United States Department of the Interior

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MAY 21 1986

BAQM

NATIONAL PARK SERVICE
SOUTHEAST REGIONAL OFFICE
75 Spring Street, S.W.
Atlanta, Georgia 30303

IN REPLY REFER TO:
N3615(SER-OPS)

MAY 16 1986

Mr. Tom Rogers
Bureau of Air Quality Management
State of Florida
Department of Environmental Regulations
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Rogers:

Thank you for sending us a copy of North Broward County Resource Recovery Project, Incorporated's power plant site certification for a proposed resource recovery facility in Broward County, Florida. The proposed project would be located approximately 78 kilometers (km) northeast of Everglades National Park, a Class I area, and 65 km northeast of Big Cypress National Preserve, a Class II area.

Our review of the information sent to us is contained in the enclosed technical review document. The North Broward application makes the sixth application we have reviewed within the last 12 months for such facilities in the vicinity of these park units. If this trend continues, the National Park Service is concerned that the cumulative impacts from numerous such facilities, if not controlled using what we feel is best available control technology, would cause potential adverse impacts on park resources. Therefore, we are requesting that a flue gas scrubbing system be installed to control SO_2 (reduce SO_2 by over 80 percent), fluoride, hydrogen chloride and sulfuric acid mist, and that nitrogen oxides and particulate matter be controlled at a more stringent level than that proposed by the applicant. Once your technical review of the project is completed, we would like to review your preliminary determination document. We will submit any additional comments regarding the project during the 30-day public comment period.

If you have any questions regarding the enclosed comments, please contact Miguel Flores of our Air Quality Division in Denver at (303) 236-8765.

Sincerely,

Frank Catroppa

Acting Regional Director
Southeast Region

Enclosure

Technical Review of Power Plant Site Certification Application
for North Broward County Resource Recovery Project, Inc.

by

Permit Review and Technical Support Branch
Air Quality Division - Denver

North Broward County Resource Recovery Project, Inc. (North Broward) is proposing to construct a resource recovery facility in north Broward County. The location is approximately 78 kilometers (km) NE of Everglades National Park, a PSD class I area administered by the National Park Service. The proposed project is also located approximately 65 km NE of the closest point of Big Cypress National Preserve, a class II area, also administered by the National Park Service. The purpose of the proposed facility is to dispose of solid waste generated in north Broward County. The proposed project is a mass-burn facility with a continuous design rated capacity of 2,200 tons per day (TPD) of solid waste, and an electrical generating capacity of 55.5 megawatts. North Broward has mentioned that they may have an ultimate generating capacity of approximately 83 megawatts using 3300 TPD of solid waste. If North Broward wants to increase the capacity to 3300 TPD, the project must be re-evaluated to determine the effects of the associated increase in emissions.

The emissions from the proposed facility are estimated as follows based on 2,200 TPD of refuse burned: 134 tons per year (TPY) of particulate matter (PM), 1,592 TPY of sulfur dioxide (SO_2), 1,620 TPY of nitrogen oxides (NO_x), 260 TPY of carbon monoxide (CO), 37.6 TPY of volatile organic compounds (VOC), 5.79 TPY of lead (Pb), 52.1 TPY of fluorides (F), 136 TPY of sulfuric acid mist (H_2SO_4), 0.0027 TPY of beryllium (Be), 2.7 TPY of mercury (Hg), and 0.09 TPY of arsenic (As). Under the PSD regulations, these emission rates are considered significant for all except VOC. Therefore, new source review is required for PM, SO_2, NO_x, CO, Pb, F, H_2SO_4, Be, Hg, and As. Following are our comments on the best available control technology, air quality, and air quality related values analyses with respect to the project's expected impacts.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT) ANALYSIS

The major sources of emissions at the proposed North Broward County Resource Recovery Facility are the four associated furnaces. Therefore, our review focuses on emission controls on these units. Our BACT comments for the proposed furnaces are similar to the comments we submitted for the proposed Collier County and south Broward County resource recovery facilities. These comments were submitted to the Florida Department of Environmental Regulation (DER) previously. We again reference the publication entitled, "Air Pollution Control at Resource Recovery Facilities". This document was published in May 1984 by the California Air Resources Board (CARB) and discusses resource recovery facilities in detail. As of 1984, all refuse burning facilities with applications pending in California are proposing control technologies that are the same as, or more stringent than, the guideline emission limits discussed in this report.

For a new major source, a BACT analysis is required for each regulated pollutant emitted in significant amounts. For the proposed facility, the following pollutants will be emitted in significant amounts and require BACT review: PM, SO_2, NO_x, CO, Pb, F, Be, Hg, H_2SO_4, and As.

Particulate Matter

North Broward is proposing to use electrostatic precipitators (ESPs) to minimize PM emissions generated by combustion of the solid waste in the furnaces. Each ESP will be designed to reduce the exhaust gas PM concentration to 0.02 grains per dry standard cubic foot (gr/dscf). North Broward states that an ESP with an outlet grain loading of 0.02 gr/dscf is best available control technology for the proposed facility. We agree with North Broward that high efficiency control devices such as ESPs or baghouses represent BACT. However, stack testing data for other solid waste incinerators indicate these devices are capable of controlling PM emissions below the proposed 0.02 gr/dscf rate. In fact, based on information provided in the CARB document mentioned above, an emission limit of 0.01 gr/dscf can be achieved with these devices. This is the guideline emission limit proposed by the CARB for new resource recovery facilities in California and should be considered as the BACT limit for Florida facilities as well. The 0.01 gr/dscf rate is also the rate specified in the Maine Department of Environmental Protection's recent license to Penobscot Energy Recovery Company (PERC) for a resource recovery facility in Orrington, Maine. Therefore, we recommend the DER specify 0.01 as the BACT limit for North Broward.

Sulfur Dioxide

North Broward is proposing no control devices for limiting SO_2 emissions; rather, they are proposing the firing of low sulfur refuse as BACT for the proposed facility. The resulting BACT limit proposed is 0.55 pounds per million Btu heat input ($lb/10^6$ Btu).

The emission guideline recommended in the CARB document is 30 ppm, which corresponds to an SO_2 emission rate of approximately 0.08 $lb/10^6$ Btu. To achieve this emission level, which is significantly more stringent than the rate proposed by North Broward County, flue gas controls such as wet or dry scrubbing are required. Dry scrubbing processes have been effectively employed at pilot and full-scale refuse burning facilities in Europe, Japan, and the United States. Wet scrubbers have also been employed at full-scale refuse burning facilities. Also, applicants for two resource recovery facilities in Maine recently proposed the use of spray dryer scrubbers to minimize SO_2 and acid gas emissions. The resulting SO_2 emissions from the PERC facility referenced above were recently permitted at 0.067 $lb/10^6$ Btu after the scrubbing. The SO_2 emissions from Regional Waste Systems' (RWS) proposed facility in Portland, Maine, were estimated to be 0.074 $lb/10^6$ Btu.

It is our understanding that flue gas scrubbers will also be installed at the Palm Beach County resource recovery facility. In addition, for the Collier County resource recovery facility, the DER made a preliminary determination

that flue gas scrubbing or similar technology was BACT for control of acid gases. The DER also indicated that the installation of an acid gas removal system would also provide control for SO_2 emissions. We assume that the DER will make a similar determination for North Broward and require flue gas scrubbing for the proposed facility. Therefore, because the flue gas scrubbing system required for control of acid gases will also reduce SO_2 emissions, we recommend the DER specify SO_2 limits for North Broward that reflect the SO_2 reductions achievable with a flue gas scrubbing system, and are comparable with the above CARB limits.

Nitrogen Oxides and Carbon Monoxide

The two primary variables that affect the formation of NO_x from resource recovery furnaces are the temperature and the concentration of oxygen in the combustion zone. North Broward is proposing furnace design and good combustion practices as NO_x BACT. Combustion controls include use of low excess air, limiting peak combustion temperature, and good air/fuel mixing in the combustion chamber. North Broward determined that a NO_x emission rate of 5.0 lb/ton (0.55 lb/10^6 Btu) represent BACT for the proposed facility. We agree with North Broward that the proposed use of combustion controls represent BACT. However, based on information presented in the CARB report and other reports referenced in North Broward's PSD application, we feel combustion control can reduce NO_x emissions to the 3.0 lb/ton or lower range. For example, on page 4-10 of the PSD application it states that Camp, Dresser and McKee (1984) reported emission factors for five operating solid waste fired facilities in the United States ranging from 2.1 to 4.6 lb/ton. Three other facilities were permitted at a rate of about 3.0 lb/ton. EPA (1984a) also cites a factor of 3.0 lb/ton. The application also states that Henningson, Durham and Richardson (1985b) surveyed eleven solid waste incinerators throughout the United States and found NO_x emissions ranging between 1.1 and 4.7 lb/ton. In addition, A.D. Little's (1981) survey showed emissions to range from 0.7 to 4.4 lb/ton. Based on this information, we do not understand why North Broward feels a 5.0 lb/ton rate represents BACT.

Carbon monoxide emissions result primarily from incomplete combustion. North Broward is proposing as BACT a combustion control system that will insure sufficient mixing of the solid waste fuel and air so that the emissions of products of incomplete combustion are minimized. We agree with North Broward that the proposed combustion controls represent BACT for emission of CO from the proposed facility. North Broward is proposing to emit 260 TPY of CO.

Other Pollutants

Other pollutants emitted from the proposed facility that require BACT review include, Pb, F, Be, Hg, H_2SO_4 and As. In addition, although presently not a regulated pollutant, significant amounts of hydrogen chloride (HCl) can be emitted from municipal incinerators and should be minimized.

Lead, Be, and As are emitted in the solid phase. Therefore, the ESPs proposed to control PM emissions will also control these pollutants. We agree that the proposed ESPs represent BACT for these pollutants.

Fluorides, H_2SO_4, HCl, and mercury are emitted primarily in the gaseous phase. North Broward did not propose additional controls for these pollutants. However, assuming the DER determines dry scrubbing is BACT for acid gas control, as they did for the Collier County resource recovery facility, these emissions would be reduced by as much as 90 percent. We feel a dry scrubbing system or equivalent is BACT for these pollutants.

AIR QUALITY ANALYSIS

The application indicates that ISCST was used to predict the maximum air quality impacts due to the proposed plant. This seems to be an appropriate application of this model for this source. The air quality modeling analysis predicts maximum SO_2 3-hour and 24-hour concentration increases of 3.2 micrograms per cubic meter (ug/m^3) and 0.61 ug/m^3 that added to the background values of 27 ug/m^3 and 12 ug/m^3 would give total concentration levels of 30.2 ug/m^3 and 12.61 ug/m^3 respectively in Everglades National Park. The proposed plant is predicted to add only a minor amount to the annual concentration level in the park.

The attached table (from the application) shows the maximum predicted concentrations of the pollutants to be emitted from the proposed plant and concentrations known to adversely impact vegetation. Using a ratioing technique we calculated the maximum concentration of arsenic to be 0.0005 ug/m^3. We have also converted each concentration expressed in ug/m^3 to parts per million (ppm) for the heavy metals, for easier comparison to known effects levels.

AIR QUALITY RELATED VALUES ANALYSIS

There are numerous air quality related values (AQRVs) found in Everglades National Park. These include 14 Federally listed endangered and threatened species, and a number of unlisted rare and threatened species. There are also many species of epiphytes, including certain species of orchids, that are not found anywhere else in the National Park system and are uniquely sensitive to air pollution.

In addition to the resources of Everglades National Park, we are concerned about the resources of Big Cypress National Preserve. It is the responsibility of the National Park Service, under the Organic Act of 1916, to ensure that the unique resources of Everglades National Park and Big Cypress National Preserve are protected from degradation. Big Cypress contains 10 Federally threatened or endangered species and is famous for a high diversity of rare bromeliads and orchids.

The discussion below on the sensitive resources of Everglades National Park and Big Cypress National Preserve is partially from testimony given by Jack Morehead, former Superintendent of Everglades National Park, outlining NPS concerns over air pollution effects on park resources from a Dade County power plant. Because of these concerns the NPS and Florida Power and Light have instituted some research projects that are not yet complete.

Dade County Slash Pine. This pine (Pinus elliotti var. densa) is a variety of slash pine that is biologically distinct from the slash pine that is found in other parts of the southeastern U.S. (Tomlinson, 1980). Originally including some 200,000 to 300,000 acres along a limestone ridge in southeast Florida, it has been seriously cut back by farming and urban development so that the only remaining contiguous population (approximately 20,000 acres) of this variety in the world is in Everglades National Park. The species is known to be sensitive to ozone: levels as low as 0.05 parts per million (ppm) for 18 weeks of exposure have been shown to depress photosynthesis nine percent (Barnes, 1972). Stands of this pine are very open, thus increasing the flux of pollutants to many individual trees. In addition, this species does not grow with only one annual ring per year as temperate pines do. Instead, this species can produce as many as five growth flushes a year, thus subjecting five new sets of needles to air pollutants. NPS is currently funding fumigation studies exposing the pine to both ozone and SO_2 because the likelihood of synergistic effects is high (pines are known to be highly sensitive to both pollutants (Smith, 1981). These studies, conducted by the Environmental Protection Agency Corvallis Environmental Research Laboratory, have shown that south Florida slash pine is extremely sensitive to a few episodes of acute SO_2 when ozone levels average only .04 - .05 ppm/7 hour daylight mean. One exposure to one hour of SO_2 at 534 ug/m^3 plus three exposures at 267 ug/m^3 throughout the growing season caused significant reductions in biomass and size of seedling trees, even without the appearance of foliar injury symptoms. Permanent plots and potted seedlings of slash pine have been installed in Everglades National Park to monitor effects of these pollutants. So far, there have been reports of ozone-like symptoms on pines in Everglades National Park.

Lichens. Tropical hardwood trees in the hammocks in the park are typically covered with many species of foliose lichens. Lichens are extremely sensitive to low annual averages of SO_2 (less than 0.01 ppm) and have been observed to disappear in areas where such concentrations are found (Skye, 1968; Richardson, D.H.S. et al., 1981; Manning, W.J. & W. A. Feder, 1980). Lichens are the food base for the unique and rare Liguus tree snails for which Everglades National Park serves as a significant portion of their remaining habitat and population (George, 1972). The effects of SO_2 on these lichens could lead to irreversible loss of the tree snails. NPS is currently conducting studies of the SO_2 sensitivities of lichens in Everglades National Park. Of the lichens studied, one, Ramalina denticulata, appears to be sensitive to SO_2 levels at 100 ug/m^3 for six hours a week for 10 weeks. This lichen is in a genus that is known to die out at SO_2 annual average concentrations between 5 and 30 ug/m^3.

Epiphytes. The park is famous for numerous species of orchids and bromeliads, species of vascular plants that grow on branches of trees in hammocks and pinelands. The epiphytes depend on the branches for support and some nutrients, but they depend entirely on precipitation for water and most nutrients. These species have a unique susceptibility to acid precipitation and dry deposition of SO_2 and metals on their foliage. A review of the literature has shown that anatomically, physiologically, and ecologically they are uniquely sensitive to air pollution (Benzing, 1981). A study on the sensitivity of

epiphytes in Everglades National Park to air pollution (SO_2 and O_3) was initiated this year. In addition, these epiphytes and the sensitive lichen species have been placed in biomonitoring plots in the parks and other areas of south Florida. They will be studied and sampled every year for air pollution effects.

Other pollutants emitted by the proposed facility deserve special attention in the AQRV analysis. Fluoride is much more phytotoxic than SO_2, and lichens and orchids are hypersensitive to it at the parts per billion level. In addition, elevated levels of Hg and As have been found in invertebrates in the park (Ogden et al. 1974).

Due to currently high ozone levels in the park, reported ozone-like symptoms on slash pine, and the synergistic effect of ozone and SO_2, reduction of NO_x emissions from 5.0 to 3.0 lb/ton and SO_2 emissions by use of a flue gas scrubber, will minimize the impact on park resources. The use of a flue gas scrubber would also reduce fluoride emissions which are toxic to lichens and epiphytes, and it would help reduce H_2SO_4 and HCl which contribute to the acidity of rainfall.

Conclusions

The resources of Everglades National Park and Big Cypress National Preserve are unique, and many are sensitive to air pollutants. The area is a high growth area and there are presently applications pending for at least four resource recovery plants within 100 kilometers of these parks. Due to this high growth, the sensitivity of park resources, and the proposed NO_x, SO_2, and PM emission rates not reflecting BACT, the National Park Service requests that:

(1) The NO_x emission rate be reduced from 5.0 to 3.0 lb/ton;

(2) a flue gas scrubbing system be installed and the emission limitations for SO_2, F, H_2SO_4, HCl, and Hg be reduced to reflect the reductions achievable through the use of such a system; and

(3) an emission rate of 0.01 gr/dscf be specified as BACT for PM.

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Table 8-1. Maximum Predicted Concentrations Due to the Proposed NBCRR Facility Compared to Concentrations Known to Adversely Impact Vegetation

Pollutant	Average Period	Concentration (ug/m^3) Maximum Predicted Due to Facility	Concentration (ug/m^3) Background*	Concentration (ug/m^3) Total (Facility Plus Background)	Lowest Concentration Known to Impact Vegetation (ug/m^3)	Reference
		(ppm)				
SO_2	3-hour	34.6	27	61.6	260 for 6 hours 12 times in 12 weeks	Flagler and Younger, 1982
TSP	24-hour	0.71	63	63.7	32,000†	Thompson et al., 1984
NO_2	Annual	0.73	34	34.7	120	Thompson, 1970
	3-hour	35.2	**	35.2	188	Tingey, 1971.
CO	1-hour	11.0	7,000	7,011	Vegetation not impacted by CO	--
Pb	3-month	0.0026 $3.1x10^{-6}$	0.2	0.2	Unavailable to plants in high calcium and organic soils	Zimdahl and Skogerboe, 1977
	24-hour	$3.6x10^{-5}$				
F^-	24-hour	0.27 $3.5x10^{-4}$	**	0.27	1 to 3	McCune, 1969. Adams, 1956.
Be	24-hour	0.000014 $3.8x10^{-8}$	**	0.000014	Not known to be available to plants	Gough et al., 1979
Hg	24-hour	0.014	**	0.014	10 (Duration unknown)	Stahl, 1969
As	24-hour	0.0005 $1.5x10^{-7}$				

*Second highest 24-hour or highest annual average concentration measured within 10 km of the facility (see Section 5.2). The 3-hour concentration is not available with monitoring technique. The 3-hour background concentration was assumed equal to 2.25 times the 24-hour concentration of 12 $\mu g/m^3$ (DER, 1985).
†Assumes deposition velocity of 0.18 cm/sec.
**Ambient monitoring data not available in Broward County.

Source: ESE, 1986.

From - PSD Application - North Broward