more than 124 ppm or less than 60 ppm

Nitrogen Oxides: .560 lb/mmBtu (350 ppm, 3-hr rolling average, dry volume, corrected to 12% CO_2).

We would like a ceiling and a floor. This is consistent with first paragraph.

Carbon Monoxide: .090 lb/mmBtu (400 ppm, 1-hr rolling average, dry volume, corrected to 12% CO_2).
(88 ppm, 4-day rolling average, dry volume, corrected to 12% CO_2).

Lead: .00150 lb/mmBtu

Fluorides: .0040 lb/mmBtu

Beryllium: 9.30×10^{-7} lb/mmBtu

Mercury: 7.50×10^{-4} lb/mmBtu

Sulfuric acid mist: 4.70×10^{-3} lb/mmBtu

Uncontroled

* ~~Total~~ SO_2 emissions will be measured at the inlet to the acid gas control device.

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Visible Emissions: Opacity of stack emissions shall not be greater than 15% opacity. Excess opacity resulting from startup or shutdown shall be permitted providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess opacity shall be minimized but in no case exceed two hours in any 24-hour period unless specifically authorized by EPA for longer duration.

Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during start-up or shutdown shall be prohibited.

The units are subject to 40 CFR Part 60, Subpart E and Subpart Db, New Source Performance Standards (NSPS), except that where requirements in this permit are more restrictive, the requirements in this permit shall apply.

There shall be no greater than 10% opacity for emissions from the refuse bunker and the ash handling and loadout. The potential for dust generation by ash handling activities will be mitigated by quenching the ash prior to loading in ash transport trucks. Additionally, all portions of the proposed facility, including the ash handling facility, which have the potential for fugitive emissions will be enclosed. Also, those areas which have to be open for operational purposes, (e.g., tipping floor of the refuse bunker while trucks are entering and leaving) will be under negative air pressure.

b. Only distillate fuel oil or natural gas shall be used in startup burners. The annual capacity factor for use of natural gas and oil, as determined by 40 CFR 60.43b(d), shall be less than 10%. If the annual capacity factor of natural gas is greater than 10%, then the facility shall be subject to 560.44 b.

c. None of the three individual municipal solid waste incinerators shall be charged in excess of 323.6 mmbtu/hr and 863 tons per day MSW (115% rated capacity).

d. Compliance Tests

(1) a. Annual compliance tests for particulate matter, lead, SO_2, nitrogen oxides, CO, fluorides, mercury, and beryllium shall be conducted in accordance with 40 CFR 60.8 (a), (b), (d), (e), and (f).

b. Compliance with the opacity standard for the incinerator stack emissions in condition 1.a. of this part shall be determined in accordance with 40 CFR 60.11 (b) and (e).

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2. Compliance with emission limitations specified in lb/mmBtu in conditions 1.a. and 1.c. of this part shall be determined by calculating an "F" factor in dscf/mmbtu corrected to 12% CO_2 using the boilers' efficiency (as determined by the calorimeter method contained in Attachment A during acceptance testing) and the measured steam production and quality. Data obtained from test methods required in condition 1.d. of this part for compliance testing shall be used for the calculation of the "F" factor required by this condition.

See P.9, Table V-1 and P19, Section VI.D.

3. The height of each boiler exhaust stack shall not be less than 59.4 meters above ground level at the base of the stack.

4. Each incinerator boiler shall have a metal name plate affixed in a conspicuous place on the shell showing manufacturer, model number, type waste, rated capacity, thermal efficiency, and certification number.

5. The permittee must submit to EPA and DER, within fifteen (15) days after it becomes available to the County, copies of technical data pertaining to the incinerator boiler design, acid gas control equipment design, particulate control equipment design, and the fuel mix that will be used to evaluate compliance of the facility with the preceeding emission limitations.

6. Fuel

The Resource Recovery Facility shall utilize refuse such as garbage and trash (as defined in Chapter 17-7, FAC) but not grease, scum, grit screenings or sewage sludge.

7. Air Pollution Control Equipment

The permittee shall install, continuously operate, and maintain the following air pollution controls to minimize emissions. Controls listed shall be fully operational upon startup of the proposed equipment.

a. Each boiler shall be equipped with a particulate emission control device for the control of particulates.

b. Each boiler shall be equipped with an acid gas control device designed to remove at least 90% of the acid gases.

8. Continuous Emission Monitoring

a. Prior to the date of startup and thereafter, the [redacted] County shall install, maintain, and operate the following continuous monitoring systems for each boiler exhaust stack:

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(1) Continuous emission monitoring (CEM) systems to measure stack gas opacity and SO_2, NO_x, CO, CO_2, and O_2 concentrations for each unit. The systems shall meet the EPA monitoring performance specifications of 40 CFR 60.13 and 40 CFR 60, Appendix B, [redacted] during initial compliance testing and annually thereafter. Additionally, CEM's shall meet the quality control requirements of 40 CFR 60, Appendix F (Attachment B).

(2) CEM data recorded during periods of startup, shutdown and malfunction shall be reported but excluded for compliance averaging periods for CO, SO_2 and Opacity but not for NOx.

b. An excess emissions report shall be submitted to EPA for every calendar quarter. The report shall include the following:

(1) The magnitude of excess emissions computed in accordance with 40 CFR 60.13(h), any conversion factors used, and the date and time of commencement and completion of each period of excess emissions (60.7(c)(1)).

(2) Specific identification of each period of excess emissions that occurs during startups, shutdowns, and malfunctions of the furnace/boiler system. The nature and cause of any malfunction (if known) and the corrective action taken or preventive measures adopted shall also be reported (60.7(c)(2)).

We would like to have the Permit recognize higher than normal emissions may occure during startup, shutdown and malfunctions. This is consistent with 40 CFR 60 Subpart D. State Permit requires us to report any malfunction by telephone within 24 hours and confirm in writting within 72 hours. Condition III, page 1.

(3) The date and time identifying each period during which the continuous monitoring system was inoperative except for zero and span checks, and the nature of the system repairs or adjustments (60.7(c)(3)).

(4) When no excess emissions have occurred or the continuous monitoring system has not been inoperative, repaired, or adjusted, such information shall be stated in the report (60.7(c)(4)).

(5) [redacted] County shall maintain a file of all measurements, including continuous monitoring systems performance evaluations; all continuous monitoring systems or monitoring device calibrartion checks; adjustments and maintenance performed on these systems or devices; and all other information required by this permit recorded in a permanent form suitable for inspection (60.7(d)).

c. Excess emissions indicated by the CEM systems shall be considered violations of the applicable emissions limits for the purposes of this permit provided the data represents accurate emission levels and the CEM's do not exceed the calibration drift (as specified in the respective performance specification tests) on the day when initial and subsequent compliance is determined. The burden of proof to demonstrate that the data does not reflect accurate emission readings shall be the responsibility of the permittee.

opacity limit or operating

(in ppm)

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9. Reporting

a. A copy of the results of the Compliance tests shall be submitted within forty-five days of testing to the DER Bureau of Air Quality Management, the DER Southeast Florida District Office, Broward County, and EPA Region IV.

b. Continous Emission monitoring shall be reported to the DER Southeast District Office and EPA Region IV on a quarterly basis in accordance with Section 17-2.710, FAC, and 40 CFR 60.7.

c. Addresses for submitting reports are:

EPA Region IV

Chief, Air Compliance Branch
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Florida Department of Environmental Regulation (DER)

Chief, Compliance and Ambient Monitoring
Bureau of Air Quality Management
Florida Department of Environmental
Regulation (DER)
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Southeast District Office of DER

District Manager
Department of Environmental Regulation
3301 Gun Club Road
P.O. Box 3858
West Palm Beach, Florida 33402

Broward County

Broward County Environmental Quality
Control Board
500 Southwest 14th Court
Ft. Lauderdale, Florida 33315

BROWARD COUNTY, FLORIDA
Office of Resource Recovery
115 South Andrews Avenue
Fort Lauderdale, Florida 33301
305-357-6458

April 27, 1987

Mr. Wayne Aronson
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-105) -- Comments on draft Final Determination and Permit sent under April 17, 1987 cover.

Dear Mr. Aronson,

Enclosed you will find our comments on the draft Final Determination and Permit sent to me under Bruce Miller's cover dated April 17, 1987.

I have marked the changes we would suggest in the margins on the affected pages and placed any comments or explanations in brackets "[ ]". Most of our suggestions are only editorial. I believe the others involve issues we have discussed in the past.

I will be out of town on Tuesday, April 28, 1987, but I will give you a telephone call on Wednesday so we can discuss any question you might have concerning our comments.

Thank you for your consideration of our comments.

Sincerely yours,

Thomas M. Henderson
Project Director

cc: Celiene Bruce, County Administrator
Tim Smith, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.
Bruno Dunn, Signal Environmental Systems
Andy Zergot, Signal Environmental Systems

Jerry W. Whitt, Waste Management, Inc.
Steve Smallwood, FDER Air Bureau
Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau

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I. INTRODUCTION

Pursuant to Section 403.505, Florida Statutes, South Broward Resource Recovery Project, Inc. (County), applied to the Florida Department of Environmental Regulation (DER) in April 1985 for certification of a steam electric generating, solid waste energy recovery facility at a site near the intersection of the U.S. Route 441 and State Road 84 in Broward County, Florida. After a thorough review by DER, including public hearings, the Florida Power Plant Siting Board issued a site certification to the County. At the time, FDER believed that such a site certification constituted a legal prevention of significant deterioration (PSD) permit under Chapter 17-2.500 of the Florida air pollution regulations which had been approved by the U.S. Environmental Protection Agency (EPA) on December 22, 1983. In the summer of 1985, EPA became aware that the Florida Electrical Power Plant Siting Act (PPSA), under which the site certification was issued, restricts the authority of the State of Florida to implement any regulation (i.e., PSD Regulations) pertaining to power plants other than those in the Act. Consequently, EPA determined that the Florida PSD regulations were superseded by the PPSA, and that the PPSA could not legally be approved by EPA as part of the State Implementation Plan (SIP) since it did not comply with EPA PSD regulations both procedurally and substantively. Thus, EPA concluded that the proposed South Broward County Resource Recovery Facility (RRF) [redacted] a valid PSD permit under the PPSA. EPA subsequently remanded PSD authority for sources subject to the PPSA while delegating responsibility for the technical and administrative portions of the PSD review to the FDER. The following final determination and permit constitute the culmination of those activities delegated to the FDER by EPA.

The applicant plans to construct a 2250 tons per day (TPD) solid waste-to-energy facility to be located near the intersection of the U.S. Route 441 and State Road 84 in Broward County, Florida. Municipal solid waste (MSW) will be combusted to produce steam for power generation. The present plans are to construct three 750 TPD MSW incinerators. An ultimate maximum capacity of 3300 TPD is anticipated in the future which will require the addition of a fourth incinerator. The Broward County Resource Recovery Office will need to submit an application to construct the fourth unit at a future date. The applicant requests that each unit be permitted at 115% of its rated capacity. At 115% capacity, each of the three energy recovery units will have an approximate heat input of 323.6 million Btu per hour based on a heat content of 4500 Btu/lb for MSW. Each incinerator will be [redacted] to operate 8760 hours per year. The yearly tonnage of the various air pollutants emitted were calculated on this basis.

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IV. BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

A. Particulate Matter

New Source performance standards for incinerators limit particulate emissions from these units to 0.08 grains per dry standard cubic foot (gr/dscf) based on a 12% flue gas concentration of carbon dioxide. NSPS for industrial-commercial-institutional steam generating units limit particulate emissions from these units to 0.10 lb/mmBtu or approximately 0.05 gr/dscf. However, BACT clearinghouse reports incinerators emission limits to be from 0.01 to 0.03 gr/dscf.

(California)

In making the BACT determination, an emissions limit was selected to ensure that hazardous yet unregulated pollutants are controlled in accordance with the North County incinerator PSD remand. The control of dioxins, furans, and other condensible organics is hypothesized to occur due to their condensation and adsorption on particulate matter. As the collective surface area of fine particulate matter is greater than that of larger particles per mass unit and fine particulate matter consists of a significant portion of the total particulate matter, control equipment should be selected which ensures a high degree of control for fine particulates. [redacted]

Discussion of Baghouses is unnecessary and should be deleted!

agreed

to provide this high degree of control.

EPA has [redacted] to the use of an ESP [redacted]. The limit which was determined to be BACT is 0.015 gr/dscf and represents an approximate increase in ESP anualized costs of $134,000 per year or a cost of $1,035 per ton of additional particulate removed. However, the applicant may install either baghouse or an ESP to meet this limitation.

Energy impacts are considered to be insignificantly affected by the increase in removal efficiency, and environmental benefit due to decreased emissions of unregulated hazardous pollutants is not assessable at this time [redacted].

B. Sulfur Dioxide

final

The emissions of sulfur dioxide from municipal solid waste incinerators [redacted] depend [redacted] on three factors. These factors are: the sulfur content of the waste, the conversion of organic and inorganic sulfur compounds to sulfur dioxide, and the retention of the sulfur dioxide in the ash. This determination assumes that all combined sulfur is converted and none is retained in the ash.

The applicant has reported the sulfur content of the waste to be 0.19 wt% maximum and 0.12 wt% average. This results in SO_2 emission rates of 7.6 to 4.8 lb/ton of MSW fired, or, at 4500 Btu/lb, 0.840 to 0.530 lb/mmBtu, respectively. Taking into account the selection of acid gas control devices (explained under acid gas BACT), the resultant emissions of sulfur dioxide

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should be reduced by at least 65% [redacted]. EPA and the applicant have agreed that 65% control of sulfur dioxide is BACT and should result in an emissions rate range of 0.290 lb/mmBtu to 0.186 lb/mmBtu. The emissions limit stipulated as BACT in the permit is a 65% reduction of sulfur dioxide emissions, not to exceed 0.310 lb/mmBtu. This limit was based on [redacted] the emissions limits at other facilities and the variability of fuel sulfur content. Economic and environmental considerations are included under the acid gas BACT section.

C. Acid Gases

Acid gases consist primarily of sulfuric acid mist, hydrogen fluoride, and the unregulated pollutant hydrogen chloride. BACT for acid gas control was selected based on the North County remand which allows the consideration of unregulated pollutants in the assessment of BACT for regulated pollutants. The selection of 90% acid gas control includes the reduction of hydrogen chloride emissions in the economic analysis and the reduction of condensible unregulated organic emissions (i.e., dioxins, furans) and heavy metals, due to the gas cooling effects of the acid gas control system proposed, in the environmental benefit analysis.

possible

Sulfuric acid mist is generated as a result of the oxidation of sulfur dioxide to sulfur trioxide in the flue gas. Combination of sulfur trioxide and water results in the formation of sulfuric acid mists. The uncontrolled emissions of this pollutant are estimated to be as high as 200 TPY. BACT of 90% control of these emissions results in an emissions reduction of 180 TPY.

Hydrogen fluoride is created through the combustion of waste materials containing fluorine. Although the reported emissions of hydrogen fluoride vary greatly, the emissions have been reported to be as high as 0.02 lb/mmBtu. However, the applicant predicts an uncontrolled emission rate of 0.04 lb/mmBtu or 170 TPY at this [redacted] facility. A 90% control efficiency for this pollutant results in the control of 153 TPY based on the agreed emission rate of 0.004 lb/mmBtu and is considered BACT.

at other facilities

BACT is to be based upon today's conditions not the year 2000.

The formation of hydrogen chloride emissions is due primarily to the combustion of plastics containing chlorine. [redacted] The expected uncontrolled emissions from this facility are 0.47 lb/mmBtu or 2013 tons per year. Acid gas control will provide control of 90% of these emissions of hydrogen chloride or 1993 TPY.

In assessing the economic impacts, 240 TPY of sulfur dioxide, 180 TPY of sulfuric acid mist, 153 TPY of hydrogen fluoride, and 1994 TPY of hydrogen chloride were used in determining the cost effectiveness of acid gas control. EPA studies have estimated that the cost of acid gas control for this facility to be approximately 3 million dollars in annualized costs. This results in a cost of $1169 per ton of total pollutants (listed above) and is considered reasonable.

The environmental benefits due to application of acid gas control are the reduction of the flue gas temperature for the condensation of dioxins, furans, pyrenes, biphenyls, and mercury which may then be removed by a high efficiency particulate control device. Even though the formation of the toxic organic compounds ~~is~~ due to the design and operation of the combustion device, studies show that the use of acid gas control and high efficiency particulate removal equipment is capable of achieving a 99+% reduction of the compounds formed. No acceptable levels of exposure to these compounds have been ~~established~~ and EPA is ~~not~~ obligated to ensure the public a minimal exposure to them.

D. Nitrogen Oxides

During combustion of municipal solid waste, NO_x is formed in high temperature zones in and around the furnace flame by the oxidation of atmospheric nitrogen and nitrogen in the waste. The two primary variables that affect the formation of NO_x are the combustion temperatures and the concentration of oxygen. Techniques such as the method of fuel firing, correct distribution of combustion air between overfire and underfire air, exhaust gas recirculation, and decreased heat release rates have been used to reduce NO_x emission. A few add-on control techniques such as catalytic reduction with ammonia and thermal de-NO_x are still experimental and not considered to be demonstrated technology for the proposed project. State-of-the-art control of the combustion variables will be used to limit NO_x emissions at 0.54 lb/mmBtu. This level of control is judged to represent BACT.

NSPS for industrial-commercial-institutional steam generating units regulates nitrogen oxide emissions for this facility if auxiliary fuels exceed 10% of the fuel input. Permit limits have been stipulated to ensure that auxiliary fuel input at each of the units will be less than 10%.

E. Carbon Monoxide

Incomplete combustion causes the emissions of solid carbon particles (e.g., smoke or soot) unburned and/or partially oxidized hydrocarbons and carbon monoxide, as well as resulting in the loss of heat energy. The applicant proposes that good equipment design and operation are BACT for carbon monoxide. Based on technical information relating good combustion practices and BACT determinations from other states, a limit of 0.090 lb/mmBtu is judged to represent BACT for carbon monoxide emissions.

Table V-3

Broward County Resource Recovery Facility
Maximum Air Quality Impacts of the RRF
For Comparison to the De minimus Ambient Levels

Pollutant and Averaging Time	Predicted Impact (ug/m^3)	De minimus Ambient Impact Level (ug/m^3)
SO_2 (24-hour)	6.2	13
PM (24-hour)	0.8	10
NO_2 (Annual)	1.4	14
CO (8-hour) *	11.8	575
Pb (24-hour)	0.03	0.1 (quarterly)
F^- (24-hour)	0.081	0.25
Be (24-hour)	0.00002	0.0005
Hg (24-hour)	0.015	0.025

* Based on an assumed maximum of 200 ppm, 8-hour average.

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Table V-6

Broward County Resource Recovery Facility
Comparison of Total Impact with the AAQS

Pollutant and Averaging Time	Maximum Impact Project (ug/m^3)	Maximum Impact (1) All Sources (ug/m^3)	Existing Background (2) (ug/m^3)	Maximum Total Impact (ug/m^3)	National Ambient Air Quality Standard (ug/m^3)
SO_2					
3-hour	26	625	63 (3)	688	1300
24-hour	6	216	28	244	260
Annual	<1 (4)	-	4	-	60
PM					
24-hour	<1 (4)	-	93	-	150
Annual	<<1 (4)	-	59	-	60
NO_2					
Annual	1.4 (4)	-	42	43	100
CO					
1-hour	64 (4)	-	17,000	-	40,000
8-hour	12 (4)	-	10,000	-	10,000
Pb					
3-months	<0.1	-	0.9	1	1.5

(1) Maximum impact includes the FPL Port Everglades and Fort Lauderdale power plants.

(2) Existing background is estimated using the highest monitored concentrations in the area near the proposed facility.

(3) The 3-hour background is estimated by multiplying the 24-hour background by 2.25.

(4) Less than significant, no further analysis completed. For CO, analysis based on 400 ppm, 1 hour maximum and an assumed maximum of 200 ppm, 8-hour average.

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Specific Conditions

1. Emission Limitations

a. Stack emissions from each unit shall not exceed the following:

Particulate: 0.0150 gr/dscf dry volume corrected to 12% CO_2.

Sulfur Dioxide: 0.140 lb/mmBtu heat input and 60 ppm (3-hr rolling average, dry volume, corrected to 12% CO_2), or 65% control of total SO_2 emissions.* In no case shall the SO_2 emissions exceed 0.310 lb/mmBtu heat input and 124 ppm (3-hr rolling average, dry volume, corrected to 12% CO_2).

Initial and subsequent compliance tests shall determine the actual emission limit (in ppm) from the control device at 65% control efficiency. The observed average emission rate from compliance testing will be statistically analyzed using a 95% probability level to derive a hypothetical emission rate ~~[illegible]~~ (3-hr rolling average, dry volume, corrected to 12% CO_2) ~~[illegible]~~.

but no more than 124 ppm or less than 60 ppm

Nitrogen Oxides: .560 lb/mmBtu (350 ppm, 3-hr rolling average, dry volume, corrected to 12% CO_2).

Carbon Monoxide: .090 lb/mmBtu (400 ppm, 1-hr rolling average, dry volume, corrected to 12% CO_2).
(88 ppm, 4-day rolling average, dry volume, corrected to 12% CO_2).

We would like a ceiling and a floor. This is consistent with first paragraph.

Lead: .00150 lb/mmBtu

Fluorides: .0040 lb/mmBtu

Beryllium: 9.30×10^{-7} lb/mmBtu

Mercury: 7.50×10^{-4} lb/mmBtu

Sulfuric acid mist: 4.70×10^{-3} lb/mmBtu

Uncontroled

* ~~Total~~ SO_2 emissions will be measured at the inlet to the acid gas control device.

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Visible Emissions: Opacity of stack emissions shall not be greater than 15% opacity. Excess opacity resulting from startup or shutdown shall be permitted providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess opacity shall be minimized but in no case exceed two hours in any 24-hour period unless specifically authorized by EPA for longer duration.

Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during start-up or shutdown shall be prohibited.

The units are subject to 40 CFR Part 60, Subpart E and Subpart Db, New Source Performance Standards (NSPS), except that where requirements in this permit are more restrictive, the requirements in this permit shall apply.

There shall be no greater than 10% opacity for emissions from the refuse bunker and the ash handling and loadout. The potential for dust generation by ash handling activities will be mitigated by quenching the ash prior to loading in ash transport trucks. Additionally, all portions of the proposed facility, including the ash handling facility, which have the potential for fugitive emissions will be enclosed. Also, those areas which have to be open for operational purposes, (e.g., tipping floor of the refuse bunker while trucks are entering and leaving) will be under negative air pressure.

b. Only distillate fuel oil or natural gas shall be used in startup burners. The annual capacity factor for use of natural gas and oil, as determined by 40 CFR 60.43b(d), shall be less than 10%. If the annual capacity factor of natural gas is greater than 10%, then the facility shall be subject to 560.44 b.

c. None of the three individual municipal solid waste incinerators shall be charged in excess of 323.6 mmbtu/hr and 863 tons per day MSW (115% rated capacity).

d. Compliance Tests

(1) a. Annual compliance tests for particulate matter, lead, SO_2, nitrogen oxides, CO, fluorides, mercury, and beryllium shall be conducted in accordance with 40 CFR 60.8 (a), (b), (d), (e), and (f).

b. Compliance with the opacity standard for the incinerator stack emissions in condition 1.a. of this part shall be determined in accordance with 40 CFR 60.11 (b) and (e).

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2. Compliance with emission limitations specified in lb/mmBtu in conditions 1.a. and 1.c. of this part shall be determined by calculating an "F" factor in dscf/mmbtu corrected to 12% CO_2 using the boilers' efficiency (as determined by the calorimeter method contained in Attachment A during acceptance testing) and the measured steam production and quality. Data obtained from test methods required in condition 1.d. of this part for compliance testing shall be used for the calculation of the "F" factor required by this condition.

See P.9, Table V-1 and P19, Section VI. D.

3. The height of each boiler exhaust stack shall not be less than 59.4 meters above ground level at the base of the stack.

4. Each incinerator boiler shall have a metal name plate affixed in a conspicuous place on the shell showing manufacturer, model number, type waste, rated capacity, thermal efficiency, and certification number.

5. The permittee must submit to EPA and DER, within fifteen (15) days after it becomes available to the County, copies of technical data pertaining to the incinerator boiler design, acid gas control equipment design, particulate control equipment design, and the fuel mix that will be used to evaluate compliance of the facility with the preceeding emission limitations.

6. Fuel

The Resource Recovery Facility shall utilize refuse such as garbage and trash (as defined in Chapter 17-7, FAC) but not grease, scum, grit screenings or sewage sludge.

7. Air Pollution Control Equipment

The permittee shall install, continuously operate, and maintain the following air pollution controls to minimize emissions. Controls listed shall be fully operational upon startup of the proposed equipment.

a. Each boiler shall be equipped with a particulate emission control device for the control of particulates.

b. Each boiler shall be equipped with an acid gas control device designed to remove at least 90% of the acid gases.

8. Continuous Emission Monitoring

a. Prior to the date of startup and thereafter, the [redacted] County shall install, maintain, and operate the following continuous monitoring systems for each boiler exhaust stack:

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(1) Continuous emission monitoring (CEM) systems to measure stack gas opacity and SO_2, NO_x, CO, CO_2, and O_2 concentrations for each unit. The systems shall meet the EPA monitoring performance specifications of 40 CFR 60.13 and 40 CFR 60, Appendix B, [redacted] during initial compliance testing and annually thereafter. Additionally, CEM's shall meet the quality control requirements of 40 CFR 60, Appendix F (Attachment B).

(2) CEM data recorded during periods of startup, shutdown and malfunction shall be reported but excluded f[illegible] compliance averaging periods for CO, SO_2 and Opacity but not for NOx.

b. An excess emissions report shall be submitted to EPA for every calendar quarter. The report shall include the following:

(1) The magnitude of excess emissions computed in accordance with 40 CFR 60.13(h), any conversion factors used, and the date and time of commencement and completion of each period of excess emissions (60.7(c)(1)).

(2) Specific identification of each period of excess emissions that occurs during startups, shutdowns, and malfunctions of the furnace/boiler system. The nature and cause of any malfunction (if known) and the corrective action taken or preventive measures adopted shall also be reported (60.7(c)(2)).

We would like to have the Permit recognize higher than normal emissions may occure during startup, shutdown and malfunctions. This is consistent with 40 CFR 60 Subpart D.
- State Permit requires us to report any malfunction by telephone within 24 hours and confirm in writting within 72 hours. Condition II, page 1.

(3) The date and time identifying each period during which the continuous monitoring system was inoperative except for zero and span checks, and the nature of the system repairs or adjustments (60.7(c)(3)).

(4) When no excess emissions have occurred or the continuous monitoring system has not been inoperative, repaired, or adjusted, such information shall be stated in the report (60.7(c)(4)).

(5) [redacted] County shall maintain a file of all measurements, including continuous monitoring systems performance evaluations; all continuous monitoring systems or monitoring device calibrartion checks; adjustments and maintenance performed on these systems or devices; and all other information required by this permit recorded in a permanent form suitable for inspection (60.7(d)).

c. Excess emissions indicated by the CEM systems shall be considered violations of the applicable emissions limits for the purposes of this permit provided the data represents accurate emission levels and the CEM's do not exceed the calibration dritt (as specified in the respective performance specification tests) on the day when initial and subsequent compliance is determined. The burden of proof to demonstrate that the data does not reflect accurate emission readings shall be the responsibility of the permittee.

- opacity limit or - operating

(in ppm)

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9. Reporting

a. A copy of the results of the Compliance tests shall be submitted within forty-five days of testing to the DER Bureau of Air Quality Management, the DER Southeast Florida District Office, Broward County, and EPA Region IV.

b. ~~Stack~~ Monitoring shall be reported to the DER Southeast District Office and EPA Region IV on a quarterly basis in accordance with Section 17-2.710, FAC, and 40 CFR 60.7.

Continous Emission data

c. Addresses for submitting reports are:

EPA Region IV

Chief, Air Compliance Branch
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Florida Department of Environmental Regulation (DER)

Chief, Compliance and Ambient Monitoring
Bureau of Air Quality Management
Florida Department of Environmental
Regulation (DER)
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Southeast District Office of DER

District Manager
Department of Environmental Regulation
3301 Gun Club Road
P.O. Box 3858
West Palm Beach, Florida 33402

Broward County

Broward County Environmental Quality
Control Board
500 Southwest 14th Court
Ft. Lauderdale, Florida 33315

Barry

Resource Recovery Office
Room 521, 115 South Andrews Avenue
Fort Lauderdale, Florida 33301
(305) 357-6458

April 30, 1987

DER
MAY 6 1987
BAQM

Mr. Wayne Aronson
Air Program Branch
Environmental Protection Agency, Region IV
345 Courtland Street
Atlanta, Georgia 30365

RE: South Broward Resource Recovery Project (PSD-FL-105) -- Furnace Design Specification.

Dear Mr. Aronson,

Enclosed you will find for your file record a copy of the Furnace Design for the South Broward Resource Recovery Project (Section 1.10.1 of Exhibit 1 to the Construction Contract dated August 19, 1986). You will note the Peak Steam Mass Flow Rate for each furnace is 192,000 pounds per hour.

If you have any questions concerning this specification, then please give me a telephone call.

Sincerely yours,

Thomas M. Henderson
Project Director

cc: Celiene Bruce, County Administrator
Tim Smith, Greenberg Traurig Askew
Ken Kosky, KBN Engineering
Ron Mills, Malcolm Pirnie, Inc.
Bruno Dunn, Signal Environmental Systems
Andy Szurgot, Signal Environmental Systems
Pat Patton, Waste Management, Inc.
✓Steve Smallwood, FDER Air Bureau
Clair Fancy, FDER Air Bureau
Barry Andrews, FDER Air Bureau

1.9.5 Charging Hoppers and Chutes

Charging Hoppers: Charging hoppers shall be designed to withstand the impact of the fully loaded crane grapple.

Charging hoppers shall have a minimum dimension of 23 feet by 19 feet and be independently supported by the charging floor structure and shall be arranged so as to control spillage onto the charging floor.

Charging hopper discharge throat (exit) shall be smaller than furnace feed chute entrance to furnace/boiler and shall be adequately sized to accommodate individual furnace/boiler rated throughput capacity.

Chutes and Cut-Off Gates: Chutes connecting charging hoppers and furnace/boiler feed throat shall be either water cooled or refractory lined.

Between each charging hopper discharge and chute entrance there shall be a cut-off gate to control burnback during furnace/boiler shutdown.

1.10 Combustion Systems.

1.10.1 Furnace Design.

The Company shall provide three (3) independent Von Roll/Babcock & Wilcox mass-burn stocker-fired furnace with multiple pass waterwall type boilers. Each of the three (3) units will have a nameplate capacity of 750 tons per day or a total plant capacity of 2,250 tons per day. The hydraulic ram feeder/grate system shall be a Von Roll No. R-10078 system. The boilers shall be manufactured by Babcock & Wilcox with the following characteristics:

- Normal Steam Mass Flow Rate (lbs/hr)	167,000
- Peak Steam Mass Flow Rate (lbs/hr)	192,000
- Maximum Continuous Capacity (lbs/hr)	167,000
- Outlet Steam Conditions (psig/oF)	900/830
- Feedwater Temperature (oF)	300
- Gas Temperatures (oF):	
Entrance to Radiation Section	2200
Entrance to Convection Section	1150
Entrance to Superheater Section	1380
Entrance to Economizer Section	630
- Radiation Section:	
Wall Type	Membrane
Radiant Surface (ft^2/unit	7537
Tube Thickness (in.)	0.188

- Convection Section:

Convective Surface (ft^2/unit)	55,315
Tube Thickness (in)	0.180

- Superheat Section:

Convective Surface (ft^2/unit)	21,504
Tube Thickness	0.203/0.180
Material Type	SA210A/SA209 Incoloy

All Furnace, boiler and Auxiliary equipment shall be manufactured and constructed in accordance with ASME boiler and Furnace construction codes except where otherwise stated. All equipment shall be so stamped. All refractory shall meet minimum ASTM standards. A soot blowing system or tube rapping system shall be provided which will clean boiler tubes. An access door allowing for inspection and maintenance of the tubes and tube cleaning system shall be provided.

Boiler drums shall be Class 1 fusion welded construction, tested before shipment. The steam drums shall be fitted with steam separation baffles yielding dry steam with purity of one part per million (ppm) solids at maximum continuous steaming conditions, at the design pressure and Temperatures, when boiler water concentrations do not exceed standard ABMA limits. Each drums shall have two (2) manhole openings.

Superheaters shall be manufactured of SA210A and SA209 alloy. A bare tube economizer section shall be provided designed for forced circulation with a feed water temperature of 300oF and pressures at a minimum of 125% of the boiler design pressure.

1.10.2 Combustion Air System.

The distribution of primary and secondary air jets shall provide a furnace environment such that temperture and emission standards shall be achieved. Two forced draft fans shall be provided for each boiler with the the following test block capacities:

- Primary Air, ACFM/S.P. (in H_2O) - 73,000/21.0
- Secondary Air, ACFM/S.P. (in H_2O) - 49,000/36.0

Combustion air fans shall be mounted on vibration elimination bases with non-combustible flexible connections at the inlets and outlets of the fans. They shall be automatically controlled with manual override system in the control room. Fan drives shall have a minimum of 125% of maximum design brake horsepower (BHP).

SOUTH BROWARD CITIZENS FOR A BETTER ENVIRONMENT, INC.
2390 SW 29 Way Fort Lauderdale, Florida 33312

June 9, 1987

United States Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Attn: Winston A. Smith

Dear Sir:

Your recent Permit to Construct issued for the South Broward incinerator contains laudable restrictions, however, I still feel deserted by the agencys responsible for our health and safety. I refer to the correspondence enclosed that has been totally ignored by you and other agencys.

We, the South Broward Citizens for a Better Environment beg you to reconsider your approval for this centroid site in our urban South Broward.

Sincerely yours,

Philip W. Beck

Philip W. Beck
Vice President
South Broward Citizens for a Better Environment, Inc.

cc: Mr. Steve Smallwood
Florida DER

Senator Lawton Chiles
Lakeland, Florida

JAN 26 1984

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

JAN 23 1984

4PM-EA/EHH

Colonel Alfred B. Devereaux, Jr.
District Engineer
U.S. Army Corps of Engineers, Jacksonville
P.O. Box 4970
Jacksonville, Florida 32232

ATTENTION: Vic Anderson

SUBJECT: Broward County
(Permit Application Nos. 83B-3304 & 83B-3305)

Dear Colonel Devereaux:

This is in response to the above referenced public notices regarding proposed construction of solid waste recovery and landfill facilities in wetlands adjacent to the South New River Canal, Broward County, Florida. The applicant proposes to fill 15.6 acres of wetlands at the 18.4 acre County Southern Resource Recovery site to construct a mass-burn incinerator complex designed to process 1,300 tons per day of municipal solid waste. The applicant proposes to mitigate for onsite wetland filling by creating 15 acres of tidal wetlands adjacent to the South New River Canal.

The proposed County Southern Residue/Unprocessible Waste Landfill facility will be constructed by placing 1,570,000 cubic yards of limestone and sand fill over 133 acres of wetlands at the 152 acre site. This diked incinerator residue and disposal cell and retention pond complex would receive 710-965 tons per day of ash residue and unprocessible waste from the Resource Recovery Facility incinerator. Each landfill cell will be lined with an impermeable membrane and surrounded by +9' MSL berms and roadways and internal stormwater swales. To compensate for the proposed 133 acres of wetland filling, the applicant proposes to preserve and enhance 14 acres of adjacent marsh, create 18 acres of tidal wetland adjacent to the South New River Canal and create an additional 15.5 acres of wetlands offsite.

Based on information provided to us by Federal, State and County biologists, environmental engineers and planners familiar with the proposal and the project site, and our review of the reports concerning the proposed project prepared by the applicant's environmental consultant, EPA has serious surface and groundwater

quality and wetland concerns with the proposed project. A member of my staff inspected the adjacent City of Fort Lauderdale regional sewage sludge composting facility site in December 1982, so we are somewhat familiar with the wetland habitat types at the resource recovery site.

Section 404(b) Guidelines state that from a national perspective, the degradation or destruction of aquatic resources by filling operations in wetlands is considered the most severe environmental impact covered by the guidelines. Filling in wetlands may be permitted only when it can be demonstrated that the site selected is the least environmentally damaging alternative or if the applicant can demonstrate that other alternatives are not practicable and that wetland filling will not have an unacceptable adverse impact on the aquatic resource. The proposed project involves filling approximately 148 acres of wetlands adjacent to the South New River Canal, a riverine system which has been seriously degraded by numerous man-related filling, drainage, channelization and effluent impacts. The wetland habitat types proposed for filling vary considerably in quality across the site, ranging from stressed at the southern incinerator area to highly productive at the northeastern proposed landfill portion of the project site.

Since the proposed project is not water dependent, in order for the proposed project to be in compliance with Section 404(b) Guidelines, the applicant must convincingly show that alternative upland site locations are not practicable for project construction and that project construction will not result in unacceptable adverse impacts to the aquatic resource. EPA feels that the applicant has failed to convincingly demonstrate that the proposed project is in compliance with the 404(b) Guidelines on either of these crucial tests. The short and long-term environmental impacts of construction, operation and maintenance of solid waste landfills in wetlands are not preferable to siting of such landfills at upland locations. However, if you concur with the applicant's determination that practicable upland locations are not available, EPA would not object to the issuance of a permit for the resource recovery facility (83B-3304) provided that stringent erosion/turbidity control measures are installed and maintained during project construction and the proposed mitigation plan is installed concurrently with project construction.

Regardless of your practicable alternatives evaluation, EPA strongly feels that the direct wetland impacts and potential long-term surface and groundwater degradation associated with construction and operation of the landfill facility (83B-3305), as it is currently proposed, are unacceptable. The existing sawgrass marsh-hardwood swamp wetland systems east of the Florida Power and Light Company (FP&L) north-south powerline at the proposed landfill site are highly productive and very valuable. This 45-50 acre wetland area is one of the last remaining functional wetland systems adjacent

to the South New River Canal in the highly urbanized Ft. Lauderdale region. These wetlands serve many beneficial ecological functions: including providing fish and wildlife habitat; hydrological buffering; groundwater exchange; water purification; pollution and erosion traps; and, food chain production. Wetlands are a valuable public resource and this Agency takes a strong stand against unnecessary filling, dredging or otherwise altering of this already diminishing habitat. Therefore, EPA recommends for the denial of any filling east of the FP&L north-south powerline at the proposed landfill (83B-3305) site. We also feel that the currently proposed mitigation plan for the landfill site is inadequate and that any permitted wetland filling should be mitigated by at least 1:1 wetland creation, preferably at the project site. An acceptable mitigation plan should be coordinated with and approved by this office and the U.S. Fish and Wildlife Service.

A member of my staff will be inspecting the landfill and resource recovery sites during the week of January 30th in the company of the applicant's environmental consultant. We will provide you with any additional comments concerning this project in early February. Thank you for providing us with this opportunity to comment on these projects.

Sincerely yours,

Charles R. Jeter
Regional Administrator

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33702

JAN 10 1984

January 4, 1984

F/SER13/GLN
904-234-5061

Colonel Alfred B. Devereaux, Jr.
District Engineer, Jacksonville District
Department of the Army, Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232

Dear Colonel Devereaux:

The National Marine Fisheries Service has reviewed Public Notice No. 83B-3304 and 83B-3305 dated December 15, 1983. Broward County proposes to fill wetlands adjacent to the South New River for a non-water dependent resource recovery facility in Broward County, Florida.

Based on an October 18-19, 1983, on-site survey and information provided by the applicant's consultant regarding site, it appears that about 150 acres of marsh and wooded swamp flood plain of the South New River will be filled by project construction and the subsequent placement of ash. These wetlands provide seasonal feeding and nursery areas for important migratory commercial and recreational fish and shellfish, detritus for estuarine food chains, and promote good water quality by filtering upland runoff.

The proposed project is not water dependent and could be constructed on an upland site. Since several upland sites are available in the area, the project does not appear to conform with Section 404b guidelines for wetland fill. The project could be better constructed on uplands which could require no additional fill. The site 4 (Davie site) provides a suitable alternative in an upland cattle pasture. In addition, areas west of the Davie site in sections 17, 18, 19, 20, 29 and 30 are cattle pastures that could be used as an upland site (NMFS map I).

Therefore, we recommend that this permit be denied and that the applicant construct the facility on the uplands which are currently available.

Sincerely yours,

Edwin J. Keppner

for Richard J. Hoogland
Chief, Environmental Assessment Branch

cc:
Fld. Supv. FWS, Vero Beach
S.N. Moore, EPA, ATLA
FDER
FGFFC
GOMFMC
Trop. Eco.