CITY OF TAMPA

Bob Martinez, Mayor

Water Resources and Public Works

Dale Twachtmann
Administrator

May 18, 1982

Mr. Clair Fancy
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Fancy:

By this letter, the City of Tampa wishes to notify the Department of Environmental Regulation of its intent to withdraw permit application number AC-2947278 for construction of Facility II of the McKay Bay Refuse-to-Energy Project. Hillsborough County is now, separately from the City of Tampa, constructing its own resource recovery facility and therefore it is now no longer appropriate to plan for a second resource recovery facility at our McKay Bay site.

Thank you for your time and efforts on the City's behalf and if you have questions concerning this action, please contact Dr. Richard Garrity of my staff.

Very truly yours,

Dale Twachtmann

Dale H. Twachtmann
Administrator, Water Resources and Public Works

DHT/dw

City Hall Plaza • Tampa, Florida 33602 • 813/223-8771

Gaseous Emission Control Is Vital

By Daniel T. Skizim

CONTROL OF GASEOUS emissions recently has become a major issue facing some proposed mass-burning resource recovery projects. For these and future projects, specification of the degree of air pollution control will dictate not only the type and cost of control equipment, but more importantly will affect the perception and allocation of project risks for both the project proponent and system vendor.

Preservation of air quality and recovery of energy from municipal solid wastes are noteworthy goals. Therefore, project planners and regulators need to weigh carefully the technical and financial aspects of gaseous emissions controls in relation to the objectives of the entire project.

The Clean Air Act Amendments of 1977 and Prevention of Significant Deterioration (PSD) requirements focused increased attention on maintaining or improving the quality of the air we breathe with regard to several key pollutants. Since then the EPA has been studying the problem of gaseous emissions from municipal solid waste incinerators. As a result, resource recovery facilities (incineration plants) have come under scrutiny for various pollutants emitted during the conbustion process, primarily sulfur dioxide (SO_2) and hydrogen chloride (HCl). Since both So_2 and HCl, in sufficient concentration, are recognized as human irritants and can cause damage to buildings, interest is increasing in the post combustion control of these gases. However, thus far the EPA has not promulgated any new regulations in this area.

Local, State Attention

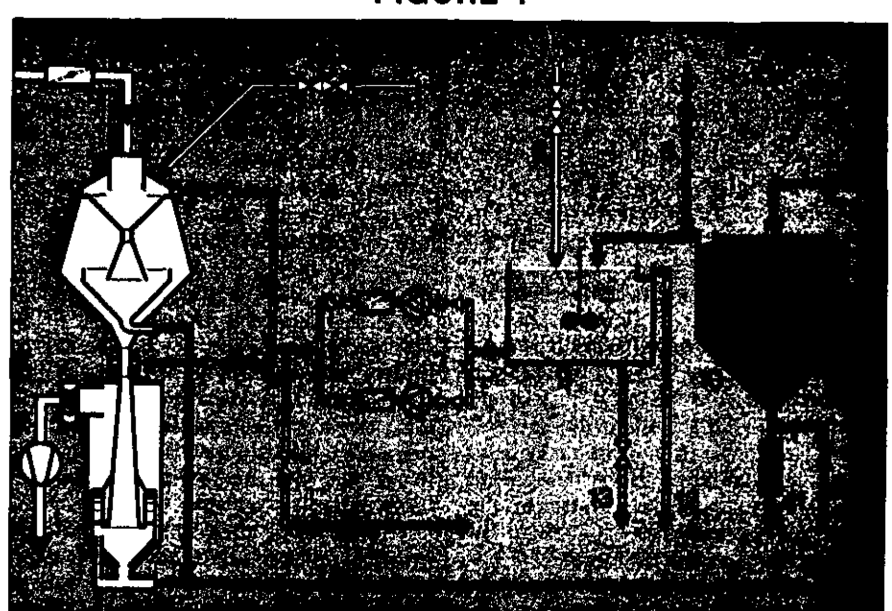
Until recently, furnace operational parameters and the fuel itself (solid wastes) have been considered a method or device for abating SO_2 and HCl emissions because: (1) not all of the sulfur and chlorine present in the waste are released as So_2 and HCl and (2) municipal solid waste is a relatively low sulfur and low chlorine content fuel. For example, a mass-burning resource recovery facility burning "typical" solid wastes might emit about two pounds of SO_2 and eight pounds of HCl for every ton of waste input.

Because of existing (SO_2) and potential (HCl) ambient air quality problems in certain regions of the U.S., the question of gaseous emissions control for resource recovery plants is receiving much attention on the state and local levels. This question is delaying implementation of a few major resource recovery projects. The delays stem from controversy over what to control, how to control it and how much control is necessary.

California is moving toward fairly stringent control requirements for HCl and SO_2. The level of control and type of technology to be applied have been the subject of debate among regulatory bodies, project proponents and equipment suppliers. One California project is requiring equipment vendors to supply control devices to achieve 90% removal of both HCl and SO_2. It seems likely that the first resource recovery facility to be permitted in California will set state precedents with regard to the type and degree of control. Also, both New York and New Jersey are currently testing flue gases from municipal waste incinerators to determine applicable standards for HCl.

On the local level, gaseous emissions control is often imposed without regard

FIGURE 1



1 Raw gas inlet
2 Clean gas outlet
3 Saturation venturi
4 Washing stage
5 Emergency water
6 Fresh water
7 Waste-water to settling basin
8 Soda lye
9 Agitated tank preceding pumps
10 Settling tank
11 Sludge
12 Emergency overflow
13 Emergency drain

for the existing local ambient air quality. Local regulations are sometimes the result of prior bad experiences with dirty incineration plants of another era, the belief being that resource recovery plants are the equivalent of such archaic polluting sources. In one major project recently, additional gas cleaning was required by the host community after the proposal process was completed. This was done without preliminary study of existing conditions and impact on the project's viability.

West German Standards

A review of European experience might be helpful to U.S. project proponents. Emission limitations for HCl and SO_2 have been placed on municipal waste incinerators in other industrialized countries, most notably West Germany, a densely populated nation with a large concentration of people in a small geographic area. Resource recovery plants often are placed near population centers to be near district heating grids and industrial energy markets. Because of the heavy use of plastic in consumer packaging in West Germany, uncontrolled HCl emissions from a West German municipal waste incinerator can be several times greater than those from a U.S. incinerator. Hence, there was rather early recognition of the need for strict controls and a consequent development of gas scrubbing technology.

West German regulations, which were tightened in 1974, place emphasis on HCl control. However, SO_2 is also controlled by the chemical reactions taking place in the same control device.

West German gaseous emission standards for municipal refuse-fired plants are:

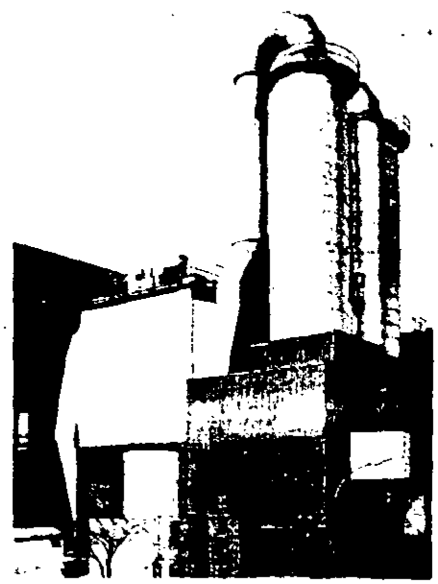
HCl, ppm_v — 61 (77)**
SO_2, ppm_v — 34* (43)**

*Lowest value applied in 1981. West German emission limitations for SO_2 are applied selectively at varying degrees of control, depending on the local situation (much like U.S. PSD regulations).

**Approximate values. West German standards are reported at 11% O_2 which is indicative of about 110% excess air. For a U.S. mass-burning resource recovery facility firing "typical" refuse and operating at 100% excess air, these values are converted to a 12% CO_2 standard. West Germany also has regulations for hydrofluoric acid (HF) and carbon monoxide (CO).

Wet Scrubber System

Until recently the West Germans met both acid gas and particulate regulations with an electrostatic precipitator for particulate removal followed by a wet scrubber for acid gas control. A schematic of such a system is shown in Figure 1.



DRY SCRUBBING is used effectively on this West German refuse-burning facility.

Resource recovery facilities have historically achieved efficient, reliable particulate control with the electrostatic precipitator (ESP). An ESP uses high-voltage direct-current corona discharge established between two electrodes to charge particles of dust in the flue gas. Charged particles are collected on a grounded electrode, which is then rapped to dislodge the dust. The dust falls into a hopper and is removed from the system.

Precipitator advantages are:

- High efficiency.
- High turn-down ratio.
- Low pressure drop.
- High reliability.
- Low maintenance.

However, limitations on preipitators include:

- Sensitivity to changes in dust and gas characteristics.
- Loss of efficiency in the submicron range.
- Effect of fluctuations in flow and changes in dust loading on performance, i.e., it is a constant percentage device.

In spite of these drawbacks, the ability of an ESP to operate on a resource recovery plant for long periods with a high efficiency is well documented.

Traditionally, a wet scrubber has been used downstream of an ESP to control gaseous emissions. A typical wet scrubber for the control of HCl emissions consists of a gas cooling section where the flue gases are saturated, an absorption section and a recirculation loop. At saturation temperature, the dirty gases flow into the absorption section where relatively high velocity is achieved. Here the liquid is finely atomized to promote good contact with the dirty gas. The scrubbed gas then exits the device. The particulate laden liquid is further processed prior to recirculation.

The advantages of wet scrubbing for gaseous emissions control are:

- Great versatility in handling varying gas flows and conditions as fuel and furnace parameters change.
- It is not susceptible to fires.
- Some re-entrained particulate carried over from the ESP is captured.

Although this is recognized to be an effective process for gaseous emissions control, it has several tradeoffs.

Scrubber disadvantages are:

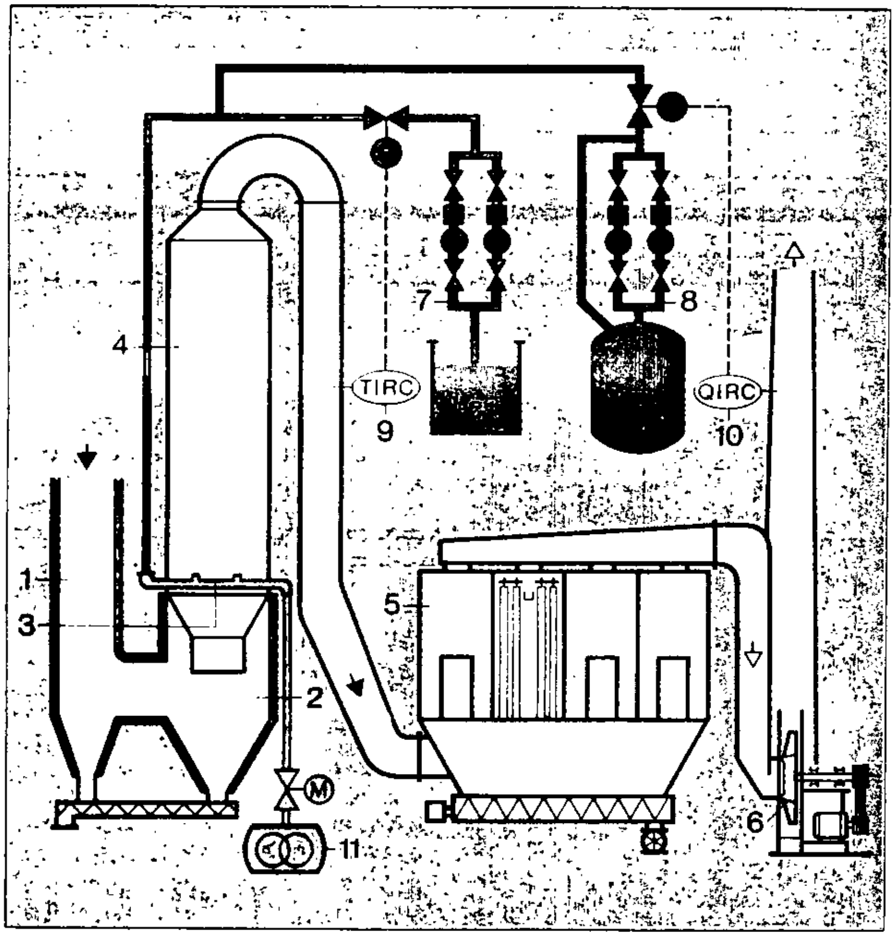
- Sludge disposal poses a problem.
- The scrubber operates in a highly corrosive atmosphere with the attendant maintenance problems.
- It has relatively high power requirements.
- Exotic materials used in fabrication increase the cost.
- The cool, high moisture content flue gas inhibits plume (and pollutant) dispersion and is usually highly visible. The facility must either pay an energy penalty for flue gas reheat to suppress the visible plume and regain buoyancy or consider a taller stack.

Dry Scrubbing Technology

To eliminate many of the problems associated with wet scrubbing, a new dry scrubbing technology recently has been developed. This system is shown installed on a West German refuse-fired plant in the accompanying photo. It has been in commercial operation about five years. It consists of a reaction tower in which the chemistry, although similar to the wet scrubbing process, produces a free-flowing powder of dry salts; a particulate control device to capture this powder, usually a fabric filter, but sometimes an ESP as shown in the photo; and reagant storage and metering equipment.

A schematic of this system is shown in Figure 2. Dirty flue gas enters the reaction tower in a tangential manner. A precollector section removes up to 70% or more of the particles. Then, a spray system injects and atomizes slurried reagent into the flue gas. The water is completely evaporated, and the chemical reaction between the pollutant gases and the reagent produces dry salts that are carried over to the fabric filter. There, the dust is collected on the surface of the bags by inertial compaction, diffusion, direct interception and sieving. Dust that builds up is dislodged by mechanical or pneumatic means, or by a combination of the two, and collected in hoppers for subsequent removal. A fabric filter is preferred since any unreacted reagent buildup on the bags in available to react with residual SO_2 and

FIGURE 2



1 Boiler outlet
2 Precollector
3 Spray system
4 Reactor vessel
5 Fabric filter
6 I.D. fan
7 Water system
8 Absorbent system
9 Temperature control
10 Outlet concentration monitor and control
11 Compressed air system

HCl in the flue gas, yielding potentially higher removal efficiences.

In addition to the advantages of this system that have been noted, fabric filters are insensitive to fluctuations in gas flow and inlet loading, i.e., they are constant output devices, and they are more efficient than ESPs in the submicron range. Also, since the flue gas is not saturated, there is no visible plume.

Some disadvantages are:

- The dry product contains soluble salts that may make disposal difficult.
- Exit gas temperature is reduced by about 180°F, somewhat inhibiting plume rise and pollutant dispersion.
- Reagent can be expensive, depending on the degree of control required.

Because of the significant advantages of the dry scrubbing system for both gaseous and particulate emission control (particularly in the submicron range), it undoubtedly will be preferred over the wet system except in some site-specific instances.

In the absence of firm emission limitations, it is difficult to evaluate the economic impact of gas scrubbing on resource recovery in general. However, for this discussion, let's use as an example two typical 1,200 tons per day (TPD) mass-burning resource recovery facilities and evaluate the effects on capital and operating cost of applying high efficiency ESP's for one facility versus a dry scrubber/fabric filter for emissions control for the other. Let's establish fairly stringent control requirements: The particulate outlet requirement is .02 grains per day standard cubic foot (corrected to 12% CO_2) for both control scenarios, and HCl and SO_2 removal efficiencies are 90% for the additional control of gaseous pollutants. The installed capital cost of the equipment only, flange-to-flange, in current dollars is:

Particulate control — $3.2 million.

Particulate plus gaseous control — $8.2 million.

These costs represent about 3.9% and 9.6% of the total construction capital costs of each resource recovery facility. For the control of gaseous emissions the capital cost does not reflect additional modifications that may be necessary to the balance of the facility, e.g., increased fan horsepowers, controls, foundations, etc. These will add slightly to the stated capital cost for gaseous emissions control.

Operating and maintenance costs of the dry scrubbing system are difficult to predict because of two important reasons:

- Experience with the equipment is limited.
- Refuse is notoriously variable in its elemental make-up.

For this example, let's apply the previously discussed emission controls to each refuse-fired system operating continuously at its design rating and firing a "typical" waste (of a fixed composition). The incremental cost of the gas cleaning system is represented by additional labor and materials, chemicals, water and the debt service (assume power consumption of the precipitator is offset by the motor horsepower requirements of the dry system). In present day dollars, this incremental cost could add approximately $1.25 million, or $3.25 per ton of waste processed, to the annual operating budget. Not included in this example is a large unknown factor, the perceived risk of the system operator. The true magnitude of this factor, and its relative worth, cannot become fully known until the project participants are sitting at the negotiating table.

Caution Urged

It is hoped that the foregoing discussion has acquainted the reader with the technological developments in gaseous emission controls for resource recovery plants and with the complexities and impacts of these control requirements. It is apparent that there will be continued and increasing emphasis on the control of gaseous emissions from resource recovery facilities. This is expected as resource recovery facilities most often seek sites near the centers of population and industry. In the absence of federal guidelines for gaseous incinerator emissions, state and local regulatory bodies are playing a more active role in setting emission limits. The following cautions are urged:

- The regulatory and project framework should be compatible with the development of resource recovery projects.
- Given the lack of ambient HCl data, existing local conditions should be stud-

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Energy Market

Continued from page 18

clarified, project cost analyses should be updated to insure continued project viability. It is possible for market requirements to become so stringent that the project becomes unfeasible. This is a fact best discovered early in the project so that efforts can be redirected to other alternatives before major expenditures are incurred.

Fuels derived from municipal solid waste will have physical and chemical properties different from those of conventional fuels. In some cases, existing facilities will need to be modified to handle refuse-derived fuel. Costs for modifying existing facilities must be identified in the early stages of a project so the net economic benefit of selling RDF to a market can be quantified.

The price of RDF will usually be equivalent to the price of the displaced fossil fuel, less additional costs incurred in its use, and perhaps, a discount reflecting risk borne by the user. Table III lists the prices several energy markets are paying for different types of refuse-derived fuels. Prices vary considerably because of the different fuels being displaced and the different expenses incurred by the market in handling the fuel.

TABLE III

Selling Price of Different Refuse-Derived Fuels

Facility Location	Type of RDF Produced	Energy Market	Market Fuel Displaced	Selling Price of RDF[a] ($/million Btu)
Ames, Iowa	fluff	municipal utility	coal	—[b]
Bridgeport, Connecticut	powdered	investor-owned utility	oil	3.76[c]
Madison, Wisconsin	coarse	municipal utility	coal	1.60
Milwaukee, Wisconsin	fluff	investor-owned utility	coal	1.27

[a]Source: "Waste to Energy Compendium" DOE Report CE/20167-05 (1981).
[b]City-owned RDF plant and municipal power plant. No specific price set for RDF.
[c]RDF was priced at $56.50/ton with HHV of 7,500 Btu/lb.

RDF Market Opportunities

Solid RDF can be used in combination with other fuels in existing boilers, generally coal-fired. There are two principal markets for such use — electric utilities operating steam-electric power plants fired by fossil fuel and large industrial operations.

Utilities would appear to be the most promising market because they represent a long-term, stable market that consumes large quantities of fuel and often are located close to urban areas where the solid waste is generated. One prime concern of a utility is to maintain a reliable system. Utilities, however, have been reluctant to purchase RDF because the long-term effects of RDF combustion on utility boilers is not known and therefore represent a sizable risk for the utility.

In most cases, a coal-fired power plant will require at least the addition of receiving and storage facilities to enable it to handle solid RDF. The cost for modifications should be known by the project team before fuel pricing is discussed.

Large industries represent a potential market for solid RDF due to the quantity of fuel consumed by many industrial operations. To date, however, no industry has purchased the fuel on a long-term contractual basis. Cement plants, paper mills, steel mills and lime plants burn large amounts of fossil fuel, but have little or no experience with firing solid RDF. Of these markets, cement plants appear most promising. Several plants have burned RDF as a supplemental fuel on a trial basis. A typical cement plant producing 2,000 tons per day of product could consume the RDF produced from a 500 tpd resource recovery facility. □

First 'Keep America Beautiful Week' Set

New York, New York — The nation's first Keep America Beautiful Week will be observed from April 18 to April 24. The week-long event expands Keep America Beautiful Day activities carried out in American communities for the past 11 years.

Activities are expected to include recycling, beautification, restoration of historic monuments, cleanups and educational efforts, as in past years. An awards competition will honor the best KAB Week projects. Further information and entry materials are available from Keep America Beautiful, 99 Park Ave., New York, N.Y. 10016.

Financing

Continued from page 20

are ultimately transferred to the vendor and the municipality. Ideally, the lease and the service agreement are of equal duration. Under ERTA, at the end of both, the lessor can sell the entire plant to the city for a nominal amount, say one dollar.

Word of Caution

It would be best to conclude this article with a word of caution about innovative financing of major capital investments such as resource recovery plants. It is a very tricky business and it involves some risk. The process of setting up a tax leasing scheme is particularly complex. There are many unanswered questions concerning the involvement of municipalities in these arrangements. In many ways, leverage leasing is still an experimental technique for raising capital.

At the same time, the investment community is very optimistic about the future of leverage leasing to finance resource recovery plants. Most consultants agree these individually designed plans are the best way to line up attractive financing in inflationary times. And financing costs can be the element that makes a new waste-to-energy plant an economic success. □

Emissions

Continued from page 30

ied before imposing a standard (or guarantee point).

- If regulations are to be set, serious consideration should be given to the West German experience. Any attempt at standard setting should recognize the variable nature of the fuel source.
- Project proponents and system vendors need to work together to determine the economic effects of gaseous emissions control on the project.
- If no gaseous emissions control is required, the facility design should include provisions for the future addition of gas control equipment.
- Regardless of the type or degree of emissions control required, the financial community perceives resource recovery as risky. An increase in control requirements at this juncture can only serve to further inhibit project implementation. □

The author is manager of proposals, Energy Systems Division, Browning-Ferris Industries, Inc., Houston, Texas.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

John

APR 29 1982

REF: 4AW-AF

DER
MAY 03 1982
BAQM

Mr. C. H. Fancy, Deputy Chief
Department of Environmental Regulation
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Fancy:

My staff has completed its review of your Preliminary Determination for the City of Tampa's proposal to construct a 1,000 ton per day solid waste disposal facility to be located in Tampa, Florida, and offer the following comments:

1. The SO_2 impact on Pinellas County's non-attainment area was stated as being insignificant, however, for clarification purposes the distance from the source to the non-attainment area and its associated impact at that point should be presented.

2. TSP offsets should be documented and obtained prior to issuing the PSD permit. If revised permits or modified emissions limitations are to be used, these should be attached to the PSD permit.

3. The predicted annual concentrations for lead, flouride, mercury, and beryllium are all greater than the significance levels, and are therefore subject to BACT, monitoring, and modeling requirements as contained in the PSD regulations.

4. A condition should be added to the permit to include the New Source Performance Standard ¶60.53 "Monitoring of Operations". This should include comparative daily charging rates and hours of operation.

5. Continuous monitoring requirements for TSP, SO_2 and NO_x should be added to the permit in order to insure compliance with hourly emissions limitations.

If you have any questions concerning this matter, please contact Mr. Kent Williams of my staff at (404) 881-4552.

Sincerely yours,

Tommie A. Gibbs

Tommie A. Gibbs, Chief
Air Facilities Branch

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

ADDRESS ONLY THE DIRECTOR, FISH AND WILDLIFE SERVICE

APR 23 1982

DER

APR 30 1982

BAQM

Mr. C. H. Fancy
Bureau of Air Quality Management
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Fancy:

The City of Tampa proposes to rehabilitate a municipal incinerator and to add an additional unit to increase the combustion design capacity to 1000 tons of refuse per day. The project will result in allowable emission increases of 27.9 lb/hr of particulate matter (PM) and 170.0 lb/hr of sulfur dioxide (SO_2) and is subject to PSD review.

The proposed site is approximately 77 km south-southeast of Chassahowitzka National Wildlife Refuge, a class I area administered by the Fish and Wildlife Service (FWS). Air quality estimates made by the applicant, using the EPA approved Single Source (CRSTER) Model with five years of hourly meteorological data from Tampa, indicate the SO_2 and PM concentrations should be less than one microgram per cubic meter on an annual average at distances greater than 10 km from the source. A screening analysis performed for the FWS by the Air Quality Division of the National Park Service indicated one hour concentration estimates of less than one microgram per cubic meter at Chassahowitzka. Therefore, we do not expect an adverse effect on this class I area due to the emissions of the proposed project alone.

The proposed emission control technology was also evaluated and we concur with the State of Florida's determination that the best available control technology (BACT) will be applied. However, we recommend that the emission limitations in the permit be expressed in terms of lb pollutant/ton refuse in addition to the lb pollutant/hr limitations contained in the draft. This will ensure that BACT will be used at all levels of operation.

We appreciate this opportunity to provide comments.

Sincerely yours,

Robert E. Gilmore

Acting Associate Director

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DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
WASHINGTON, D. C. 20240

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