DRAFT BACT
FOR REVIEW/COMMENTS
CONTENTS SUBJECT TO CHANGE

Best Available Control Technology (BACT) Determination

South Broward County Resource Recovery, Inc.

Broward County

The applicant plans to eventually construct a 3300 ton per day (TPD) municipal solid waste (MSW) incinerator facility to be located at 4400 South, State Road 7, Ft. Lauderdale, Florida. The thermal energy from combustion of the MSW will be used to produce steam for electric power generation.

The present plans are to install three 400 TPD mass burn incinerators that will process a total of 1200 TPD of MSW. This BACT review will apply only to these three units, at some future date a BACT review will be made for the fourth unit as a modification to an existing facility.

Each of the three mass burn incinerators will have an approximate heat input of 166 million Btu per hour, based upon a MSW calorific content of 5000 Btu per pound. Each incinerator will be scheduled to operate 8760 hours per year and on this basis the tons per year of the various air pollutants emitted were calculated. The applicant has projected the total annual tonnage of regulated air pollutants emitted from the three units to be as follows:

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DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION) Ed Svec	Initial / Date
2.	Initial / Date
3.	Initial / Date
4.	Initial / Date

REMARKS:

FOR EVENTUAL REVIEW

INFORMATION	
	Review & Return
	Review & File
	Initial & Forward

DISPOSITION	
	Review & Respond
	Prepare Response
	For My Signature
	For Your Signature
	Let's Discuss
	Set Up Meeting
	Investigate & Report
	Initial & Forward
	Distribute
	Concurrence
	For Processing
	Initial & Return

FROM: Sol

DATE 8/11/85

PHONE

Particulate	(PM)	330	(25)*
Sulfur Dioxide	(SO_2)	2444	(40)*
Nitrogen Oxides	(NOx)	2488	(40)*
Carbon Monoxide	(CO)	395	(100)*
Lead	(Pb)	133	(1.6)*
Beryllium	(Be)	.0041	(.0004)*
Mercury	(Hg)	1.4	(0.1)*
Fluorides	(F)	111	(3)*
Ozone	(VOC)	58	(40)*
Sulfuric Acid Mist		12	(7)*

*Regulated Air Pollutants-Significant Emission Rates Florida Administrative Code Rule 17-2.500, Table 500-2.

The Broward County solid waste energy recovery facility was reviewed according to Florida Administrative Code Chapter 17-17, Electrical Power Plant Siting and Rule 17-2.50, Prevention of Significant Deterioration (PSD). The Bureau of Air Quality Management (BAQM) will perform the air quality review for the siting committee, which includes this BACT determination. The certification number assigned to the proposed facility is PA 85-22.

Rule 17-2.500(2)(f)3 requires a BACT review for all regulated pollutants emitted in an amount equal to or greater than the significant emission rates listed in Table 500-2, Regulated Air Pollutants. The facility is located in an area classified

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as attainment for all air pollutants, except ozone. The emission limits for the air pollutant ozone (VOC) will be determined through the application and employment of Lowest Achievable Emission Rate (LAER), Rule 17-2.640, if applicable.

BACT Determination Requested by the Applicant:

The following emission limits are based upon tons of MSW charged.

PM - 0.67 lbs	CO - 0.80 lbs	Hg - 0.0023 lbs
SO_2 - 4.91 lbs	Pb - 0.27 lbs	F - 0.23 lbs
NOx - 5.00 lbs	BE - 8.4 x E-6	VOC - 0.12 lbs

Date of Receipt of a BACT Application:

June 9, 1985

Date of Publicatilon with Florida Administrative Weekly:

June 14, 1985

Review Group Members:

Ed Svec - New Source Review Section

Clair Fancy - Central Air Permitting

Tom Rogers - Air Modeling Section

Buck Oven - Power Plant Siting

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BACT Determinatilon by DER:

Pollutant	Emission Limit/Per Source
Particulate Matter	0.03 lbs/dscf, corrected to 12% CO
Sulfur Dioxide	1.9 lb/ton MSW charged
Nitrogen Oxides	3.0 lb/ton MSW charged
Carbon Monoxide	1.5 lb/ton MSW charged
Mercury	2240 grams/day [1]
Beryllium	8.4 x E-6 lb/ton MSW charged
Visible Emission	15 percent opacity

(1) When more than 2205 lb/day of municipal sewage sludge is fired, compliance with the mercury emission limit shall be demonstrated in accordance with 40 CFR 61, Method 101 Appendix B.

Compliance with limitations for sulfur oxides, particulate matter, and nitrogen oxides will be demonstrated in accordance with Florida Administrative Code Rule 17-2.700, DER Methods, 1, 2, 3, 4, 5, and 6, and 40 CFR 60 Apendix A; Method 7. Compliance

with the opacity limit shall be demonstrated in accordance with Florida Administrative Code Rule 17-2.700(6)(a)9., DER Method 9.

A continuous monitoring system to measure the opacity of emissions of each stack shall be installed, calibrated, and maintained in accordance with the provisions of Rule 17-2.710 - Continuous Emission Monitoring Requirements. The CEM's must be installed and operational prior to compliance testing.

BACT Determination Rationale:

Each MSW incinerator will have a charging rate more than 50 tons per day, and therefore, is subject to the provisions of 40 CFR 60.50, Subpart E, New Source Performance Standards (NSPS). The NSPS standard regulates only particulate matter. The particulate matter standard is 0.08 grains/dscf, corrected to 12% CO. This NSPS was promulgated in 1971 and no longer reflects state-of-the-art for control of particulate emissions. The applicants proposed particulate matter emission limit of 0.03 grains/dscf, corrected to 12% CO is judged to represent BACT. All the other requirements as set forth in the NSPS, Subpart E will apply.

The Department has determined that the emission limit for SO_2 to be 1.9 pounds per ton of MSW charged into the incinerator. MSW components that appear to be major contributors of sulfur include rubber, plastics, foodwastes, yardwastes, and paper.

The SO_2 emission limit was determined to be BACT for another larger mass burn incinerator and generated debate as being unrealistic. The Department has not received any actual test data to indicate that this SO_2 emission limit is unattainable due to the inherent sulfur content of the MSW. The amount of SO_2 emitted would be comparable to the burning of distillate oil having less than a 0.5 percent sulfur content. Burning low sulfur fuel is one acceptable method of controlling SO_2 emissions. The installation of a flue gas desulfurization systems to control SO_2 emissions is not warranted when burning MSW.

The mercury emission limit determined as BACT is equal to 70% of the National Emission Standard for Hazardous Air Pollutants (NESHAPs), 40 CFR 61.50, Subpart E, for muncipal waste water sludge incineration plants. The provisions of this subpart, however, do not apply because no grease, scum, grit screenings or sewage slugde will be incinerated in the proposed incinerators. The BACT is determined to be 2240 grams per day. This level of mercury emissions is not considered to have a major impact on the environment.

The uncontrolled emission of beryllium, according to the California report, when firing MSW is estimated to be 6.2×10^{-6} pounds per million Btu. Uncontrolled beryllium emissions would be approximately 11 grams per 24 hours or 0.01 TPY. The operating temperature of the particulate matter emission control device will be below 500 °F. Operation below this temperature

is necessary to force absorption/condensation of beryllium oxides, present in the flue gas stream, onto available fly ash particles subsequentially removed by the particulate control device. Assuming 95% efficiency of the control device the annual beryllium emissions are estimated at 0.0007 tons per year. This amount of beryllium emitted is considered to have a negligible impact on the environment. The emission factor of 8.4×10^{-6} lb/ton MSW proposed by the applicant is judged to be BACT. If, however, beryllium containing waste as defined in the National Emission Standards for Hazardous Air Pollutants (NESHAPs), Subpart C, Subsection 61.31(g), is charged into the incinerator; emissions of beryllium to the atmosphere shall not exceed 10 grams per 24 hour or an ambient concentration of 0.01 ug/m^3, 30 day average. Compliance with this beryllium emission limit will be in accordance with the NESHAPs, Subpart C.

The temperature of the incinerator combustion gases at the inlet to the particulate control device is estimated to be 425-475 °F. At these temperatires any lead would be in a nonvaporous state and would be removed by the particulate control device. The majority of lead emissions from an incinerator are expected to originate from solder joints in discarded electronic devices. The amount of lead emitted is not considered to have a significant impact upon the environment.

During combustion of municipal solid waste, NOx is formed in high temperature zones in and round the furnace flame by the oxidation of atmospheric nitrogen and nitrogen in the waste. The two

primary variables that affect the formation of NOx are the temperature and the concentration of oxygen. Techniques such as the method of fuel firing to provide correct distribution of combustion air between overfire and underfire air, exhaust gas recirculation, and decreased heat release rates have been used to reduce NOx emissions. A few add-on control techniques such as catalytic reduction with ammonia and the thermal de-NOx are still experimental, and are not considered to be demonstrated technology for the proposed project. State-of-the-art control of the combustion variables will be used to limit NOx emissions at 3 pounds per ton of MSW charged. This level of control is judged to represent BACT.

Carbon monoxide is a product of incomplete combustion where there is insufficient air. Incomplete combustion will also result in the emissions of solid carbon particulates in the form of smoke or soot and unburned and/or partially oxidized hydrocarbons. Incomplete combustion results in the loss of heat energy to the boiler. The department agrees with the applicant that BACT is a combustion control system that will insure sufficient mixing of the MSW and air so that the emission of products of incomplete combustion are minimized. The proposed CO emission rate is 1.5 pounds per ton of MSW charged. This level of control is judged to represent BACT.

Furthermore, CO has a calorific value of 4347 Btu/lb and when discharged to the atmosphere represents lost heat energy. Since heat energy is used to produce the steam which drives the

generator to produce electric power, there is a strong economic incentive to minimize CO emissions.

Hydrocarbon emissions, like carbon monoxide emissions, result from incomplete oxidation of carbon compounds. Control of CO and HC emissions can be mutally supportive events. BACT for hydrocarbons is high combustion temperature, good mixing, and proper air and fuel management.

The type of air pollutants emitted when incinerating plastics depends on the atomic composition of the polymer. Plastics composed of only carbon and hydrogen or carbon, hydrogen and oxygen form carbon dioxide and water when completely combusted. Incomplete combustion yields carbon monoxide as the major pollutant.

Plastics containing nitrogen as a heteroatom, yields molecular nitrogen, some NOx, carbon dioxide, and water when completely combusted. Incomplete combustion may yield hydrogen cyanide, cyanogen, nitrites, ammonia and hydrocarbon gases. Complete combustion of plastics containing halogen or sulfur heteroatoms form acid gases such as hydrogen chloride, hydrogen fluoride, sulfur dioxide, carbon dioxide, and water. Halogen or sulfur compounds can form on incomplete combustion of the plastic. Polyvinyl chloride (PVC), one of the many polymers, has been implicated as causing the most serious disposal problem due to the release of hydrogen chloride (HCl) gas when incinerated. This problem has long been realized resulting in other polymers

being used in packaging. For example, the weight percent of chlorine in polyurethane is 2.4, with only trace amounts in polyethlyene and polystyrene, as compared to the weight percent of 45.3 in PVC.

Plastic materials have a high heat of combustion, for example, coated milk cartons - 11,330 Btu/lb, latex - 10,000 Btu/lb and polyethylene 20,000 Btu/lb. For comparison, newspaper and wood have a heat content of 8,000 Btu/lb, and kerosene - 18,900 Btu/lb. Here again there is economic incentative to obtain as complete combustion as possible.

The department has not substantiated any acid gas emission problems from existing MSW incinerators. What impact future materials used in the manufacture of disposals will have on ambient air quality is unknown. BACT for the control of acid gas emissions is that the inital design of the proposed facility include provisions for the possible future installation of a wet or dry flue gas scrubber system, if deemed necessary by the department and the Broward County Environmental Quality Control Board.

The applicant had indicated there would be sulfuric acid mist emissions from the proposed sources. Acid mist is created when sulfur trioxide combines with water vapor at a temperature below the dew point of sulfur. Sulfur trioxide is formed by the catalytic oxidation of sulfur dioxide. MSW does not contain vanadium pentioxide, the catalyst required for this distinct

chemical reaction, therefore, no sulfuric acid mist will be emitted.

The air quality impact of the proposed emissions has been analyzed. Atmospheric dispersion modeling has been completed and used in conjunction with an analysis of existing air quality data to determine maximum ground-level ambient concentrations of the pollutants subject to BACT. Based on these analyses, the department has reasonable assurance that the proposed solid waste recovery facility in Broward County, subject to these BACT emission limitations, will not cause or contribute to a violation of any PSD increment or ambient air quality standard.