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January 12, 1988

Mr. Hamilton S. Oven, Jr.
Administrator, Siting Coordination Section
FLorida Department of Environmental Regulation
Twin Towers Office Building
2500 Blair Stone Road
Tallahassee, FL 32399-2400

RE: Responses to Comments from DER on the Power Plant Siting
Application for the Pasco County Resource Recovery Facility

Dear Mr. Oven:

Attached are the responses to the comments made by the Florida Department of Environmental Regulation (DER) in the letter dated December 22, 1987 (also attached). The responses follow the order in which the comments were made. These responses are clarifications to Volume III of the Power Plant Siting Application (dated November 6, 1987) for Pasco County Resource Recovery Facility. Camp Dresser & McKee Inc. is the environmental and engineering consultant for the Pasco County, Florida Solid Waste Resource Recovery Project and has prepared the responses on behalf of Pasco County and Mr. George Ellsworth.

It is our understanding that these comments reflect the current guidance given by EPA Region IV as stated in their letter dated December 18, 1987 and a letter from EPA in Washington, D.C. dated December 1, 1987. For purposes of PSD review, the application is deemed complete as of December 1, 1987 in accordance with 40 CFR 52.21(b)(22). All other aspects of the application are understood to be deemed sufficient in accordance with Section 17-17.081 of the Florida Administrative Code.

It is our intent to satisfy the requirements of DER. If any further clarifications are required, please let us know.

Sincerely,

CAMP DRESSER & McKEE INC.

Raymond C. Porter / for
Daniel E. Strobridge
Project Manager

Attachments

cc: ✓Barry Andrews, DER Bureau of Air Quality Management
Margaret V. Janes, DER Bureau of Air Quality Management
Bruce Miller, EPA Region IV, Air Programs Branch
Wayne J. Aronson, EPA Region IV, Air Programs Branch
George Ellsworth, Pasco County, Resource Recovery Manager

ATTACHMENT

RESPONSES TO COMMENTS FROM THE DER ON THE POWER PLANT SITING APPLICATION FOR THE PASCO COUNTY RESOURCE RECOVERY FACILITY

1. Tables 1 and 2, attached, include the costs for the selective non-catalytic reduction (SNCR) alternative for the control of NOx. This is the only control technology other than furnace design and proper operation that has been applied to resource recovery facilities. The SNCR system included is the Thermal DeNOx System designed by Exxon which utilizes ammonia (NH_3) as the reactive reagent. The reactions and system are discussed in Volume III of the permit application on pages 4-57 to 4-59. The Thermal DeNOx System is estimated to have a capital cost of $2,414,000 and an annual operating cost of $703,000/year. The ammonia can be injected into the boiler with a carrier gas of either steam or compressed air, with the compressed air system being the most economical. The Thermal DeNOx System is designed to reduce NOx emissions by forty percent, but the removal efficiency has not been guaranteed by Exxon on refuse fired facilities.

   These costs are based only on a single vendor's quotation. Exxon is not an operator of resource recovery facilities. The Thermal DeNox System has been operating at only one facility for a relatively short period of time. Therefore, capital, operation and maintenance cost may not be fully quantified. Although no additional costs for controlling NOx emissions by furnace design and proper operation are included in Table 1, designing an efficient furnace and operating the combustion controllers, grate or combustor system, temperature monitors and auxilary burners do have associated costs which will be included in the total cost of the facility. It is not possible to differentiate what portion of these costs are associated with the control of NOx, CO or VOC emissions.

TABLE 1

COST COMPARISON OF NOx ALTERNATIVE CONTROL STRATEGIES

Alternative Control Strategy	NOx Emission Rate, TPY	NOx Removal Efficiency, %	Incremental Controlled NOx Emissions, TPY	Annual Control Costs 1000's \$/yr(1)	Control Costs \$/ton NOx Controlled(1)	Tipping Fee Increase \$/ton(2)
Furnace Design and Proper Operation	1352	0	---	0	0	0
Selective Non-Catalytic Reduction (SNCR)(3)	811	40	540	703	1302	1.89

(1) Control Costs (\$/ton of NOx Controlled) equals the Annual Control Costs (1000's \$/yr) divided by the Controlled NOx Emissions (TPY), i.e. \$703 x 10^3 / 540 tons = \$1302/ton NOx controlled.

(2) Tipping Fee Increase (\$/ton) equals the Annual Control Costs (1000's \$/yr) divided by the Tons of Waste Processed per year with 85% availability (1200 TPD x 365 days/yr c 0.85 = 372,300 TPY).

(3) SNCR System used in this analysis is the Exxon Thermal DeNox System.

TABLE 2

CAPITAL AND OPERATORS/MAINTENANCE COSTS FOR NOx ALTERNATIVE CONTROL STRATEGIES

Alternative Control Strategy	CAPITAL COSTS (IN 1000'S $) Capital Cost(1)	CAPITAL COSTS (IN 1000'S $) Annualized(2) Capital Cost	POWER REQUIREMENTS AND ANNUAL O&M COSTS (IN 1000'S $) Power (KW)	Power(3) Cost	Labor(4) Cost	Maintenance Materials & Supplies(5)	Special Costs	Total Annual Cost
Furnace Design and Proper Operation	0	0	0	0	0	0	0	0
Selective Non-Catalytic Reduction (SNCR)(7)	2,414	246	180	54	30	169(6)	24	$703

(1) Includes Bond Burden.

(2) Annualized capital costs assume 20 year plant life and interest rate equals 8% (capital recovery factor = 0.1019).

(3) Power costs assume plant operation for an entire year with 85% availability. Power cost = $0.04/KWh.

(4) Labor costs assume base 1 man-year required at $30,000/yr.

(5) Maintenance assumed to be 1.0 percent of capital cost.

(6) Includes cost of ammonia based on $250/ton NH_3.

(7) SNCR System used in this analysis is the Exxon Thermal DeNox System.

The implementation of SNCR in the U.S. has occurred only in California where the ambient air is not in attainment of the National Ambient Air Quality Standards (NAAQS) for NO_2. The only operating Thermal DeNOx System, installed at the Commerce RRF, was permitted as "Innovative Technology" and has been operating for less than a year. The requirement for SNCR at the Stanislaus facility, which is still under construction, represents LAER and not BACT. Thus, the long-term operation of a SNCR on resource recovery facilities has not been demonstrated in the U.S.

Table 3 contains the maximum annual ground level concentrations for the NOx alternatives. Table 1 shows that the two alternatives, (1) furnace design and proper operation and (2) SNCR, represent 1.1 percent and 0.66 percent, respectively of the FAAQS for NOx (100 ug/m^3). Because the reduction in emissions does not result in a significant air quality benefit, implementation of SNCR is not warranted. The economic impact ($1,302 per ton of NOx removed) is greater than the $1,000/ton removed guideline, as stated in conversations with DER, for evaluating the cost benefits for BACT. Thus, furnace design and proper operation is selected as BACT for the Pasco County RRF.

2. Emissions of cadmium, chromium, copper, manganese, nickel and polycyclic organic matter are not PSD regulated pollutants. However, the environmental portion of the BACT analysis for PSD regulated pollutants may consider potential reductions in nonregulated pollutants.

   The trace metals, cadmium, chromium, copper, manganese and nickel are associated with the particulate portion of emissions from a resource recovery facility. The proposed air pollution control includes a dry scrubber and a baghouse designed to achieve 0.015 grains per dry standard cubic foot corrected to 12 percent CO_2. The dry scrubber, through the process of evaporating the water in the lime slurry, cools the flue gas, facilitating the condensation of vaporous metal emissions to the particulate phase. The baghouse effectively reduces total and fine particulate emissions such that particulate borne trace metal emissions would also be minimized.

TABLE 3

COMPARISON OF NOx CONCENTRATIONS FOR ALTERNATIVE NOx CONTROL TECHNOLOGIES TO FAAQS

Control Alternative	Estimated Maximum Annual Impact (ug/m^3)	Percent of FAAQS (%)
Furnace Design and Proper Operation	1.1	1.1
Selective Non-Catalytic Reduction (SNCR)(1)	0.66	0.66

Regulated Concentrations

Annual

FAAQS = 100 ug/m^3

PSD Significance Level = 1 ug/m^3

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(1) SNCR System used in this analysis is the Exxon Thermal DeNox System.

Polycyclic organic matter (POM) is a class of compounds characterized by carbon atoms arranged in multiple ringed structures. These compounds are a trace component of the volatile organic compound (VOC) emissions from a resource recovery facility. To minimize emissions of VOC, dioxins and furans and POM, the facility will employ automatic combustion controls, overfire and underfire air systems and auxiliary burners. Thus, the emission limit for VOC emissions effectively reduces trace organic emissions.

3. Each grate (or combustor), furnace and boiler system will be designed to combust 300 tons per day of reference waste with an average higher heating value (HHV) of 4,800 Btu per pound for a heat release rate of 120 million Btu per hour per unit (480 million Btu per hour for the facility). The boiler system works most efficiently when the heat release within the furnace is kept within 80 to 100 percent of the design heat release rate. To maintain efficient boiler operation, a balance must be made between waste throughput and heat content. If the heat content of the waste is greater than 4,800 Btu per pound the waste is processed at a slower rate. If the heat content is lower than 4,800 Btu per pound the waste is processed at a faster rate. For short periods of time (less than three hours), the maximum heat release is not expected to exceed the design heat release rate by more than 10 percent or 132 million Btu per hour per unit (528 million Btu per hour for the facility). This would be equivalent to firing 330 tons per day of waste with a heat content of 4,800 Btu per pound or 300 tons per day of waste with a heat content of 5,280 Btu per pound.

4. Once the facility is constructed, compliance testing will be conducted in accordance with FAC 17-2.700 and 40 CFR 60. The sampling procedures will be submitted for Florida DER review and approval prior to conducting the tests. The pollutants for which compliance with emission limitations must be demonstrated are listed on Table 4. The emissions reflect the short term operating release rates used in the air quality dispersion analysis. The operating condition of 1,200 tpd of 5,000 Btu/lb waste has a pollutant

TABLE 4

POLLUTANT EMISSIONS RATES

Pollutant	Averaging Time	Controlled Concentrations at Stack Top(3)
Particulate Matter (TSP or PM_{10})	24-Hour	0.0156 gr/dscf at 12% CO_2
Carbon Monoxide	8-Hour	104 ppmdv at 7% O_2
Nitrogen Oxides	3-Hour	417 ppmdv at 7% O_2
Sulfur Dioxide	3-Hour	104 ppmdv at 7% O_2
Volatile Organic Compounds (as CH_4)	3-Hour	38.8 ppmdv at 7% O_2
Lead	24-Hour	7.82×10^{-4} gr/dscf at 12% CO_2
Beryllium	24-hour	6.56×10^{-8} gr/dscf at 12% CO_2
Mercury	24-Hour	4.38×10^{-6} gr/dscf at 12% CO_2
Inorganic Arsenic	24-Hour	7.09×10^{-4} gr/dscf at 12% CO_2
Fluorides	3-Hour	1.20 ppmdv at 7% O_2
Sulfuric Acid Mist	--	(1)
Hydrogen Chloride(2)	3-Hour	104 ppmdv at 7% O_2
Dioxin(2) (as 2,3,7,8-TCDD toxics equivalent)	24 Hour	3.92 ng/Nm^3 at 12% CO_2

(1) EPA Region IV has determined that there is no reliable testing method for this pollutant.

(2) Not a PSD regulated pollutant.

(3) Concentrations represent short-term operating release rates as modeled in the air quality analysis.

emission rate 1.042 times that of the design operating condition. Gaseous pollutants are expressed in units of parts per million on a dry volume basis corrected to 7 percent oxygen. Particulate borne pollutants are expressed in units of grains per dry standard cubic foot corrected to 12 percent carbon dioxide.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

December 22, 1987

George Ellsworth
Resource Recovery Manager
7536 State Street
New Port Richey, Florida 33553

Dear Mr. Ellsworth:

The Florida Department of Environmental Regulation has reviewed the power plant siting application for sufficiency in accordance with section 17-17.081, Florida Administrative Code. The following areas need to be addressed either in Section 3.4.3 or Volume III of the application:

1. It will be necessary to establish BACT for nitrogen oxides using the top down approach. (According to EPA directives, BACT is now being evaluated from a top down approach. In using this approach, BACT is initiated using LAER as a starting point. BACT is then determined based on the economic, environmental, and energy impacts of each technology associated with LAER. If the control/emission rate associated with LAER is not justified by these constraints, a lesser degree of control is selected and the analysis is repeated until the level of control that is justified is reached.)

2. All toxic air pollutants need to be addressed with respect to the proposed control technology. For municipal waste combustors the toxic air pollutants are identified in the publications entitled, "Compiling Air Toxic Emission Inventories," EPA-450/4-86-010 and "Control Technologies for Hazardous Air Pollutants," EPA-625/6-86-014. In accordance with these publications, the pollutants cadmium, chromium, copper, manganese, nickel and polycyclic organic matter need to be addressed.

3. Will the heat release from the project at its maximum capacity exceed 500 MMBtu/hr (e.g. 1320 tons/day refuse having a heat content of 5000 Btu/lb)?

4. How does the County propose to show compliance with emission limitations for all the pollutants emitted in greater than significant quantities (re: Table 2-1)? What will be the emission concentrations for the above mentioned pollutants on a dry basis and corrected to 7% O_2 or 12% CO_2 (apart from the ones already submitted in the application).

If you have any questions concerning these requirements you may wish to contact Barry Andrews in the Bureau of Air Quality Management at (904) 488-1344.

Sincerely yours

Hamilton S. Oven Jr.

Hamilton S. Oven, Jr. P.E.
Administrator, Siting
Coordination Section

HSO

cc: Diane Tremor
Richard Donelan
All parties

E.6. Air Quality Impacts

a. Introduction

The proposed solid waste resource recovery facility (RRF) will emit a wide variety of pollutants into the ambient air. Some of these pollutants are specifically regulated, others are not. Of the specifically regulated pollutants some are regulated in order to protect human health and welfare, and have limiting ambient air concentration levels that are not to be exceeded. All of the specifically regulated pollutants are bound to certain emission restrictions which can differ for different source types. In many cases a pollutant is regulated for one source type and not another. For the pollutants identified as potentially being emitted from this facility, the following regulations may apply: (1) Prevention of Significant Deterioration (PSD) including Best Available Control Technology (BACT), and protection of the State and National Ambient Air Quality Standards (NAAQS); (2) New Source Performance Standards (NSPS), and; (3) National Emission Standards for Hazardous Air Pollutants (NESHAP).

This section will deal with the prevention of significant deterioration regulations. The pollutants which are potentially subject to the PSD regulations are:

Pollutant	Emissions (TPY)
carbon monoxide (CO)	100
nitrogen dioxide (NO_2)	40
sulfur dioxide (SO_2)	40
ozone (O_3)	40 (VOC)
particulate matter (PM)	25
total reduced sulfur (including H_2S)	10
reduced sulfur compounds (including H_2S)	10
sulfuric acid mist (H_2SO_4)	7
fluorides (F-)	3
vinyl chloride	1
lead (Pb)	0.6
mercury (Hg)	0.1
asbestos (As)	0.007
beryllium (Be)	0.0004

The significant emission rate in tons per year (TPY) for the determination of PSD applicability is listed beside each pollutant. Volatile organic compounds (VOC) are the regulated pollutants for ozone.

1. Applicability

The new resource recovery facility (RRF) is subject to the PSD regulations because it will emit 100 tons or more per year of at least one of the PSD regulated pollutants. Having satisfied this criteria, PSD review is also required for all other pollutants listed above if the emission rate equals or exceeds the significant rate (on a facility wide basis). The Pasco County RRF has been estimated to emit in PSD-significant amounts nine of the PSD-pollutants. These are the criteria pollutants particulate matter, sulfur dioxide, nitrogen dioxide carbon monoxide, volatile organic compounds and lead, and the non-criteria pollutants fluorides, sulfuric acid mist and mercury. A determination of BACT and an air quality impact analysis is required for each of these pollutants.

Best Available Control Technology Determination

The applicant plans to eventually construct a 1200 ton per day (TPD) resource recovery facility (RRF) to be located at a site in Pasco County which is bounded on the west and and south by Hays Road, on the east by Shady Hills Road, and on the north by Bluebird Lane. The thermal energy from combustion of the municipal solid waste (MSW) will be used to produce steam for electric power generation.

The present plans are to install three 300 TPD mass burn units that will process a total of 900 TPD of MSW. This BACT review will be made for the ultimate capacity of 1200 TPD as requested by the applicant.

Each of the four mass burn units will have an approximate heat input of 120 million Btu per hour, based upon a MSW heating value of 4800 Btu per pound. Each unit will be scheduled to operate 8760 hours per year. The applicant has indicated the maximum total annual tonnage of regulated air pollutants emitted from the four units based on operating at nameplate capacity and continuous operation to be as follows:

Pollutant		Maximum Annual Emissions (Tons/Year)	PSD Significant Emissions Rate (Tons/Year)
Particulate	(PM)	68	25
Sulfur Dioxide	(SO_2)	471	40
Nitrogen Dioxide	(NO_2)	1351	40
Carbon Monoxide	(CO)	103	100
Ozone	(O_3)	44 (VOC)	40
Lead	(Pb)	3.4	0.6
Mercury	(Hg)	3.07	0.1
Beryllium	(Be)	0.000285	0.0004
Fluorides	(F)	17	3
Sulfuric Acid Mist		75	7
Arsenic	(AS)	0.191	0

The Pasco County RRF was reviewed according to Florida Administrative Code Chapter 17-17, Electrical Power Plant Siting and Rule 17-2.500, Prevention of Significant Deterioration (PSD). The Bureau of Air Quality Management (BAQM) performed the air quality review for the siting committee, which includes this BACT determination. The certification number assigned to the proposed facility is PA 87-23.

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 as attainment for all air pollutants.

BACT Determination Requested by the Applicant:

The following emission limits are based upon a unit ton of MSW charged.

PM - 0.309 lbs   CO - 0.470 lbs   Hg - 0.014 lbs

SO_2 - 2.15 lbs   Pb - 0.0155 lbs   F - 0.077 lbs

NOx - 6.17 lbs   Be - 1.3 x E-6 lbs   VOC - 0.20 lbs

As - 8.7 x E-5 lbs H_2SO_4 - 0.344 lbs

Date of receipt of a BACT application:

November ~~6~~ 16, 1987

Date of publication with Florida Administrative Weekly:

March 4, 1988

BACT Determination Procedure:

In accordance with Florida Administrative Code Chapter 17-2, Air Pollution, this BACT determination will be based on the maximum degree of reduction of each pollutant emitted which the Department, on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques. In addition, the regulations state that in making the BACT determination, the Department shall give consideration to:

(a) Any Environmental Protection Agency determination of Best Available Control Technology pursuant to Section 169, and any emission limitation contained in 40 CFR Part 60 (Standards of Performance for New Stationary Sources) or 40 CFR Part 61 (National Emission Standards for Hazardous Air Pollutants).

(b) All scientific, engineering, and techncal material and other information available to the Department.

(c) The emission limiting standards or BACT determinations of any other state.

(d) The social and economic impact of the application of such technology.

In addition to the criteria discussed above, the EPA has recently stressed that BACT should be determined using the "top-down" approach. The first step in this approach is to determine, for the emission source in question, the most stringent control available for a similar or identical source or source category. If it can be shown that this level of control is technically or economically infeasible for the source in question, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections.

The air pollutant emissions from resource recovery facilities can be grouped into categories in accordance with the control equipment and techniques that are available to control emissions from these facilities. Using this approach, the emissions can be classified as follows.

° Combustion Products (Particulates and Heavy Metals). Controlled generally by particulate control devices.

° Products of Incomplete Combustion (CO, VOC, Toxic Organic Compounds). Control is largely achieved by proper combustion techniques.

° Acid Gases (SO_x, NO_x, HCl, Fl). Controlled generally by gaseous control devices.

Grouping the pollutants in this manner lends itself well to performing the BACT analysis since the selection of control equipment available to control the type or group of pollutants emitted and the corresponding energy, economic, and environmental impacts can be examined on a common basis. It should be noted that although all of the pollutants addressed in the BACT analysis are not subject to having a specific emission limiting standard set for them as a result of the PSD review, it is EPA's policy that the control of such "nonregulated" air pollutants may be considered in imposing a more stringent BACT limit on a "regulated" pollutants (i.e., particulates, sulfur dioxide, fluorides, sulfuric acid mist, etc.), if there is a reduction in the "nonregulated" air pollutants which can be directly attributed to the control device selected as BACT for the abatement of the "regulated" pollutants. This policy was recently reaffirmed by the Administrator in a remand of a PSD permit for the North County Resource Recovery Facility in San Marcos, California. Two additional similiar remands for resource recovery PSD permits occured in EPA Region V.

2. BACT Analysis:

a. Combustion Products

The projected emission of particulates, lead, and mercury are well above the significant emission rates given in Florida Administrative Code Rule 17-2.500, Table 500-2. In addition, studies have shown that resource recovery facilities emit approximately 27 other metals not classified as being regulated by the PSD Rule. The uncontrolled emissions of metals from resource recovery facilities generally amount to approximately 0.01 pounds per ton of refuse incinerated. Although the controlled emissions of metals is low in comparison to other pollutants, metals and metallic compounds associated with emissions of fine particles (particles smaller than two microns in diameter), or as vapors, depending on the chemistry of the metal, can pose especially severe health risks. A discussion on how metals can be absorbed by the body and the health effects associated by several of the metals of concern can be found in the California Air Resources Board (CARB) report on resource recovery facilities. The emission of metals from resource recovery facilities substantiates the need for providing high efficiency particulate control.

Each unit will have a charging rate of 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 NSPS particulate matter standard is 0.08 grains/dscf, corrected to 12% CO_2. This NSPS was promulgated in 1971 and no longer reflects state-of-the-art for control of particulate emissions. Based on the information available, vendors now guarantee both electrostatic precipitators and fabric filter technology to achieve grain loadings below 0.015 grains/dscf corrected to 12% CO_2. This level is slightly higher than 0.01 grains/dscf corrected to 12% CO_2 as a fine particulate standard that other states such as California and Maine have proposed to represent BACT, but is in accordance with other recent BACT determinations for other resource recovery facilities of this size in the state of Florida.

With respect to lead emissions, two conditions are needed to achieve high removal efficiencies of metallic compounds emitted at refuse burning facilities: (1) operation of particulate matter control equipment at temperatures below approximately 260°C (500°F), and (2) consistently efficient removal of submicron fly ash particles. The maximum temperature of the RRF combustion gases at the inlet to the particulate control device is estimated to be 280°F. At this temperature the particulate control equipment would be capable of removing a significant amount of the lead emissions from the flue gas stream.

When flue gas temperatures are lowered below 260°C (500°F), metallic compounds are removed from the vapor phase by absorption and condensation preferentially on fine particles with submicron particles receiving the highest concentrations of metals--because there are a much greater number of small particles than large particles and collectively the smaller particles have a greater total amount of surface area than the larger particles. Properly designed and operated fabric filter systems appear at this time to offer the best method for consistent and efficient removal of fine (and in particular submicron) fly ash. Removal efficiencies of fine fly ash using these systems can be in excess of 99% with respect to MSW incinerators. Studies have indicated the weight percent of submicron particles emitted from combustion is on the order of 45% which clearly indicates the need for efficient control of particles in this size range.

The California Air Resource Board (CARB) report on resource recovery facilities indicates that the highest uncontrolled lead emission rate from refuse-fired facilities tested is 16,000 ug/MJ. Based on a heating valve of 4,800 Btu per pound of refuse, this equates to an emission rate of 8.36 lbs per ton of refuse charged. Recent testing of baghouses and high efficiency four field electrostatic precipitators (ESPs) indicates that lead removal efficiencies greater than 99% are being achieved with both types of control devices. Taking into consideration this efficiency and the maximum emission rate, 0.005 lbs per ton of refuse charged has been judged to represent BACT for lead emissions from the most recently permitted resource recovery facilities in Florida and thus is also deemed as BACT for the Pasco facility.

The emission limit determined to be BACT for mercury is 0.0036 pounds per ton of refuse charged. This limitation is consistent with the majority of the RRFs recently permitted in the State of Florida.

The emissions limits which constitute BACT for these pollutants for this facility can reasonably be expected to be met with a particulate control device that would achieve a grain loading not to exceed 0.015 grains/dscf corrected to 12% CO_2, as measured by EPA Method 5.

In addition, performance testing has indicated that the use of a dry scrubbing system in conjunction with a fabric filter will enhance the collection efficiency of the particulate control device. A report based on testing completed in Europe (Dry Scrubbing of Municipal Solid Waste Incinerator Flue Gas By Spray Dryer Absorption, 77th Annual Meeting of APCA, San Francisco, California, June 24-29, 1984) indicated that a dry scrubber used in conjunction with a baghouse provided the highest level of control of particulates and heavy metals, with the control in both the particulate phase and the vapor phase ranging from 75% to more than 97%. The control of mercury is substantially improved using a dry scrubber since mercury exits the boiler being 90-100% in the vapor phase. The enhanced control of heavy metals is largely due to the reduction in the flue gas temperature brought about by the dry scrubber which allow the metals to cool and condense onto the particulate matter with preference to the fine particulates due to the greater surface area per unit mass. The proposed control of a dry scrubber used in conjuncion with a baghouse designed to achieve 0.015 grains per dry standard cubic foot corrected to 12 percent CO_2 is deemed to also represent BACT for the emissions of heavy metals which are not PSD regulated pollutants such as cadmium, chromium, coppper, manganese, and nickle.

Energy Economic and Environmental Impacts Analysis

In accordance with previous BACT/LAER determinations for resource recovery facilities and the concept of "top down" BACT, the dry scrubber--baghouse combination represents the most stringent control availalbe for particulate and heavy metals. Since this level of control has been proposed by the applicant, no further discussion regarding energy, economic, or environmental impacts of other control strategics is needed. It should be noted however that the energy and economic impacts of using an equally efficient alternative control strategy (dry scrubber - ESP) were demonstrated to be greater than the proposed control.

b. Acid Gases

The emissions of sulfur dioxide, nitrogen dioxide, fluorides, and sulfuric acid mist, as well as other acid gases which are not "regulated" under the PSD Rule, constitute a significant amount of emissions that needs to be addressed from the standpoint of available control.

The sulfur dioxide emissions from resource recovery facilities are directly related to the sulfur content of the refuse incinerated. MSW components that appear to be major contributors of sulfur include rubber, plastics, food wastes, yard wastes and paper.

Various studies have indicated average SO_2 emission levels of 2.0 to 2.8 lb/ton MSW charged with deviations of ± 1.3 to 1.6 lb/ton. A recent test conducted on Pinellas County units 1 and 2 on May 21 and 22, 1986, indicated that the average SO_2 emissions were 0.38 and 0.14 lb/MM Btu respectively. This corresponds to an emission factor of 3.65 and 1.34 pound per ton using a heating value of 4,800 Btu per pound of refuse incinerated. The amount of SO_2 emitted would be comparable to the burning of distillate oil having less than a 0.5% sulfur content. Burning low sulfur fuel is one acceptable method of controlling SO_2 emissions in some cases. The installation of a flue gas desulfurization system to control SO_2 emissions alone is not clearly warranted when burning MSW. However, other acid gases and their chemical reaction products are emitted from resource recovery facilities and their impacts need to be evaluated when addressing the control of acid gases. One such reaction product is sulfuric acid mist. Some of the sulfur dioxide emitted from the combustion of the sulfur containing refuse is oxidized to SO_3 which then combines with water vapor to produce sulfuric acid mist.

Emissions of fluoride also originate from a number of sources in the refuse. The control of fluorides can be reduced at refuse-burning plants by removal of selected refuse components with high fluoride content, and the use of flue gas control equipment.

The acid gases that have been addressed in this analysis are related in part to the amount of plastics in the waste stream.

The type of air pollutants emitted when incinerating plastics depends on the atomic composition of the plastics. 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 yield molecular nitrogen, some NOx, carbon dioxide, and water when completely combusted. Incomplete combustion yields hydrogen cyanide, cyanogen, nitrites, ammonia and hydrocarbon gases. Complete combustion of plastics containing halogens or sulfur heteroatoms form acid gases such as hydrogen chloride, hydrogen fluoride, sulfur dioxide, carbon dioxide, and water. Halogen or sulfur compounds form from the incomplete combustion of the plastic. Polyvinyl chloride (PVC), one of many plastics, has been implicated as causing the most serious disposal problem due to the release of relatively large amounts of hydrogen chloride (HCl) gas when incinerated. This problem has long been realized resulting in other plastics being used in packaging. For example, the weight percent of chlorine in polyurethane is 2.4, with only trace amounts in polyethylene and polystyrene, as compared to a weight percent of 45.3 in PVC.

A recent study of MSW incineration performed for the USEPA has indicated that the plastics content of refuse is expected to grow by from 300-400% between the year 1968 and 2000. This increase can be expected to increase uncontrolled HCl emissions from municipal waste incineration by roughly 400% from 1970 to the year 2000.

Emissions of HCl at refuse incineration facilities can be reduced by removal of selected refuse compenents with high chlorine contents (source separation), combustion modification, and the use of flue gas control equipment. Although the combustor configuration may influence the amount of chlorine conversion, combustion modification is not a viable means of controlling HCl emissions.

Potential emissions of HCl can be reduced significantly by removing high chlorine content plastic items from the waste stream. This is particularly true when the plastics are the PVC type explained earlier. With the exception of limited recycling efforts, source separation of plastics has not been demonstrated and costs are uncertain at this time. In addition, the combustion of plastics may be favorable from an energy point of view due to their relatively high heating value.

Plastic materials have a high heat of combustion (for example; coated milk cartons - 11,300 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; kerosene 18,900 Btu/lb.

At this time flue gas controls are the most conventional means of reducing HCl emissions, as well as the other acid gases at refuse burning facilities.

The control equipment available to reduce the emissions of sulfur dioxide, sulfuric acid mist, fluorides, and hydrogen chloride consist primarily of the wet or dry scrubber. The wet scrubbing process is capable of removing greater than 80% of the sulfur dioxide emissions and over 90% of the other acid gases. These removal efficiencies are comparable to that achieved by dry scrubbing technology but the wet scrubber has the disadvantage of creating contaminated wastewater and/or sludges that can present a wastewater or sludge disposal problem. Because of the great concern for the state's groundwater supplies, control devices that produce wastewater which needs to be treated before disposal are not considered good options for these facilities. In addition, equipment corrosion and scaling problems have been encountered when using wet scrubbing technology.

The dry flue gas scrubbing system is an available option that does not have the problems associated with the wet scrubber. Dry scrubbers have been successfully demonstrated in Europe, Japan, and to a limited extent in the United States. Although many units have been permitted to employ dry scrubbing technology in the United States, only one facility (Framingham Massachusetts) has been operating in the U.S. for an extended period of time with this technology. Other facilities operating which incorporate this technology in the United States are in Marion County, Oregon and Commerce, California. Experience with dry scrubbers have indicated that control efficiencies for SO_2 and HCl are in the ranges of 80-90 percent and 80-98 percent, respectively. In addition, the use of a fabric filter in conjunction with a dry scrubber has been shown to increase SO_2 removal efficiencies by as much as 16 percent. This is primarily due to the reagent in the bag's filter cake being able to serve as another site for SO_2 absorption to take place.

In accordance with the discussion on the availability of applicable control technology and previous BACT determination completed in other states as well as Florida, a dry scrubber capable of removing 70% of the sulfur dioxide emissions and 90% of the hydrogen chloride emissions is deemed to represent BACT for this facility.

Another pollutant which has been categorized as an acid gas is nitrogen oxide. During combustion of municipal solid waste, nitrogen oxides are 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 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 emission.

Flue gas controls appear to offer the greatest potential for NOx reductions though their application on full-scale RRFs has been limited. The controls which have been applied to combustion processes are selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR). The SNCR system involves the intimate contact of ammonia and flue gas NOx in the boiler through the use of injectors located in the boiler's wall. Like SNCR, the SCR technology also injects ammonia into the flue gas, however, its reaction with NOx is at a lower temperature and is enhanced by using a catalyst bed.

The SNCR system has been applied primarily in Japan at several installations on small-to medium sized incinerators. U.S. installations appear only in California with one unit operating (Commerce RRF) and another planned (Stanislaus RRF). It should be noted that both of the California RRFs are in non-attainment areas for NOx thus, the SNCR systems represent LAER and not BACT. California's 300 tpd Commerce RRF has been operating since February of 1987 with a SNCR system that achieves an average NOx reduction of 40 percent. The system, permitted as "Innovative Technology," has had minimal operating problems. The Stanislaus facility, in its 2nd year of construction, has been permitted with a SNCR system as being able to achieve NOx reductions of 43.5 percent. Although the use of SNCR Systems has been asociated with LAER and not BACT determinations, the energy, economic, and environmental impacts of applying SNCR must be evaluated in accordance with the "top down" BACT approach.

Energy, Economic and Environmental Impacts Analysis

As is the case with the proposed particulate/heavy metals control equipment, the dry scrubber-baghouse combination represents the most stringent control available for removal of the acid gases other than nitrogen oxides that is commonly used on resource revoery facilities in this country, thus no further discussion regarding energy, economic, or environmental impacts is needed. Although studies have indicated that the highest acid gas removal efficiencies can be achieved by using wet scrubbers, the applicant has stated that wet scrubbers are now considered an obsolete technology for resource recovery facilities due to several significant disadvantages. The applicants proposed control for nitrogen oxides (standard combustion controls), however, do not represent the greatest level of control. To satisfy the concept of "top down" BACT the applicant has provided a cost benefit analysis of applying SNCR to the facility.

In order to justify the cost effectiveness of air pollution control, the EPA has developed costing guidelines to obtain the highest reduction of emissions per dollars invested. This method of maximizing emission reductions per capital invested is a major factor when New Source Performance Standards (NSPS) are developed by the EPA. For NOx emissions, EPA has determined that a cost of up to 1,000 per ton of emissions controlled ($0.50/lb) is reasonable for NSPS.

The Thermal DeNOx System, a type of SNCR, is estimated to have a capital cost of $2,414,000 and an annual operating cost of $277,000. Assuming a capacity factor of 85 percent at design rate operation, the amount of NOx reduction for the 40% efficient Thermal DeNOx System would be approximately 540 tons per year. Taking this reduction in consideration with the total annualized cost (annual operating cost plus capital cost amortized over 20 years at 8 percent interest) of $523,000, the cost per ton of particulate controlled is approximately $969.00.

From the standpoint of cost effectiveness, the installation of SNCR appears to be reasonable. The cost effectiveness of equipping the facility with SNCR is also strengthened by the fact that a BACT determination must be at least as stringent as any applicable NSPS, thereby warranting a higher cost of control. For example, California's South Coast Air Quality Management District has established a guideline of $9,000 per ton of NOx removal as being reasonable for BACT.

Although the cost effectiveness of SNCR appears to be justifiable, it should be noted that the NOx impacts as proposed (no SNCR) by the applicant are minimal. The applicant has predicted the highest annual nitrogen dioxide (NO_2) impact to be 1.03 ug/m^3. This impact level in conjunction with the estimated background concentration of NO_2 (39 ug/m^3) is well below the National Ambient Air Quality Standard of 100 ug/m^3.

c. Products of Incomplete Combustion

The emissions of carbon monoxide, volatile organic compounds and other organics from resource recovery facilities are largely dependent upon the completeness of combustion.

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. 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 an 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 mutually supportive events.

An analysis of a proposal to construct a MSW incinerator in 1988 would not be complete unless the subject of dioxins was adressed.

Dioxin is a hazardous material that has received widespread public attention. It is found in trace amounts whenever substances containing chlorine (for example, plant and animal tissus and plastics) are burned. It is also an impurity that can be found in some herbicides, such as "2,4,5-T".

Although the subject of dioxin is new, and relatively little is known, two important things stand out: 1) Dioxin is readily minimized in properly designed and operated BACT-equipped facilities, and 2) very small amounts cause demonstable health effects in some animal exposure tests. Although most of the reduction in dioxin emissions is believed to take place in the combustion chamber, the installation of add-on controls has been demonstrated to provide additional removal of dioxins.

Efficient combustion is essential to minimize the formation of organic compounds. Four factors control combustion efficiency: 1) reaction temperature within the combustion zone and post-combustion zone, 2) residence time of reactants and intermediate products in the combustion and post-combustion zones, 3) turbulence or mixing efficiency, and 4) air to fuel ratio.

Properly operated refuse-burning furnaces can minimize formation of chlorinated and non-chlorinated organic compounds. The bureau agrees with the applicant that modern incinerators, have controlled emissions of organic compounds to a great extent through proper combustion. In order to assure that good combustion is continuous, many studies have been completed to define operating factors that reflect efficient combustion.

It is generally accepted that CO measurements are a good indicator of good combustion. The combustion process of automobiles, fossil fuel boilers and hazardous waste incinerators are now controlled on the basis of CO emissions. Of greater importance in relation to MSW incineration, the questions remain, is good combustion related to low dioxins, or are CO and dioxin emission related?

In a recent report (Municipal Waste Combustion Study - Report to Congress) the Environmental Protection Agency (EPA) indicated that good combustion is essential to minimize the emissions of organic compounds such as dioxins. With the goal of complete combustion in mind, the EPA has developed combustion strategy elements termed "good combustion practices" for mass burn facilities (see Table 1).

The applicant has stated that these practices will be used as operational guidelines. in accordance with these guidelines and the level of control achieved by the proposed dry scrubber baghouse combustion, it is apparent that BACT is being applied for the control of toxic organic compounds such as dioxins and polycyclic organic matter. In addition, the practice of limiting carbon monoxide emissions to 50 ppm correct to 12% CO_2 based on a 4 hour average is deemed as BACT.

c. BACT DETERMINATION BY DER

Discussion

Based on the information presented in the preceeding analysis, the bureau has determined that the dry scrubber-baghouse combination is justified as being BACT for this facility.

In accordance with this determination, the emission limits on a pollutant basis are set as follows:

Air Pollutant	Emission Limit Per Unit
Particulate Matter	0.015 grains/dscf, corrected to 12% CO_2, as measured by EPA Method 5
Sulfur Dioxide	60 ppmdv corrected to 12% CO_2, 6-hour rolling average; or 70% reduction of uncontrolled SO_2 emissions, 6-hour rolling average. Not to exceed 120 ppmdv corrected to 12% CO_2, 2-hr rolling average.
Nitrogen Oxides	6.17 lb/ton refuse charged
Carbon Monoxide	50 ppmdv corrected to 12% CO_2, 4-hr rolling average.
Fluorides	0.077 lb/ton
Sulfuric Acid Mist*	
Lead	0.005 lb/ton
Mercury	0.0036 lb/ton
Beryllium	1.3 x E-6 lb/ton refuse charged
Arsenic	8.7 x E-5 lb/ton
VOC	0.20 lb/ton refuse charged
Visible Emission	15% opacity, six minute average

*Due to the lack of an accurate test method for measuring sulfuric acid mist emissions from RRFs, no emission limitation is proposed as BACT.

(1) Compliance with the mercury emissions 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, and 6, and 40 CFR 60 Appendix A; Method 5, 7, 10, 12, 13A or 13B. 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 that meets all requirements found in the Federal Register, to measure combustion temperature plus NOx, SO_2, CO, O_2, CO_2 levels and opacity of the stack's emissions 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. In addition, the combustion efficiency calculated by: $\% \; CE = (1/(1 + (CO/CO_2))) \times 100$ shall be at least 99.8%, for an 8-hour average.

Table 1

Practice	Mass Burn Preliminary Target
Design temperature at fully mixed height	1800°F at fuly mixed height
Underfire air control	At least four separately adjustable plenums. One each under the drying and burnout zones and at least two separately adjustable plenums under the burning zone.
Overfire air capacity (not an operating requirement)	40% of total air
Overfire air injector design	That required for penetration and coverage of furnace cross section
Auxiliary fuel capacity	That required to meet start-up temperature and 1800°F criteria under part-load operations
Excess Air	6-12% excess oxygen (dry basis)
Turndown restrictions	80 - 110% of design - lower limit may be extended with verification tests
Start-up procedures	On auxiliary fuel to design temperature
Use of auxiliary fuel	On prolonged high CO or low furnace temperature
Oxygen in flue gas (continuous monitor)	6 - 12% dry
CO in flue gas (continuous monitor)	50 ppm on 4 hour average corrected to 12% CO_2
Furnace temperature (continuous monitor)	Minimum of 1800°F (mean) at fully mixed height across furnace
Adequate air distribution	Verification test

V. Ambient Air Quality Analysis

Prevention of Significant Deterioration (PSD)

A. Introduction

The Pasco County Board of County Commissioners (the applicant is proposing to construct a resource recovery (solid waste disposal) facility on a 751 acre site off Hayes Road within the county. The facility will use mass-burn technology and will initially produce 22 megawatts (MW) of electricity by burning 900 tons per day (tpd) of municipal solid waste. An ultimate processing capacity of 1200 tpd is being requested by the applicant in anticipation of future need. This ultimate capacity will produce 29 MW of electricity. The facility, as reviewed, will consist of four individual incinerator/boilers each with a 300 tpd processing capacity. The operation of these units will result in the significant emissions of regulated air pollutants and thus must be reviewed by the Department.

The Pasco facility will be located in a Class II PSD area. The facility will also be located within 100 kilometers of the Chassahowitzka National Wilderness Class I area and within 50 kilometers of the Tampa particulate nonattainment area and the Pinellas County SO2 nonattainment area. The pollutant emissions estimated by the applicant, considering control equipment, indicate that the following nine compounds emit in PSD-significant amounts: particulate matter (PM, including PM10), carbon mono- xide (CO), nitrogen oxides (NOx), sulfur dioxide (SO2), volatile organic compounds (VOC), lead (Pb), mercury (Hg), fluorides (F-), and sulfuric acid mist (H2SO4). The air quality impact analysis required by the PSD regulations for the subject pollutants includes:

- An analysis of existing air quality;
- A PSD increment analysis (for SOS and PM only);
- An Ambient Air Quality Standards (AAQS) analysis;
- An analysis of impacts on soils, vegetation, visibility, and growth-related air quality impacts; and
- A "Good Engineering Practice" (GEP) stack height determination.

Other pollutants (aside from those specifically regulated by the PSD regulations) will also be emitted into the ambient air by the proposed facility. Some of these have become issues of public concern, such as hydrogen chloride (HCl), dioxins (2,3,7,8 -TCDD), and various heavy metals. Although these pollutants have no ambient air standards, they are considered in the Best Available Control Technology (BACT) analysis. The applicant has estimated the ambient impacts, however, of some of these pollutants and compares these concentrations to regulatory guidelines used in several other states.

The analysis of existing air quality generally relies on preconstruction monitoring data collected in accordance with EPA-approved methods. The PSD increment and AAQS analysis depends on air quality dispersion modeling carried out in accordance with EPA guidelines.

Based on these required analyses, the Department has reasonable assurance that the proposed facility, as described in this report and subject to the conditions of approval proposed herein, will not cause or contribute to violation of any PSD increment or ambient air quality standard. In addition, the Department has evaluated, to the extent possible, the ambient impacts of several non-PSD regulated pollutants. Control and/or emission limitations have been set for some of these pollutants for the purpose of reducing any potential harmful effects.

B. Modeling Methodology

The EPA-approved industrial Source Complex Short-Term (ISCST) atmospheric dispersion model (version 6) was used to predict the impact of the new Pasco facility on the surrounding ambient air. This model determines ground-level concentrations of inert gases or small particulates emitted into the atmosphere by point, area, or volume-type sources. It incorporates elements for plume rise, transport by the mean wind, and Gaussian dispersion. In addition, the model allows for the separation of sources, building wake downwash, adjustment for calm conditions, and various other input and output features.

The applicant conducted screening modeling, for the purpose of defining the worst-case operating conditions, and refined modeling to ensure that the highest concentrations were identified. For both sets of modeling runs the applicant received prior approval from the Department on the methodology by submitting a modeling protocol.

The screening modeling identified the worst-case operating conditions to be a 1200 tpd facility burning waste with a heat content of 5000 btu per pound (btu/lb). The nominal operating conidtions of the facility are expected to be 1200 tpd at 4800 btu/lb. This worst-case condition was used in the refined modeling.

For the refined modeling, five years of sequential hourly meteorological data were used. The surface and upper-air data were National Weather Service (NWS) data collected in Tampa during the period 1970-1974. Since five years of data were used, the highest, second-high short-term predicted concentrations are compared with appropriate ambient standards or PSD increments. For the annual averages the highest predicted yearly average was compared to the standards. The stack and emission characteristics used in the refined modeling for the Pasco facility are summarized in Table I and Table II, respectively. Since the proposed stack height is equal to the calculated GEP height, building wake downwash was not included in the modeling.

The initial refined modeling selected 360 receptors surrounding the facility from 0.3 kilometers to 15 kilometers. Additional receptors were located at the Chassahowitzka National Wilderness (Class I) Area, the Cedar Keys National Wilderness Area, and the Pinellas County SO2 nonattainment area. The average terrain elevations at these receptors were used. Considering only the Pasco facility sources, the critical days and receptors were identified from these runs. Fine resolution receptor girds (100 meter spacing) for these critical days and receptors further refined the maximum concentrations.

The results of these model runs, as shown on Table III, shows that for particulate matter, sulfur dioxide, and carbon monoxide the maximum predicted concentrations are less than the

Table I

Pasco County Resource Recovery Facility
Source Characteristics

Source	UTM E (km)	UTM N (km)	Stack Height(m)	Exit Temp.(K)	Exit Velocity(m/s)	Stack Diameter (m)
Incinerator/ Boilers (4)	347.12	3139.23	83.8	394.3	15.69	3.05(1)

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(1) Effective diameter for four flues in the common stack; each individual flue has a diameter of 1.52 m.

Table II

Pasco County Resource Recovery Facility
Emission Rates

Pollutant	Emission Factor (lb/MMBtu)	Annual Emission Rate (TPY) (1)	Short-term Emission Rate (lb/hr) (2)
Particulate Matter (TSP or PM10)	0.0322	68	16.1
Sulfur dioxide (SO_2)	0.224	471	113
Nitrogen Oxides (as NO_2)	0.643	1,351	322
Carbon Monoxide (CO)			
Annual	0.0490	103	24.5
8-hour	0.0979		49.0
1-hour	0.391		195.5
Non-Methane Hydrocarbons	0.0208	44	10.4
Lead (Pb)	0.00161	3.4	0.805
Sulfuric Acid Mist (H_2SO_4)	0.0358	75	17.9
Fluoride (as HF)	0.00802	17	4.01
Mercury (Hg)	0.00146	3.07	0.729
Beryllium (Be)	1.35×10^{-7}	0.000285	0.0000677
Inorganic Arsenic (As)	9.07×10^{-6}	0.0191	0.00454
Hydrogen Choloride (HCl)	0.127	267	63.5
Dioxin (as 2,3,7,8-TCDD)	3.54×10^{-9}	7.45×10^{-6}	1.77×10^{-6}

(1) Annual rate based on 1200 TPD operation assuming 4800 Btu per pound of waste.
(2) Short-term rate based on 1200 TPD operation assuming 5000 Btu per pound of waste.

Table III

Pasco County Resource Recovery Facility
Maximum Predicted Concentrations (Pasco County RRF only)

Pollutant	Averaging Period	Maximum Conc. (ug/m^3)	Significant Impact Level (ug/m^3)	Deminimus Monitoring Level (ug/m^3)
Sulfur Dioxide	Annual	0.36	1	NA
	24-hour	2.98	5	13
	3-hour	11.49	25	NA
Particulates	Annual	0.05	1	NA
(TSP or PM$_{10}$)	24-hour	0.43	5	10
Nitrogen Dioxide	Annual	1.03	1	14
Carbon Monoxide	8-hour	3.42	500	575
	1-hour	35.2	2,000	NA
Lead	24-hour	0.02	NA	0.1
Mercury	24-hour	2.25×10^{-2}	NA	2.5×10^{-1}
Beryllium	24-hour	2.09×10^{-6}	NA	5.0×10^{-4}
Fluorides (as HF)	24-hour	0.124	NA	0.25

defined significance levels for these pollutants. As such, no further analysis for impact in the Class II area is required. For nitrogen dioxide, the maximum predicted concentration is marginally above the defined significance level. The Department is not requiring any further modeling for this pollutant because of its small predicted impact and the fact that no large sources are near the Pasco facility. None of the other pollutants have defined significant impact levels.

A more detailed description of the modeling analysis, along with the model output, is contained in the Pasco application. The Department has reviewed the applicant's analysis and found that it conforms with the guidelines established by the EPA and followed by the Department.

C. Analysis of Existing Air Quality

Preconstruction ambient air quality monitoring may be required for all pollutants subject to PSD review. In general, one year of quality assured data using an EPA reference, or the equivalent, monitor must be submitted. Sometimes less than one year of data, but not less than four months, may be accepted when Department approval is given.

An exemption to the monitoring requirement can be obtained if the maximum air quality impact, as determined through air quality modeling, is less than a pollutant-specific deminimus concentration. In addition, if current monitoring data already exist and these data are representative of the proposed source area, then at the discretion of the Department these data may be used.

The predicted maximum air quality impacts of the proposed facility for those pollutants subject to PSD review are given in Table III. The monitoring deminimus level for each pollutant is also listed. All pollutants have maximum predicted impacts below their respective deminimus values. Therefore, specific preconstruction monitoring is not required for any pollutant. The applicant has, however, used the available monitoring data located in Pasco and the surrounding counties to develop existing background concentrations for the proposed facility area. These background values have been used to develop the maximum total concentrations for comparison with the ambient air quality standards.

D. PSD Increment Analysis

The PSD increments represents the amount that sources may increase the ambient ground-level concentrations of SO2 and PM. The purpose of these increment limitations is to prevent areas which currently have good air quality from being significantly degraded. If an area currently has ambient concentrations near the ambient air quality standards for SO2 or PM, then the increased emissions from new sources must not cause or contribute to a violation of the standards and the allowed increments would be reduced to prevent such exceedances.

The proposed Pasco facility is to be located in a Class II area and must meet the increments defined for this class. The facility will also be approximately 27 kilometers from the Chassahowitzka National Wilderness Class I Area. The applicant msut also show that the new facility will not cause or contribute to an exceedance of the more restrictive Class I increments in that area.

All of the emissions of SO2 and PM at the proposed Pasco facility will consume increment. The increased ground-level concentrations due to the Pasco facility alone has been shown, from the dispersion modeling, to be less than the defined significant impact levels for all averaging times. That is the maximum concentrations were below 5 ug/m^3, 24-hour average and 1 ug/m^3, annual average for PM, and below 25 ug/m^3, 3-hour average, 5 ug/m^3, 24-hour average, and 1 ug/m^3, annual average for SO2. As such, no other increment consuming sources were evaluated for Class II area increments.

There are no defined significant impact levels for Class I areas; any impact within 100 kilometers is considered potentially significant. As such, a full PSD increment analysis was performed for this area. All increment consuming sources which could potentially interact with the Pasco facility to impact on the Class I area were modeled. The Pasco facility itself has maximum impacts on the Class I area of less than 10 percent of the defined increments. Table IV summarizes the predicted increment consumption on the Class I area. The percent consumed is quite high, due mostly to other sources, but is still within the allowed increments.

Table IV

Pasco County Resource Recovery Facility
Maximum Predicted Increment Consumption on
The Chassahowitzka National Wilderness Class I Area

Pollutant	Averaging Period	Maximum Conc. Pasco RRF only Concent. (ug/m^3)	Maximum, All Increment Consuming Sources (ug/m^3)	Allowed Class I Increment (ug/m^3)
Particulate Matter	Annual	0.061	2.79	5
	24-hour	0.0039	7.56	10
Sulfur Dioxide	Annual	0.027	1.43	2
	24-hour	0.42	4.91	5
	3-hour	1.98	21.12	25

The concentrations listed for the Pasco facility only represent the maximums which occurred over the five year modeling period and are not the paired (in space and time) concentrations associated with the total of all sources.

E. Ambient Air Quality Standards (AAQS) Analysis

Of the pollutants subject to review, only the criteria pollutants PM, SO_2, CO, NO_2, Pb, and ozone (O_3) have AAQS with which to compare. In general, the total ambient air quality impacts are determined by adding the predicted modeled concentrations to an estimated background concentration for each pollutant. In the case of the Pasco facility, the predicted maxmimum concentration increases are less than the sigificant impact levels defined in the State regulations for PM, SO_2, CO, and NO2. As such, no further modeling of other sources is required. Significant impact levels for Pb and O_3 are not defined. Ozone is a photochemically formed pollutant resulting mainly from motor vehicle emissions. The regulated pollutant for ozone formation is volatile organic compounds (VOC) which cannot be modeled for source-specific applications. Ozone, by way of VOC's, is regulated though BACT. Lead is also primarily a motor vehicle related pollutant and no other point sources were considered.

A new national ambient air quality standard has recently been promulgated for particulates less than 10 micrometers in diameter. This new standard, which has not yet become a State standard, is set at 150 ug/m^3. This is the same value as the current state total particulate standard. Since the mass of particles less than 10 micrometers is a subset of the total particulate mass, compliance with the current state total particulate standard ensures compliance with the national small particulate standard.

Table V summarizes the estimates of the predicted maximum air quality for these pollutants in the vicinity of the Pasco facility. These estimates are considered conservative (i.e., overestimates) because the background valeus used for each of these pollutants are generally derived from the more urban (polluted) Tampa Bay area.

Given existing air quality in the area of the proposed facility, emissions from this facility are not expected to cause or contribute to a violation of an AAQS.

Table V

Pasco County Resource Recovery Facility
Ambient Air Quality Standards Analysis

Pollutant	Averaging Period	Pasco RRF Impact (ug/m^3)	Estimated Ambient Background (ug/m^3)	Total Impact (ug/m^3)	Florida AAQS (ug/m^3)
Sulfur Dioxide	Annual	0.4	26	26	60
	24-hour	3	103	106	260
	3-hour	12	456	468	1300
Particulates (1)	Annual	0.1	43	43	60
	24-hour	0.4	87	87	150
Nitrogen Dioxide	Annual	1	39	40	100
Carbon Monoxide	8-hour	3	1145	1148	10,000
	1-hour	35	5153	5188	40,000
Lead	3-month	0.02 (2)	0.4	0.4	1.5

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(1) Particulates includes as a subset PM$_{10}$. Since maximum concentrations are less than 150 ug/m^3, the Federal PM$_{10}$ standard is also met.

(2) The 24-hour average concentration was substituted for the 3-month coverage.

F. Additional Impacts Analysis

1. Impacts on Soils and Vegetation

The ground-level concentrations of the criteria pollutants are predicted to be well below all applicable AAQS, including the national secondary standards designed to protect public welfare-related values. As such, these pollutants are not expected to have a harmful effect on soils and vegetation.

2. Impact on Visibility in the Class I Area

An EPA Level-1 visibility screening analysis was performed by the applicant for impact on the Chassahowitzka National Wilderness Area. The results indicate that no impact on visibility is expected in this area as a result of the Pasco facility.

3. Growth-Related Air Quality Impacts

The proposed Pasco facility is not expected to significantly change employment, population, housing, or commercial/industrial development in the area to the extent that a significant air quality impact will result.

4. GEP Stack Height Determination

Good Engineering Practice (GEP) stack height is defined as the greater of: (1) 65 meters or (2) the maximum nearby building height plus 1.5 times the building height or projected width, whichever is less. A single stack will be constructed servicing all four incinerator/boiler units. The largest structure which may influence the plume will be the building housing the boiler units. The height of this structure will be 110 feet and represents the lesser dimension of the height and width. The calculated GEP stack height is, thus, 275 feet. The actual stack will be equal to this height, therefore, no aerodynamic building wake downwash is anticipated.

5. Noncriteria Pollutants

Mercury (Hg), fluorides (F-), and sulfuric acid mist (H_2SO_4) are subject to the PSD regulations. These noncriteria pollutants have no ambient air quality standards with which to compare predicted air concentration levels. These pollutants are regulated by the application of BACT. Mercury is additionally subject to NESHAP standards.

The applicant has evaluated the potential ambient air impacts of these pollutants by comparing their predicted ambient air concentrations with guideline ambient air levels (AAL) developing by New York state and Massachusetts, and the threshold limiting values (TLV) developed by the American Conference of Governmental Industrial Hygenists (ACGIH). The results show that none of these pollutants exceed any of these guideline levels. The Department is reasonably assured that there will be no significant air impact from these pollutants.

6. Non-PSD Pollutants

The Department requested that the applicant address several non-PSD pollutants that will be emitted from the facility and are of some public concern. Among these pollutants are hydrogen chloride (HCl), dioxins (as 2,3,7,8-TCDD), arsenic (As), and other heavy metals. Most of these pollutants will be controlled to a greater or lesser extent by the dry scrubber/baghouse control equipment, and by proper and efficient combustion. For example, HCl will be 90% controlled by the dry scrubber and dioxins are efficiently destroyed by maintaining proper temperature and dwell time in the combustion chamber.

For some of these pollutants, namely HCl and As, predicted ambient concentrations can be compared with AAL's and TLV's. The applicant has done this and has shown that no exceedance of these guideline levels is expected.

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Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: Pasco County Resource Recovery Facility (PSD-FL-127)

Dear Ms. Janes:

This is to acknowledge receipt of the above-mentioned applicant's responses to the Florida Department of Environmental Regulation (DER). After reviewing the documents, we would like to comment on the applicant's response regarding the possible installation of NO_x controls.

In the submitted documents, the applicant rules out the option of installing the mentioned Exxon $deNO_x$ system. The first reason given is that the system's incremental cost of $1,302 per ton of NO_x removed exceeds the DER's econonmic guideline for BACT cost benefits of $1,000 per ton of removal. The other reason given is that the slight improvemnt of modeled NO_x incremental consumption as a result of installing the system does not justify the additional capital expenditures. In order to comment more thoroughly on these statements, we consulted with EPA Headquarters on this matter.

Regarding the incremental cost, it was made known to us that Headquarters is preparing a study document on the subject of establishing NO_x increments and NO_x reduction controls. From the study's preliminary surveys on the general incremental costs associated with the installation of these controls, the applicant's $1,302 appears to be reasonable and further consideration is warranted.

On the point raised by the applicant on the modeled NO_x incremental consumption, the applicant should know that a BACT determination is done separately from the air quality modeling. Air quality modeling is used only to ensure that a determined BACT will not violate any ambient quality standards. It does not in any way play a part in justifying the economic feasibility of relaxing a higher level BACT. Therefore, unless the applicant can demonstrate that it is economically and/or technologically impossible to implement a higher level of control, the higher level control should be given further consideration.

Thank you for the opportunity for providing our input. If you have additional information or comments, please contact me or Gary Ng 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

Copied: Pradeep Raval
Tom Rogers
CHF/BT
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CDM
environmental engineers, scientists, planners, & management consultants

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RECEIVED
MAR 10 1988
DIVISION OF
ENVIRONMENTAL PERMITTING

March 9, 1988

Mr. Barry Andrews
Florida Department of
Environmental Regulation
Air Quality Section
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Andrews:

This letter, with attachments, represents our formal response to your request for additional information concerning our BACT analysis with respect to NO_x control. Our preliminary analysis of the costs for Thermal DeNO$_x$, dated January 12, 1988, was based on an initial review of information provided by Exxon. As you will recall, it indicated that the Thermal DeNO$_x$ system would cost approximately $968 for each ton of NO_x removed at the Pasco County facility, and thus increase the facility tipping fee by $1.40 per ton of waste combusted. (These costs were based on a NO_x removal efficiency similar to that which is achieved at the Commerce, California facility [40 percent]; the only operating DeNo$_x$ installation at this time.)

CDM has discovered, however, that these figures obtained from Exxon are misleading, and in fact, contradict analyses recently conducted for the 3,000-tpd Fairfax County, Virginia refuse combustion facility. The Virginia Air Pollution Control Board issued a construction permit without Thermal DeNO$_x$ to the Full Service Company (FSC) whose analysis indicated a cost of $3 per ton of waste combusted and approximately $2,000 per ton of NO_x removed. The FSC's analysis was based on an optimistic NO_x removal efficiency of 50 percent. CDM's analysis has shown that use of Thermal DeNo$_x$ would increase the Pasco County Resource Recovery Facility's tipping fee by approximately $3 per ton. It also indicates a cost of approximately $2,478 per ton for NO_x removal (based on a 40 percent NO_x reduction).

As can be seen, the costs for controlling NO_x at the Fairfax facility is more than two times larger than those obtained from Exxon for Pasco County. This significant difference is attributed to the costs associated with the risks the FSC would encounter in using the Thermal DeNO$_x$ system. Some of these risks include:

- o Boiler fouling and/or corrosion which could lead to facility downtime.
- o Environmental opacity violations from the possible formation of a visible NH_4Cl stack plume.
- o Environmental emission violations for the release of ammonia which has an acrid odor, or the formation of other pollutants such as cyanide.

Recent conversations with prospective FSCs have confirmed that costs associated with vendor risk would be passed on to and borne by the county.

Standard combustion controls, including proper distribution of overfire and underfire air and temperature controls, are proposed for controlling NO_x emissions at the Pasco County facility. The temperature within the furnace chamber will be below 2,100°F, thus inhibiting the formation of thermal NO_x. Also, O_2 analyzers will be installed on each combustion train to ensure that the proper quantity of excess air is added to the furnace. Additionally, cost estimates for NO_x removal are 248 percent of the $1,000/ton of NO_x removal cited by FDER. NO_x emissions from the facility are projected to be 6.17 pounds per ton of municipal solid waste. This equates to 1,351 tons per year based on 100 percent availability. At this rate, the maximum annual predicted NO_2 impact concentration is 1.03 ug/m^3, which is below the annual NO_2 NAAQS/FAAQS of 100 ug/m^3. Hence, additional NO_x controls would be of very little environmental benefit. Therefore, BACT for nitrogen oxides is proposed to be the combustion controls inherent in the system's design.

Based on CDM's analysis, therefore, additional NO_x control is not warranted since:

- o Exxon's Thermal DeNO_x system has very limited operating data on U.S. MSW facilities.
- o The projected NO_2 environmental impacts from a Pasco County facility will be within compliance of the NAAQS/FAAQS.
- o It is being used as an innovative technology in an NO_x non-attainment area as LEAR.

I have included, as an attachment to this letter, a package which discusses CDM's analysis in greater detail. If you have any questions, or require additional information, please feel free to contact me.

Sincerely,

CAMP DRESSER & McKEE INC.

Daniel E. Strobridge

DES:jlb

PC7T.10/21

cc: Mr. Clare Fancy
Mr. Hamilton S. Oven, Jr.
Mr. Bruce Miller
Mr. Wayne Aronson

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Pradeep Raval
Tom Rogers

4.6.1 BACT DETERMINATION FOR OXIDES OF NITROGEN (NO_x)

Introduction

NO_x emissions from the proposed Pasco County RRF will be inherently controlled by furnace design and operation. Thermal NO_x formation will be inhibited by controlling flame temperatures. Currently, NO_x control techniques other than standard refuse combustion control techniques (i.e., the proper distribution of combustion overfire and underfire air supply and temperature maintenance) are not normally applied to mass-burning systems. It is interesting that within the refuse combustion industry, state regulatory agencies have recently focused much attention toward the destruction of organic emissions such as dioxins and furans. The methods generally suggested include high furnace temperatures and retention times; however, these furnace operating techniques tend to increase thermal NO_x emissions. Thus, an emission trade-off exists between controlling organic emissions and NO_x. The cost for NO_x controls are projected to be unreasonable based upon recent FDER and U.S. EPA guidance. The following analysis is presented to support this statement.

Background

Oxides of nitrogen (NO_x) are products of combustion processes, including refuse combustion; nitric oxide (NO) is the predominant form produced. During the combustion process, a small amount of NO is further oxidized to form nitrogen dioxide (NO_2), a brown-red gas. NO_x which reacts with sunlight and hydrocarbons to form ozone (O_3) and other secondary pollutants.

NO_x emissions are generated during fuel combustion by two separate sources. NO_x is formed by the reduction and subsequent oxidation of the available organically-bound nitrogen in the fuel (fuel NO_x). NO_x formation also results from high temperature oxidation of atmospheric nitrogen which enters into the combustion process as part of the combustion air (thermal NO_x).

Though the precise mechanism by which fuel and combustion air nitrogen are converted to NO_x is not completely understood, the relative quantities of fuel NO_x and thermal NO_x are known to be related to furnace design factors, refuse composition and plant operating parameters. Reports generally support the theory that most NO_x emissions resulting from refuse firing are oxidized fuel nitrogen.

NO_x Controls

The prime factors which affect the formation of thermal NO_x are the quantity of oxygen present in the combustion zone and the flame temperature. The rate of nitrogen oxide formation tends to increase significantly when temperatures are above 2100°F, particularly if the oxygen concentration in the combustion zone is greater than approximately 2 percent by volume. Fuel NO_x formation is strongly affected by the mixing rate of the fuel and combustion air (flame intensity), the quantity of oxygen present in the primary combustion zone, and the nitrogen content of the fuel.

Other Methods of Controlling NOx Emissions

Besides reducing NO_x emissions through furnace design and operation, NO_x emissions may potentially be reduced at refuse-burning facilities by other methods: minimizing the quantity of NO_x generated during combustion (combustion modification), and by reducing the quantity of NO_x in the flue gas stream (flue gas controls).

Combustion modification techniques such as flue gas recirculation (FGR) and staged combustion can potentially be used to reduce NO_x emissions from refuse-fired incinerators. FGR, however, has been employed more than staged combustion on MSW facilities with applications in Japan, West Germany, and Denmark. These types of combustion modifications have not been employed on U.S. MSW facilities.

Staged Combustion. In staged combustion, fuel is burned under starved air conditions such that the combustion gas temperatures are significantly below the adiabatic flame temperature and until there is no available oxygen. Following some heat removal in the boiler, additional air is added downstream to allow complete combustion of the cooler flue gases. The initial step drives the fuel nitrogen into the gas-phase with the net-effect of lowering the amount oxidized during combustion to thermal NO_x levels at the reduced temperature.

Staged combustion has been applied successfully to fossil fuel fired boilers. Tests of its effects on a tangentially-fired pulverized coal boiler operating at 16 percent excess air indicated that a NO_x emission reduction of 33 percent was achievable. The direct application of these results to MSW combustion are not possible. The tangential burning of pulverized coal at 16 percent excess air is a completely different mechanism than the moving grate or travelling grate spreader stoker operating at much higher excess air levels in MSW combustion.

To some extent, a form of staged combustion can be attempted in today's MSW furnaces through the strategic use of underfire and overfire air injection. Informal testing at a North Andover, MA MSW facility on the effects of controlled and reduced combustion air levels on NO_x emissions showed approximately a 20 percent reduction. The test conditions, however, resulted in immediate boiler instability and slagging with the expectation of future boiler corrosion. It was concluded that this approach to staged combustion as a NO_x control method for MSW incinerators is not feasible due to boiler problems and associated reduction in availability. Thus, the possible operational problems associated with staged combustion and its lack of application on U.S. MSW facilities does not warrant its implementation at the Pasco County RRF.

Flue Gas Recirculation. Flue gas recirculation (FGR) is a combustion modification which reduces NO_x emissions by extracting a portion of the flue gas and returning it to the furnace through the burner windbox. FGR operates by lowering peak flame temperatures by dilution thus, decreasing thermal NO_x formation. The system consists of an FGR fan assembly, air apportioning and mixing system, and ductwork necessary to connect the stack to the furnace or underfire or overfire air system. Because the recirculated flue gas is relatively cool, the bulk furnace temperature decreases, resulting in a reduction of thermal NO_x formation. FGR is commercially available and applicable to all gas and distillate oil-fired industrial boilers, since NO_x emissions due to firing of these low-nitrogen fuels are contributed mostly by thermal NO_x. FGR is not, however, as effective for residual oil- and coal-fired boilers, since much of the total NO_x emissions may be attributed to fuel-NO_x, the type of NO_x minimally controlled by FGR.

FGR has been applied at MSW facilities in Japan and Europe by ducting cool flue gas from a point after the air pollution control device back to the underfire air fan. Since MSW contains relatively high amounts of nitrogen, as with coal and residual oil, and since it is generally accepted that NO_x generated from refuse is primarily due to fuel nitrogen conversion and not oxidation of atmospheric nitrogen, flue gas recirculation is expected to achieve only limited NO_x reduction on refuse-fired facilities. Results from experimentation at a 660-TPD refractory wall furnace at the Kita refuse burning facility in Japan indicated that a 25-percent NO_x emission reduction was achievable.

Little data is available to support that FGR will improve NO_x control at the Pasco County RRF facility when used in conjunction with the proposed combustion controls. Thus, FGR would be expected to be only of limited effectiveness in controlling NO_x and, therefore, does not warrant the installation expense and lower fuel efficiency caused by a decrease in optimum flame temperature.

Flue Gas Controls

Flue gas controls appear to offer the greatest potential for NO_x reduction, though their application on full-scale RRFs has been limited. The controls which have been applied to combustion processes are selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR). The SNCR (also referred to as Thermal $DeNO_x$) is a patented process of Exxon Research and Engineering and involves the intimate contact of ammonia and flue gas NO_x in the boiler through the use of injectors located in the boiler waterwalls. Like SNCR, the SCR technology also injects ammonia into the flue gas, however, its reaction with NO_x is at a lower temperature and enhanced by using a catalyst bed.

Selective Catalytic Reduction (SCR). In the SCR process, after the anhydrous ammonia is injected into the flue gas stream, the mixture passes through a catalyst bed, located between the boiler and the economizer, where NO is converted to N_2. The function of the catalyst is to effectively lower the activation energy of the NO decomposition reaction. The reaction is allowed to proceed in a cooler part of the flue gas stream, rather than in the furnace at high temperatures (1600-1800°F) as required with the SNCR. Optimum temperature for reduction using SCR is between 530 and 800°F. Lower temperatures yield slow reaction rates; higher temperatures result in a shortened catalyst life.

SCR systems have been experimented at facilities firing coal or oil; NO_x removal efficiencies in excess of 90 percent have been reported. In addition, high reductions have been achieved on full-scale operations with the catalyst located both upstream and downstream of the particulate control device. In contrast, refuse-fired boilers have encountered difficulties with the use of SCR for NO_x control, particularly because of catalyst fouling due to difficulties with particulate poisoning. In applications where the catalyst is upstream of the particulate removal device, the relatively high particulate grain loading of the flue gas fouls the catalyst, rendering the bed ineffective for NO_x removal. The particulate may erode the catalyst and substrate material, or may poison or blind the catalyst.

SCR has been applied extensively on a experimental basis to oil, gas and coal fired boilers in Japan; has been tested on oil and gas fired boilers in the U.S.; and has been applied to coal-fired boilers in the U.S. on a limited basis. No refuse incinerator, however, in the United States has been equipped with SCR. In addition, no firm vendor guarantees have been offered. As a result, SCR cannot be considered as a viable control alternative under the guidelines established for determining BACT.

Selective Non-Catalytic Reduction (SNCR). The SNCR process is based on the gas phase homogeneous reaction between the NO_x in the flue gas and injected ammonia, NH_3, to produce gaseous nitrogen and water vapor. In general, NH_3 is injected into the hot flue gas by means of either air or steam as a carrier gas at a point in the boiler where the flue gases are at an optimum temperature. The following two reactions govern the success of the process:

(1) $NO + NH_3 + 1/4\ O_2 \rightarrow N_2 + 3/2\ H_2O$
(2) $NH_3 + 5/4\ O_2 \rightarrow NO + 3/2\ H_2O$

Flue gas temperature is critical to the success of the SNCR process and must be kept between 1600°F (871°C) and 1800°F (982°C), at the point where the NH_3 is injected. Above this temperature range the second reaction begins to dominate thus limiting the NO removal and possibly creating a counterproductive situation of generating more NO. If the flue gas temperature falls below 1600°F (871°C), the rate of both reactions slows down such that ammonia does not react but instead freely passes through the system (ammonia slippage) and into the ambient atmosphere. The ability of controlling the flue gas temperature within this range may be difficult since refuse composition varies and subsequently causes its heating value to fluctuate. Unexpected flue gas temperature shifts are possible in the boiler when fluctuations in the refuse heating value occurs and may even require the use of supplemental fuel firing systems. Consequently, depending on the direction of the temperature shift, the Thermal $DeNO_x$ system could result in a NO_x emission control trade-off of either a slippage of unreacted acrid ammonia vapor and/or an ammonium chloride cloud into the atmosphere or an increase in the quantity of NO_x emitted.

Beyond the potential NH_3 reaction problems associated with not maintaining the flue gas temperature within this optimal range, several other technical difficulties may result from the SNCR technology. Residual NH_3 may react with SO_3 and HCl present in the flue gas to form various ammonium salts including: ammonium sulfate [$(NH_4)_2SO_4$]; ammonium bisulfate (NH_4HSO_4); and ammonium chloride. Depending on the type, these salts may be deposited in the boiler causing damage to boiler internals, removed in the air pollution control equipment, or exit the stack as a visible plume. Ammonium bisulfate salt has the potential to form in the boiler and, in the cooler sections, precipitate from the vapor phase as a very hygroscopic and sticky liquid. Since this salt has a relatively low melting point, it can contribute to significant fouling and corrosion in the lower temperature sections of the boiler (economizer). Ammonium sulfate also has the potential to form in the boiler, however, it is weakly acidic and does not appear to have boiler fouling characteristics. When formed, $(NH_4)_2SO_4$ precipitates from the gas phase as a dry solid powder with particle sizes in the range of 1 to 3 microns (Lyon, 1987). Consequently, $(NH_4)_2SO_4$ formation would result in a NO_x emission control trade-off of increased particulate emissions. At approximately 250°F the remaining ammonia slippage which eludes the pollution control equipment will begin to react with gaseous HCl to form ammonium chloride (NH_4Cl) which is a dry, white salt that can contribute to a visible plume. In addition, a potential for cyanide formation from the chemical reaction between ammonia and hydrocarbons poses potentially worse NO_x control trade-offs than those associated with ammonium salt formation (CARB, 1984).

Minimal operational experience exists on the potential effects of ammonia and its by-products on the boiler internals and the pollution control system of a refuse combustion facility. If formed, ammonium salts could corrode the scrubber and fabric filter internals and cause fouling or increased fabric filter wear. An ammonium chloride plume has been reported on Japanese refuse combustion facilities and if formed, could violate state opacity regulations. A visible plume was photographed from the Kawasaki, Japan facility which combusts approximately 221 tpd of refuse from each of its three furnaces. At this facility the NO_x removal efficiency has been estimated to be between 40 and 60 percent.

Thermal DeNox Applications

The Thermal $DeNO_x$ system has primarily been applied to refuse combustion facilities in Japan where several systems exist--not in the U.S. The largest of the Japanese units features three Mitsubishi-Martin furnaces each rated at 300 tpd of refuse. Tests conducted on these units from 1976 to 1978 indicated that NO_x removal efficiencies of approximately 60 percent were possible but with ammonia breakthroughs of 30 ppmv (CARB, 1984). These efficiencies were accomplished by controlling furnace temperature and the ammonia to NO_x molar injection ratio.

In the U.S., California is the only state where Thermal DeNox has been tested and is operational. California's 300-tpd Commerce refuse combustion facility has been operating since February of 1987 with a Thermal $DeNO_x$ system that showed an average NO_x reduction in excess of 40 percent after compliance testing in June of 1987. The system, permitted as "Innovative Technology," appears to have had minimal operating problems with no reported NH_4Cl visible in the plume, even though some ammonia breakthrough does occur. Operation of the facility has been intermittent due to boiler problems but it is unknown as to whether they are attributable to operation of the $DeNO_x$ system. The facility appears to have minimal ammonia breakthrough which reduces the possibility of NH_4Cl formation but, this may be due to the fuel which consists exclusively of commercial waste. The waste stream at the Commerce facility has properties which are more homogeneous and probably have a lower nitrogen content than that found at other facilities which combust residential wastes. A more homogeneous fuel provides for stable combustion temperatures and enables the Thermal $DeNO_x$ system to operate within the specific operating temperature range or "window." The reaction of NO_x with NH_3 is maximized when the temperature of the flue gas doesn't deviate from the specific range. Thus, NO_x removal is favored and NH_3 slippage is minimized. The facility is still operating under a temporary permit as of February 1988.

The two other California facilities which plan to incorporate the Thermal $DeNO_x$ system, Long Beach and Stanislaus County, will be the first in the U.S. to combust a more representative waste. These facilities will combust waste that is residential, commercial, and industrial. This less homogeneous waste stream, compared to the Commerce facility, will probably cause the furnace temperature to vary over a wider range resulting in a greater NH_3 breakthrough and less NO_x removal. Both of these facilities are located in only NO_2 non-attainment area in the U.S. and are permitted on the basis of meeting specific NO_x emission rates or concentrations and not NO_x removal efficiencies. Thus this level of control represents the lowest achievable emission rate (LAER) and not BACT. The Thermal $DeNo_x$ technology must always be operated, however, no performance guarantees were obtained from Exxon.

Summary

The City of Commerce, California is the only U.S. application where Thermal $DeNo_x$ has been tested and is operational. Two other systems have been permitted in California for facilities at Stanislaus County and Long Beach. Both facilities are presently being constructed and are expected to be operational in late 1988 or early in 1989. This technology has gained much attention in California due to the pressing need for NO_x control, since California has the only NO_2 non-attainment area in the U.S. Additionally a large fraction of California is not in attainment for ozone. Consequently, using this technology on California's present and future planned facilities may be considered as fulfilling EPA's requirement of implementing the lowest achievable emission rate (LAER) but not BACT.

Pasco County, Florida RRF - Risk and Cost Allocation

Pasco County is currently involved in a competitive selection process to contract with a full service company (FSC) to design, build and operate its proposed resource recovery facility. Such a contract between the County and the FSC would contain provisions for liquidated damages to the County should the facility not meet certain performance guarantees (e.g., annual waste processed, environmental emission limits, electrical generation, ash residue quality). In this type of procurement—if the Thermal $DeNo_x$ system was required—the FSC would include the cost of the Exxon system in its scope of work. The County would not contract directly with Exxon. All guarantees for facility performance, including NO_x emissions, would then become responsibility of the FSC.

The FSC would subsequently be required to accept all of the risks associated with Thermal $DeNo_x$ system operation which could affect the facility's performance. Some of these risks include:

- Boiler fouling and/or corrosion which could consequently lead to facility downtime for tube cleaning, repair or replacement.
- Environmental opacity violations from the possible formation of a visible NH_4Cl stack plume. This would lead to facility fines and/or downtime.
- Environmental emission violations for the release of ammonia which has an acrid odor or the formation of other pollutants such as cyanide. If the emissions are excessive, the facility could be fined or required to be shutdown for a certain period.
- Downtime of the Thermal $DeNO_x$ system would require the facility to be shutdown until it was repaired. This technology does not have long term operating experience and, it is anticipated that breakdowns will occur.

All of these risks could result in facility downtime which could result in the FSC's failure to meet performance guarantees. If a Thermal $DeNO_x$ system was required as part of the FSC's scope of work, these risks would be evaluated and reflected in the cost of the system to the County.

To accurately represent the cost analysis conducted for the Thermal $DeNO_x$ system, additional contingencies have been added to the information provided by Exxon. These contingencies cover various operating parameters and costs associated with risk of failing to meet performance guarantees. These adjusted costs represent those which would be passed onto the County by the FSC, and include:

Item	Cost Adjustment
Ammonia consumption.	Based on a molar injection stoichiometry of 2.75 (NH_3 to NO_x).
Capital costs.	Increase Exxon capital cost by 10 percent.
Item	Cost Adjustment
Facility downtime associated with possible opacity and environmental emission violations, and equipment breakdowns.	Facility availability is decreased by a 10 day shutdown per year. Cost of this item is calculated as lost energy revenues.
Power consumption.	Cost of electricity to power air compressors and miscellaneous motors.
Increased maintenance on the boiler and possibly for the dry scrubber and baghouse.	Labor and material cost of $50,000 per year.
Labor and material for maintenance associated with the $DeNO_x$ system.	Approximately 2 percent of the capital cost per year.

The industry standard for facility availability, 85 percent, was used in the cost analysis for the dry scrubber and the baghouse. However, to analyze the Thermal $DeNO_x$ system, a reduced facility availability was used because it is believed that 10 additional days of unscheduled downtime will occur. The 10-day downtime represents approximately 2.5 percent of the annual operating period. Therefore, the reduced facility availability is 82.5 percent.

Table 4-15 illustrates the various annual operating costs for the Thermal $DeNO_x$ system. Table 4-16 shows the cost per ton of NO_x removed. Table 4-17 shows the maximum annual ground level concentrations (GLCs) for the NO_x control alternatives. The table indicates that the proposed control alternatives (i.e., proper furnace design and operation vs. Thermal $DeNO_x$) have GLCs of 1.03 and 0.62 ug/m^3, respectively. These are both below the FAAQS for NO_x at 100 ug/m^3.

Therefore, because the reduction in the GLC emissions associated with Thermal $DeNO_x$ does not result in a significant air quality benefit, its implementation offers minimal environmental benefit. Economically, the use of Thermal $DeNO_x$ would increase the facility's tipping fee by approximately \$3/ton and cost an estimated \$2,478/ton of NO_x removed (based on a 40 percent NO_x reduction). This economic impact is 248 percent greater than the \$1,000/ton removed guideline given by DER for use in evaluating the cost benefits for BACT. Thus, the application of the Thermal $DeNO_x$ system does not seem warranted and proper furnace design and operation is proposed as BACT for the Pasco County RRF.

TABLE 4-15

CAPITAL AND OPERATION/MAINTENANCE COSTS PER NO_x ALTERNATIVE CONTROL STRATEGIES

	CAPITAL COSTS (IN 1000's $)		POWER REQUIREMENTS AND ANNUAL COSTS (IN 1000's $)					
Alternative Control Strategy	Capital(1) Cost	Annualized(2) Capital Cost	Power(3) Cost	Maintenance(4) & Labor Material Cost	System(5) Operating Labor	Ammonia(6) Cost	Lost(8) Energy Revenue	Total
Furnace Design & Proper Operation	0	0	0	0	0	0	0	0
Selective(7) Non-Catalytic Reduction (SNCR)	2,655	271	102	103	20	354	254	1,104

(1) Includes Bond Burden.

(2) Annualized capital cost assume 20 year plant life and interest rate equals 8% (capital recovery factor = 0.1019).

(3) Power costs assume plant operation for an entire year with 82.5% availability. Power cost = \$0.04/KWh.

(4) Maintenance assumed to be 2.0 percent of capital cost plus \$50,000/yr for increased boiler maintenance.

(5) System operating labor based on 1/2 man-year required at \$20,000/yr (includes benefits).

(6) Included cost of ammonia based on \$450/ton NH_3 (Delivered).

(7) SNCR system used in this analysis is Exxon Thermal $DeNO_x$.

(8) Downtime assumed as 10 days per year. Calculated as (10 days/yr x 120 tons waste/day x 530 KWh/ton x \$0.04/KWh.

TABLE 4-16

COST COMPARISON OF NO_x ALTERNATIVE CONTROL STRATEGIES

Alternative Control Strategy	NO_x (4) Emission Rate, TPY	NO_x Removal Efficiency, %	Incremental(4) Controlled NO_x Emissions, TPY	Annual(1) Control Costs 1000's $/yr	Control(1) Costs $/ton NO_x Controlled	Tipping(2) Fee Increase $/ton
Furnace Design and Proper Operation	1,351	0	-	0	0	0
Selective(3) Non-Catalytic Reduction (SNCR)	811	40	540	1,104	2,478	3.01

(1) Control Costs ($/ton of NO_x Controlled) equals the Annual Control Costs (1000's $/yr) divided by the Controlled NO_x Emissions (TPY), i.e., 1,104 x 10^3 /(540 tons x 0.825) = 2,478/ton NO_x controlled.

(2) Tipping Fee Increase ($/ton) equals the Annual Control Costs (1000's $/yr) divided by the Tons of Waste Processed per year with 82.5% availability (1,200 TPD x 365 days/yr x 0.825 = 367,350 TPY).

(3) SNCR System used in this analysis is the Exxon Thermal $DeNO_x$ System.

(4) Potential to emit during an entire 365 day-year.

TABLE 4-17

COMPARISONS OF NO_x CONCENTRATIONS FOR ALTERNATIVE NO_x CONTROL TECHNOLOGIES TO FAAQS

Control Alternative	Estimated Maximum Annual Impact (ug/m^3)	Percent of FAAQS %
Furnace Design and Proper Operation	1.03	1.03
Selective Non-Catalytic Reduction (SNCR)(1)	0.62	0.62

Regulated Concentrations

Annual

FAAQS = 100 ug/m^3

PSD Significance Level = 1 ug/m^3

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(1) SNCR System used in this analysis is the Exxon Thermal $DeNO_x$ System.

CARLTON, FIELDS, WARD, EMMANUEL, SMITH & CUTLER, P. A.
ATTORNEYS AT LAW

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PLEASE REPLY TO:
Tallahassee

March 25, 1988

Hamilton S. Oven, Jr.
Department of Environmental
  Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399

Re: Pasco County Resource Recovery Facility

Dear Mr. Oven:

As you know, this firm represents Pasco County (Pasco) with regard to the environmental permitting of the Pasco resource recovery facility. We have been advised that Hernando County (Hernando) wants to dispose of some of its solid waste at the Pasco resource recovery facility. Pasco and Hernando currently are negotiating and it appears likely that an agreement concerning this issue will be ratified on March 29, 1988.

Under the terms of the proposed agreement, Hernando would be allowed to bring solid waste to Pasco's resource recovery facility after the facility has been built, passed its compliance tests, and started commercial operations. Hernando would bring 100 tons per day (monthly average) of solid waste. All of Hernando's waste must be processable (i.e., burnable) in the resource recovery facility. No hazardous waste would be accepted. The agreement would remain in existence for ten years.

To accommodate Hernando, Pasco would initially construct its resource recovery facility with three combustion units capable of handling 350 tons per day (tpd), rather than 300 tpd, as currently proposed. This change should not be significant, however, because the County's facility would have a capacity of 1,050 tpd, which is substantially less than the ultimate site capacity of 1,200 tpd that Pasco has requested for approval in this site certification proceeding.

The proposed change in capacity would not change the environmental impacts of the project. The County's application and environmental analysis of the resource recovery facility were based on the ultimate site capacity of 1,200 tpd. For example, the analysis of air quality, water supply, wastewater, and traffic were based on 1,200 tpd.

We are aware of only two conditions of certification that would be affected by the proposed increase in the initial size of the resource recovery facility. Page 11, ¶ ¶ 1.c. and 1.e. of the conditions refer to the capacity of the boilers. These numbers may need to be changed. If we identify any other potential changes in the conditions, we will notify you immediately.

We believe this proposed change will provide substantial benefits to the citizens of Pasco and Hernando Counties. Hernando currently disposes of its solid waste in a state forest. Hernando's new proposal would allow it to utilize a more appropriate method of and location for solid waste disposal. The citizens of Pasco will benefit from this proposal because the initial size of the Pasco County facility will be increased by 150 tpd and thus there will be an additional 50 tpd of excess capacity available to accommodate future growth in Pasco. After Pasco's ten year contract with Hernando expires, Pasco will have an additional 100 tpd of excess capacity available to accommodate growth.

We will notify you as soon as we learn whether if Pasco and Hernando have executed their agreement. In the interim, please call me if you have any questions or comments.

Sincerely,

David S. Dee

David S. Dee

cc: Richard Donelan
Kent Zaiser
C. Larry Keesey
Ed Helvenston
M. Twomey
Paul Darst
Barry Andrews ✓
Clair Fancy

DSD/vc:oven-3

Copied: Pradip Raval
Tom Rogers
CHF/BT
Barry Andrews
} 3.28.88

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(904) 354-1600

PLEASE REPLY TO:
Tallahassee

March 22, 1988

HAND-DELIVER

RECEIVED
MAR 22 1988
DER - BAQM

Hamilton S. Oven, Jr.
Administrator
Siting Coordinating Section
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399

RE: Pasco County Resource Recovery Facility
Power Plant Siting Application
PA 87-23, DOAH Case No. 87-5337

Dear Mr. Oven:

As you know, this law firm represents Pasco County in its efforts to obtain site certification for the proposed Pasco County resource recovery facility. We have reviewed the report prepared by the Florida Department of Environmental Regulation (DER) concerning the proposed Pasco County facility and have discovered several issues that should be brought to your attention. The following preliminary comments address some of the most important issues, but they are not intended to be comprehensive. We hope to address these and other issues with you in the immediate future.

For the purposes of this letter, underlined words should be added to the text of the DER report and the conditions of site certification. Words that have been ~~stricken~~ should be deleted.

DER Report

Page 2, ¶ 1

The description of the proposed facilities should acknowledge that the County will build "an ash and solid waste disposal area, . . ."

Page 24, ¶ E

The last half of this paragraph has been inadvertently transposed to the top of page 25.

Page 26, ¶ 3

The County hired a zoologist to conduct an in-depth evaluation of the gopher tortoise populations at the site. She concluded that the northeastern portion of the site would not be an appropriate area for relocating the gopher tortoises. Accordingly, the County disagrees with the contrary statements in the report submitted by the Florida Game and Fresh Water Fish Commission and the County opposes any proposal which would utilize the northeastern portion of the site for the relocation and management of gopher tortoises.

Page 28, ¶ B(2)

The proposed facility will reduce the amount of imported fuel oil by more than 9,000,000 barrels over the life of the project, rather than 900,000 barrels.

Page 29, ¶ D

The facility's cooling system "will require approximately 420 gpm of make-up water."

Page 31, ¶E(5)(a)

The precise amount of water used at the resource recovery facility will depend upon a variety of factors. Accordingly, the text should note that the predicted "volumes of water are estimated **expected** to be produced by the resource recovery facility during normal daily operation. . . ."

Page 36

The table indicates that the maximum annual emission of arsenic will be 0.191 tons per year. The appropriate number should be 0.019 tons per year.

Tom disagrees

The table inadvertently indicates that the PSD significant emission rate for arsenic is 0, but there is no significant emission rate for arsenic.

✓

Page 41, ¶ 2

The BACT determination for lead (0.005 lbs/ton of refuse charged) is too restrictive. The appropriate emission rate should be 7.82 x E-4 at 12% CO_2. The attached table (Table 4-1) was previously submitted to the Department and it identifies the appropriate emission rates for this facility.

? No

Page 42, ¶ 1

The BACT determination for mercury (0.0036 lbs/ton of refuse charged) is too restrictive. The appropriate emission rate should be 4.38 x E-6 gr/dscf at 12% CO_2. See the attached table.

? No

Page 46, ¶ 3

Dry scrubbers have control efficiencies for SO2 in the range of 70 to 80%, but not 80 to 90%.

OK

Page 48, ¶ 1

The Stanislaus facility is not located in an NO_2 nonattainment area.

OK

Page 49, ¶ 3

The last two sentences in this paragraph should be deleted. The reference to the California South Coast Air Quality Management District guideline apparently is for LAER.

?

Page 51, ¶ 4

EPA's "good combustion practices" are only preliminary and should not be included as permit requirements. Pasco County does not want to use EPA's preliminary proposals as permit conditions.

OK

Page 53, ¶ 1

The proposed CO emission limit of 50 ppm based on a 4 hour average is not appropriate. The limit should be 104 ppm at 7% O_2 based on an 8 hour average.

OK

Page 53, ¶ 2

Thermal deNOx controls for NOx are not appropriate in this case and should not be required as BACT.

OK

Page 54

The proposed emission limit for sulfur dioxide is too restrictive. The limit should be based on 100 ppmdv at 7% O_2 or 70% reduction by weight. As previously noted, the lead and mercury emission limits are too low.

OK

Page 55, ¶ 2

It is unnecessary to have six continuous monitoring systems for each flue. The monitor for NOx seems especially inappropriate.

EPA

The requirement for combustion efficienty apparently is based on a New York requirement. However, the State of New York requires a combustion efficiency of 99.8% on a seven day average and 99.5% for an eight hour average.

Page 58, ¶ 2, line 10

The text indicates that the stack characteristics used in the refined modeling for the Pasco County facility are summarized in Table 1 on page 59, but Table 1 does not describe the stack characteristics.

OK

Page 61

The maximum concentration of fluorides should be 0.0124, not 0.124 ug/m^3.

Tom disagrees

The de minimus monitoring level for lead is a quarterly value, not a 24 hour value.

Page 70, ¶ E. 7. a.

Construction equipment may temporarily increase noise levels above that of traffic and existing noises.

Page 70, ¶ E.8.

Construction debris will be landfilled in either a Class I or III site. However, we do not wish to imply that paper and plastic will be landfilled. Accordingly, the text should state that "construction debris such as ~~paper,~~ concrete, and ~~plastic~~ brick will be transported to the County's existing landfill for disposal. . . .

Page 71, ¶ 1, lines 3-6

The text should be modified as follows: "If one-half of the plant would remain out of operation beyond a week, incoming raw waste would be diverted to the associated landfill/ashfill ~~other county landfills~~ until processing operations resume."

Page 73, ¶ 2.a.

The resource recovery facility should not contribute to any violations of ambient air quality standards under any meteorological conditions that were modelled or considered pursuant to state or federal law.

Conditions of Certification

Page 1, § II, line 2

The text should be modified to refer to the Permittee "defined as the Applicant, ~~Vendor~~, or its successors and assigns".

Page 5, § XII, lines 8-9

The text should be modified to show that "Requests for modifications ~~of monitoring requirements~~ shall not be unreasonably withheld by the Department."

Page 6, § XIII

Pasco County intends to expedite the construction of this project. It will be extremely difficult for the County to maintain its expedited timetable if the County is required to seek and receive the Department's approval for all of the plans prior to the initiation of construction. Section XIII should be modified to require the County to submit "as-built" plans to the Department for a determination of consistency with the approved design.

It should be noted that there will not be any "hazardous, toxic, or pathological handling facilities" at the proposed Pasco County resource recovery facility and, therefore, there will be no plans for such facility. The reference to these facilities should be deleted from Section XIII.

Page 7, line 2.

Pasco County has already submitted the forms required by Chapters 17-25 and 40D-40 to the Southwest Florida Water Management District and they have been approved by the SWFWMD Governing Board. In addition, the references to a "a temporary berm" and the Fort Lauderdale compost plant appear to be inapplicable to this project. Consequently, the Department should delete all of the provisions in this paragraph that occur after line 2.

Page 8, ¶ 5.

This condition should be deleted. In the alternative, it should refer to the routine noises of operation and not include temporary construction noises.

Page 8, ¶ 6.

A fugitive particulate abatement plan should not be required because it will provide little or no significant benefit. If required, however, the fugitive particulate abatement plan should be submitted to the Department 30, not 120, days prior to start of construction.

Page 8, ¶ 8

This paragraph is unclear, inaccurate, and should be modified. The County should be required to "minimize the removal of trees and maintain a vegetative buffer around the site to the greatest extent practicable."

Page 10, ¶ 1. a.

The emission rates for SO2, carbon monoxide, lead, mercury, and arsenic are too low. See the attached table for the appropriate emission rates. ?

Page 10, ¶ 1. a. (4)

The emission limitation for carbon monoxide should be 104 ppmdv at 7% O_2 for an 8 hour averaging time. OK

Page 10, ¶ 1. a. (10)

The emission limitation for arsenic should refer to E-6, not E-5, lb/MBtu heat input. OK

Page 11, ¶ E

The last sentence of this paragraph refers to the use of supplemental oil. The County does not intend to use supplemental oil. The County will only use natural gas. ?

Page 12, ¶ 2. a.

The maximum emission rate for particulates should be 0.015, not 0.15, grains per dscf. OK

Page 12, ¶ 2. b.

The Department should delete the requirement which would maintain an average temperature in the flue gas of less than 300 degrees fahrenheit (3 hour rolling average). This requirement is unnecessary. It would be difficult or impossible to determine if the County were in compliance. EPA

Page 12, ¶ 2. c.

The selected emissions control system should be evaluated solely for consistency with the County's proposed design. The system must be reviewed promptly to enable the County to proceed with its expedited construction schedule. Accordingly, the last sentence of the paragraph should be modified to state that "the data shall be processed and approved or denied in accordance with ~~F.S. 120.60~~ Section XIII above."

Page 13, ¶ c, line 2

The County interprets the reference to "a commercial testing firm" to include a commercial testing company which is a branch or division of the company which builds and operates the facility.

Page 13, ¶ c, line 5

After the initial compliance testing, the facility should be tested annually for particulate matter only. The proposed condition implies that all substances must be tested annually. ?

Page 13, ¶ 4. a.

The emission tests should be submitted to the Southwest, not the Southeast, District office. The data should not be submitted to the Broward County Environmental Control Board. The references to the Southeast District Office in paragraphs 4. b. and 4. c. should be corrected. ok

Page 14, ¶C.

The plans should not be submitted to the Southwest Florida Water Management District because SWFWMD normally would not review the plans for the leachate and sewage facilities. To ensure an expedited timetable for construction, the last sentence in this paragraph should be modified to state that the plans and specifications shall be furnished "to the Southwest District Office for approval pursuant to Section XIII above ~~120 days prior to construction~~."

Page 15, ¶3. a.

The last sentence of this paragraph should be deleted. A specific monitoring program has already been proposed by Pasco County and approved by the Department. Most of the monitoring wells have already been installed. The groundwater monitoring program is shown on Figure 4-1 and Sheet No. 7 in Volume IV of the Pasco County application for power plant site certification. This requirement should be modified to state that the monitoring wells shall be installed in the locations identified in the County's application.

Page 17, ¶ 1

This provision should be modified to state that the plans of the final landfill design "shall be provided to the Department for review and approval pursuant to Section XIII, above, at least 60 ~~180~~ days prior to the the start of operation."

Page 19, ¶¶ 9 and 11

The County interprets these provisions to require appropriate testing of the ash residue and appropriate disposal practices. At this time, it is clear that the EP Toxicity Test is not a valid method for testing ash residue. It also is clear that the ash is not a hazardous waste. Of course, the County will comply with future testing and disposal requirements for ash.

Page 20, ¶ 17.

The paragraph does not identify the agency that should receive the construction schedule or chart. We assume that these materials should be sent to the Southwest District Office.

Page 21, ¶ 18.

DER Form 17-7.130(2) refers to a construction permit number. Paragraph 18 should state that the site certification number shall be used as the construction permit number in this DER form.

<u>Page 28, ¶ A.</u>

Paragraphs A, B, C, and D on page 28 do not indicate when the required activities are to be completed. Pasco County suggests that they should be completed 180 days after the start of commercial operations at the resource recovery facility.

<u>Page 28, ¶ B.</u>

This paragraph does not clearly describe what is required. If the plant breaks down, it will not be operated.

<u>Page 28, ¶ D.</u>

Pasco County will not accept hazardous waste at this site and, therefore, Pasco County will not submit any drawings showing any facilities for such substances.

<u>Page 30, § XXI, ¶ A.</u>

This paragraph should be deleted or modified. The County will utilize reclaimed water as its primary source of cooling water. The County has requested and received SWFWMD's approval to use a well as an alternative source of cooling water. The limitations on the use of the well are set forth at pages 24-27, above, in Section XVI, SWFWMD Consumptive Use Permitting.

<u>Conclusion</u>

The preceding comments have been terse because we do not have adequate time to fully describe our concerns in writing. However, we will be happy to discuss each of these issues with you in more detail.

Sincerely,

David S. Dee

David S. Dee

cc: Ben Harrill
Richard Donelan
Clair Fancy✓
Don Elias
Dan Strobridge

Copied: Pradeep Raval
Tom Rogers
Barry Andrews
CHF/BT
} 3.23.88

TABLE 4

POLLUTANT EMISSIONS RATES

Pollutant	Averaging Time	Controlled Concentrations at Stack Top(3)
Particulate Matter (TSP or PM_{10})	24-Hour	0.0156 gr/dscf at 12% CO_2
Carbon Monoxide	8-Hour	104 ppmdv at 7% 0_2
Nitrogen Oxides	3-Hour	417 ppmdv at 7% 0_2
Sulfur Dioxide	3-Hour	104 ppmdv at 7% 0_2
Volatile Organic Compounds (as CH_4)	3-Hour	38.8 ppmdv at 7% 0_2
Lead	24-Hour	7.82×10^{-4} gr/dscf at 12% CO_2
Beryllium	24-hour	6.56×10^{-8} gr/dscf at 12% CO_2
Mercury	24-Hour	4.38×10^{-6} gr/dscf at 12% CO_2
Inorganic Arsenic	24-Hour	7.09×10^{-4} gr/dscf at 12% CO_2
Fluorides	3-Hour	1.20 ppmdv at 7% 0_2
Sulfuric Acid Mist	--	(1)
Hydrogen Chloride(2)	3-Hour	104 ppmdv at 7% 0_2
Dioxin(2) (as 2,3,7,8-TCDD toxics equivalent)	24 Hour	3.92 ng/Nm^3 at 12% CO_2

---

(1) EPA Region IV has determined that there is no reliable testing method for this pollutant.

(2) Not a PSD regulated pollutant.

(3) Concentrations represent short-term operating release rates as modeled in the air quality analysis.

copy

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

For Routing To Other Than The Addressee
To ______ Location ______
To ______ Location ______
To ______ Location ______
From ______ Date ______

MEMORANDUM

TO: Randy Armstrong, Director
Division of Permitting

FROM: Richard T. Donelan, Jr. RTD
Assistant General Counsel

RE: In re: Pasco County Resource Recovery Facility, OGC File No. 87-1587

DATE: April 19, 1988

I would like to commend Buck Oven and Clair Fancy for their participation in the recent evidentiary hearing regarding the Pasco County Resource Recovery Facility. Both gave cogent testimony and displayed impressive technical expertise. In particular, Clair's testimony succinctly illuminated the complex issues of BACT and dioxin emissions form MWC combustors.

Buck Oven deserves special credit for pulling together all of the state agency input necessary for expeditious DER proposed action under the Power Plant Siting Act. Thanks to Buck's efforts, we were able to complete the statutory hearing process regarding the Pasco application in the absolute minimum time possible under the circumstances, in my judgment.

It is a pleasure to represent the Department in legal proceedings with the assistance of expert witnesses such as Messrs. Oven and Fancy.

cc: Hamilton S. Oven, Jr., P.E.
Clair Fancy, P.E.
Steve Smallwood, P.E.
Dan Thompson, Esquire

Copied: CHF/BT
Pradeep Raval
Tom Rogers
Barry Andrews

20 April 1988
Tallahassee, FL

copy

CARLTON, FIELDS, WARD, EMMANUEL, SMITH & CUTLER, P. A.

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April 20, 1988

John Shearer
Assistant Secretary
Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399

Re: <u>Pasco County Resource Recovery Facility</u>

Dear John:

I am sending you this letter because I want you to know that Pasco County is grateful for the exemplary efforts of Hamilton S. (Buck) Oven, Jr., Clair Fancy, Gardner Strasser, and Richard Donelan, Jr.

I am representing Pasco County in its efforts to obtain the environmental permits for a new resource recovery (refuse-to-energy) project, landfill and associated facilities. This is a major project for Pasco County and is essential to the County's long-term plans for solid waste management. At my request, the Department, Southwest Florida Water Mangement District, and the Department of Community Affairs agreed to expedite the review process for this facility. As a result of the extraordinary efforts of your staff, the County's four volume application for site certification was reviewed by the Department in 90 days, rather than the 150 or more days provided for under the Florida Electrical Power Plant Siting Act (Act). It appears that the County will be able to complete the review process under the Act in approximately 8 months, rather than the 14 months or more that are normally required.

Buck Oven, Clair Fancy, Gardner Strasser, and Richard Donelan all played key roles in this process. Buck coordinated the Department's efforts with all of the other regulatory agencies and helped ensure that the project moved forward in a timely manner. Buck and Clair Fancy were required to testify at the formal administrative hearing on April 11 and 12, 1988. They handled themselves extremely well under cross-examination by opposing counsel and cogently stated the Department's position. Gardner Strasser provided assistance to the County by coordinating and supervising the geotechnical investigation of the site. Gardner also handled himself quite well during a deposition which was taken by opposing counsel. Finally, Richard Donelan provided legal guidance to the staff and ably represented the Department's interests at the formal administrative hearing.

On behalf of Pasco County, I want to thank all of these people and express the County's gratitude to them. Since the hearing officer's recommended order concerning the County's PSD permit will go to Secretary Twachtmann for his review, I cannot advise him about these matters at this time. However, after the administrative process has been completed, I hope you will relay these sentiments to him.

Sincerely,

David S. Dee

David S. Dee

cc: Buck Oven, Jr.
Clair Fancy ✓
Gardner Strasser
Richard Donelan, Jr.
Richard Garrity
Dan Thompson
Steve Smallwood

DSD/vc:Shearer

Copied: CHF/BT
Pradeep Raval
Tom Rogers
Barry Andrews

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PLEASE REPLY TO:
Tallahassee

July 29, 1988

Clair Fancy
Department of Environmental
  Regulation
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399

Re: Pasco County Resource Recovery Facility

Dear Clair:

On July 19, 1988, the Hearing Officer entered a recommended order which recommended the approval of the Pasco County resource recovery facility. A copy of her recommended order is enclosed for your review.

We expect this recommended order to be considered by the Cabinet Aides on Wednesday, August 17, 1988 and by the Governor and Cabinet on Tuesday, August 23, 1988. Since this project has been controversial, Richard Donelan may want you to accompany him to the Cabinet Aides and Cabinet meetings. We would expect the Governor and Cabinet to ask the Department about the potential impacts of the project on air quality.

As you recall, the Power Plant Siting Act was amended to address certain issues raised by the United States Environmental Protection Agency concerning the Department's issuance of PSD permits. Section 403.509(2), Florida Statutes, provides:

> Simultaneously with the [Governor and Cabinet's] action on the application, the Department shall issue or deny any permit required pursuant to any federally delegated or approved permit program.

In this case, we assume that the Department will issue a PSD permit for the Pasco County resource recovery facility when the Governor and Cabinet consider the Hearing Officer's recommended order.

Since we have not received EPA's written approval of the project, please send us any comments or approvals that you have received from EPA. If you have not yet received any, please contact EPA and take whatever steps are necessary to ensure that EPA issues its written approval of the project before the issuance of the PSD permit. Pasco County would like to receive express authorization from EPA so that Pasco County can avoid the problems that EPA created for Hillsborough County.

We sincerely appreciate your assistance and cooperation with these matters.

Sincerely,

David S. Dee

David S. Dee

cc: Richard Donelan
Buck Oven
Barry Andrews
Bob Hauser

DSD/vc:Fancy-3

880711224

STATE OF FLORIDA } S.S.
COUNTY OF PASCO }

pasco times
Published Daily
Port Richey, Pasco County, Florida

Before the undersigned authority personally appeared J. Murry who on oath says that he is Front Counter Clerk of the Pasco times a daily newspaper published at Port Richey, in Pasco County, Florida: that the attached copy of advertisement, being a Legal Notice in the matter RE: Public notice ________ in the ________ Court was published in said newspaper in the issues of March 11, 1988

Affiant further says the said Pasco Times is a newspaper published at Port Richey, in said Pasco County, Florida, and that the said newspaper has heretofore been continuously published in said Pasco County, Florida, each day and has been entered as second class mail matter at the post office in New Port Richey, in said Pasco County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm, or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

J. Murry

Sworn to and subscribed before me this 11th day of March A.D. 19 88

Patricia B. Hansen

SEAL Notary Public

Notary Public, State of Florida at Large
My Commission Expires FEB. 1, 1991

My commission expires ________ 19____

LEGAL NOTICE LEGAL NOTICE

NOTICE OF CERTIFICATION HEARING ON AN APPLICATION TO CONSTRUCT AND OPERATE AN ELECTRICAL POWER PLANT ON A SITE TO BE LOCATED NEAR NEW PORT RICHEY, FLORIDA

1. Application number PA 87-23 for certification to authorize construction and operation of an electrical power plant near Port Richey, Florida, is now pending before the Department of Environmental Regulation, pursuant to the Florida Electrical Power Plant Siting Act, Part II, Chapter 403, F.S.

2. The proposed 751 acre resource recovery site is located in the northwestern portion of unincorporated Pasco County. The site is approximately two and one-half miles north of State Road 52. It is bounded on the west and south by Hayes Road, on the east by Shady Hills Road, and on the north by Blue Bird Lane. Florida Power Corporation has a 295-foot wide transmission line right-of-way crossing the site. Initially the site will house a 900 tons per day solid waste burning resource recovery facility. The power plant will ultimately be expanded to 1200 tons per day generating 29 MW of electricity. A short transmission line will connect to an existing FPC substation to the southwest of the facility.

3. The Department of Environmental Regulation has evaluated the application for the proposed power plant and intends to recommend approval of the project subject to conditions of certification. Certification of the plant would allow its construction and operation. The application and Staff Analysis Report are available for public inspection at the addresses listed below:

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
Southwest District Office
4520 Live Oak Fair Boulevard
Tampa, Florida 33610-7347

PASCO COUNTY UTILITIES DIVISION
7536 State Street
New Port Richey, Florida 34654

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
2379 Broad Street
Brooksville, Florida 34609-4097

4. Pursuant to Section 403.508, Florida Statutes, the certification hearing will be held by the division of Administrative Hearings on April 11-13, 1988, in the Sheraton Inn, 5316 U.S. Highway 19, New Port Richey, Florida 34654, in Pasco County, Florida, at 10:30 a.m., to take written and oral testimony on the effects of the proposed electrical power plant or any other matter appropriate to the consideration of the site. Need for the facility has been predetermined by the Public Service Commission at a separate hearing. Written comments may be sent to the Hearing Officer on or before April 1, 1988.

5. Pursuant to 403.508 (4), F.S.:

(a) Parties to the proceeding shall include: the applicant; the Public Service Commission; the Division of State Planning; the water management district as defined in Chapter 373, in whose jurisdiction the proposed electrical power plant is to be located; and the Department.

(b) Upon the filing with the Department of a notice of intent to be a party at least 15 days prior to the date set for the land use hearing, the following shall also be parties to the proceeding:

1. Any county or municipality in whose jurisdiction the proposed electrical power plant is to be located.
2. Any state agency not listed in paragraph (a) as to matters within its jurisdiction.
3. Any domestic non-profit corporation or association formed in whole or in part to promote conservation or natural beauty; to protect the environment, personal health, or other biological values; to preserve historical sites; to promote consumer interests; to represent labor, commercial or industrial groups; or to promote orderly development of the area in which the proposed electrical power plant is to be located.

(c) Notwithstanding paragraph (4) (d), failure of an agency described in subparagraphs (4) (b) 1 and (4) (b) 2 to file a notice of intent to be a party within the time provided herein shall constitute a waiver of the right of the agency to participate as a party in the proceeding.

(d) Other parties may include any person, including those persons enumerated in paragraph (4) (b) who failed to timely file a notice of intent to be a party, whose substantial interests are affected and being determined by the proceeding and who timely file a motion to intervene pursuant to Chapter 120, F.S., and applicable rules.

to timely file a notice of intent to be a party, whose substantial interests are affected and being determined by the proceeding and who timely file a motion to intervene pursuant to Chapter 120, F.S., and applicable rules. Intervention pursuant to this paragraph may be granted at the discretion of the designated hearing officer and upon such conditions as he may prescribe any time prior to 15 days before the commencement of the certification hearing.

6. When appropriate, any person may be given an opportunity to present oral or written communications to the designated hearing officer. If the designated hearing officer proposes to consider such communication, then all parties shall be given an opportunity to cross-examine or challenge or rebut such communications.

7. Notices or petitions made prior to the hearing should be made in writing to:

Ms. Diane D. Tremor
Division of Administrative Hearings
The Oakland Office Building
2009 Apalachee Parkway
Tallahassee, Florida 32399-1500

8. Those wishing to intervene in these proceedings must be represented by an attorney or other person who can be determined to be qualified to appear in administrative hearings pursuant to Chapter 120, F.S., or Chapter 17-1.21, FAC.

9. This Public notice is also provided in compliance with the Federal Coastal Zone Management Act, as specified in 15 CFR Part 930, Subpart D. Public Comments on the applicant's federal consistency certification should be directed to the Federal Consistency Coordinator, Division of Environmental Permitting, Department of Environmental Regulation.

10. On November 16, 1987, Pasco County applied to the DER to construct the aforementioned resource recovery plant. The application is also subject to U.S. Environmental Protection Agency (EPA) regulations for Prevention of Significant Deterioration of air quality (PSD), codified at 40 CFR 52.21, and Florida Administrative Code Chapter 17-2.04. These regulations require that, before construction on a source of air pollution subject to PSD may begin, a permit must be obtained from DER. Such permit can only be issued if the new construction has been determined by DER to comply with the requirements of the PSD regulations, which are described in 40 CFR 52.21 and 17-2.04, F.A.C. These requirements include a restriction on incremental increases in air quality due to the new source and application of best available control technology (BACT).

The DER has been granted a delegation by EPA to carry out the PSD review of this source. Acting under that delegation, the DER has prepared a draft permit which is included in the DER's staff analysis report. The DER has made a preliminary determination that the proposed construction will comply with all applicable PSD regulations. The degree of Class II increment consumption that will result from the construction is:

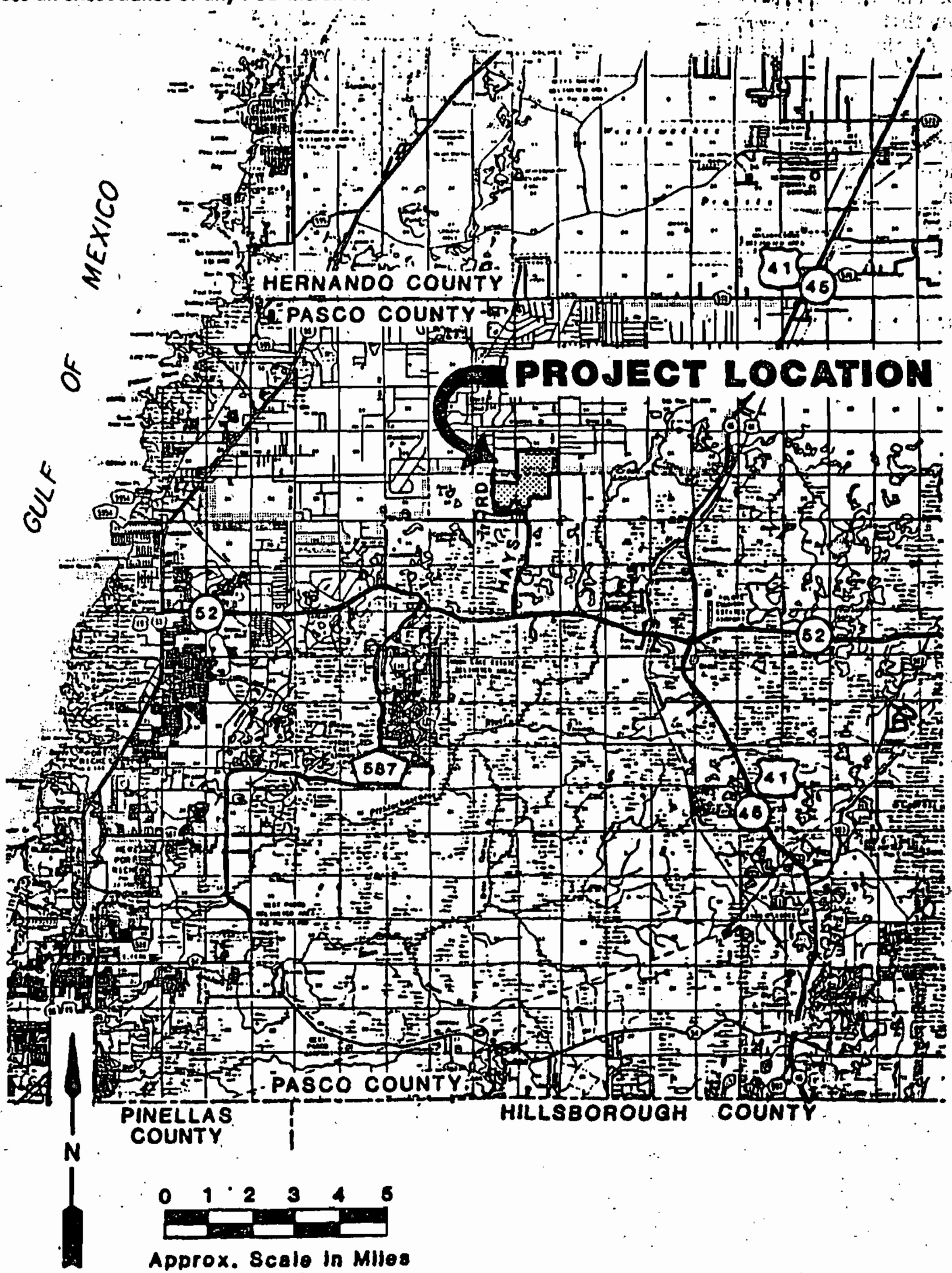
Pollutant	Annual Average	24-Hr. Average	3-Hr. Average
Particulate	0.5%	1%	
Sulfur Dioxide	2%	3%	2%

The source is located approximately 27 kilometers from the nearest Class I area.

The degree of Class I increment consumption that will result from the construction and operation of the source is:

Pollutant	Annual Average	24-Hr. Average	3-Hr. Average
Particulate	1%	0.04%	
Sulfur Dioxide	1%	8%	8%

Construction and operation of the source will not cause a violation of any ambient air quality standard nor will it cause an exceedance of any PSD increment.



System 3

D 5

PPS

PASCO/AQ