MIAMI-DADE WATER AND SEWER DEPARTMENT
4200 Salzedo Street, Coral Gables, Florida 33146 • Tel: 305-669-3700 • Fax: 669-3788

SERVE • CONSERVE

January 29, 1999

CERTIFIED: Z 427 642 151
RETURN RECEIPT

Mr. Alvaro Linero, P.E.
Administrator, New Source Review Section
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400



RE: Response to FDEP and U.S. EPA Region IV Comments
Project No. 0250281-006-AC, PSD-FL-248, John E. Preston Water Treatment Plant

Dear Mr. Linero:

This letter is written in response to comments provided by the Florida Department of Environmental Protection (FDEP) and the U.S. Environmental Protection Agency (EPA) Region IV regarding the PSD Permit Application for proposed modifications to the above-referenced facility. Comments on the application were received from FDEP in a letter dated May 11, 1998. EPA provided additional comments to FDEP in a letter dated July 10, 1998. FDEP forwarded these comments to MDWASD in a letter dated July 29, 1998. These letters are included in Attachment A.

***FDEP Comments***

CH2M HILL has discussed FDEP comments with Ms. Susan DeVore-Fillmore and Mr. Joseph Kahn, P.E., both of the FDEP New Source Review Section, in order to obtain clarification and additional detail. Based on comments received from FDEP and EPA, MDWASD requests that the PSD application submitted for this facility be revised as follows:

- Replacement of the annual power output limitation of 19,000,000 kilowatt-hours (kW-hrs) with an annual fuel consumption limitation of 1,300,000 gallons diesel fuel;

- Replacement of the power output-specific emissions limitation of 12.62 grams per kw-hr (g/kW-hr)with a heat input-based limitation of 2.15 pounds per million British Thermal Unit (lb/MMBTU) for the 20E4 engines; and

- Replacement of the power output-specific emissions limitation of 12.62 g/kW-hr with a heat input-based limitation of 4.12 lb/MMBTU for the 20F4B engines.

FDEP Form 62-210.900 signature pages are provided in Attachment B.

Our responses to FDEP's comments reflect discussions with Ms. DeVore-Fillmore and Mr. Kahn, and are provided as follows:

***FDEP Comment No. 1*** - FDEP requested a detailed cost effectiveness analysis based on vendor information for the chosen control technology, as well as for Selective Catalytic Reduction (SCR), for both sets of generator sources

***Response*** - A cost effectiveness analysis was included in the initial application. This analysis assumed that separate SCR systems would be installed on each engine (6 systems total). It is our understanding that FDEP is interested in the cost effectiveness of SCR if one system were installed for each bank of engines (one system for the 20E4 engines and one system for the 20F4B engines). Within each bank, engine exhausts would be combined into a common header leading to the SCR system.

Cost estimates have been obtained from an SCR equipment manufacturer for a single system capable of treating the combined exhaust from each bank of diesel engines. The estimate and revised cost effectiveness tables are included in Attachment C. The revised tables should replace Tables 5-2 through 5-5 of the April 1998 application submittal. The cost effectiveness of using a single SCR system to control emissions of NOx from the diesel engines is estimated to be $5,170 per ton of NOx removed. This cost effectiveness assumes that separate systems will be installed on each bank of engines and that equivalent amounts of electricity would be generated by the engines with combustion modifications or SCR (selection of emission control technology will not influence the amount of electricity generated). This cost effectiveness is lower than expected because SCR does not effectively reduce NOx emissions at engine operating loads typical for this facility (less than 50 percent). For comparison, the cost effectiveness of using combustion modifications to control emissions of NOx from the diesel engines is estimated to be $174 per ton NOx removed. Combustion modifications are an effective means of NOx reduction regardless of engine operating load. In response to this comment and EPA Comment No. 1, we maintain that SCR is not a feasible technology for reducing NOx emissions from the engines at this facility (see response to EPA Comment No. 1).

***FDEP Comment No. 2*** - FDEP requested the frequency and duration of engine startup, shutdown, and maintenance activities, or any other times the engines are operating without producing power.

***Response*** - Since the application is being revised from a power output-based approach to a fuel consumption-based approach, estimates of the frequency and duration of times when then engines operate without producing power are not necessary.

***FDEP Comment No. 3*** - FDEP requested fuel usage information, including the heat input rate (MMBTU/hr) for each diesel engine; methods proposed for determining compliance with the rates; an explanation of why fuel limitations were not proposed; and NOx emission rate calculations in terms of lb/MMBTU for comparison to RACT limitations stated in Chapter 62-296.570(4), FAC.

***Response*** - Fuel usage information for each engine model was provided in Attachment 5 of Appendix A (Air Permit Application Form and Supplemental Information) of the application. Heat input rates are approximately 27 MMBTU/hr (both engine models burning API 36 diesel fuel with a higher heating value of 19,620 BTU/lb). No method is proposed to determine compliance with these rates, since they represent the maximum capacity of each engine (potential emissions).

The proposed fuel consumption limitation corresponds to annual NOx emissions of 370 tons, which is slightly less than the level of emissions previously proposed. Emissions calculations and information in support of this request are included in Attachment D. Daily and 365-day rolling total fuel consumption will be recorded from meters located between the tanks and the engines to monitor compliance with the annual limit. Emissions calculations indicate that the control technology proposed as BACT will comply with the Florida NOx RACT standard for diesel engines.

***FDEP Comment No. 4*** - FDEP requested verification that the emissions factors used for the chosen control technology and for SCR at 100% load for both sets of engines. FDEP also requested engine brake-horsepower curves for both sets of engines, and the relationship between engine load and power-specific emissions (including emission factors at 110% load).

***Response*** - Power-specific emission factors (uncontrolled) provided by EMD for both engine models were included in Attachment 5 of Appendix A (Air Permit Application Form and Supplemental Information) of the permit application. However, the application should be revised from a power output-based approach (emissions in terms of g/kW-hr) to a heat input-based (emissions in terms of lb /MMBTU) approach. Maximum heat input-specific emissions for both engines, calculated from BSFC rates and manufacturers test data, occur at full (100%) load operating conditions.

In addition to proposed BACT, which consists of retarded injection timing plus installation of turbocharger aftercoolers, and SCR, several other NOx reduction alternatives were considered. Supporting information for the proposed BACT and other alternatives is provided in Attachment E. Proposed BACT is Alternative #2 in Attachment E. NOx emissions reductions of 85% are commonly accepted as achievable using SCR, and the catalyst manufacturer (Peerless, Inc) confirmed this level of efficiency.

***FDEP Comment No. 5*** - FDEP requested calculations supporting the proposed annual emission rates for each engine model (20E4 and 20F4B) for comparison to PSD significant emission rates.

***Response*** - Emission calculations are provided in Attachment D.

***FDEP Comment No. 6*** - FDEP requested clarification of whether or not the engine exhaust stacks would be able to comply with the requirements of Chapter 62-297.310(6), FAC, regarding sampling facilities. If not, FDEP requested clarification of how testing would be conducted to show compliance with the NOx emissions limit.

***Response*** - The 20E4 engines will not be able to comply with 62-297.310(6)(c) because there is insufficient stack length available between obstructions. The 20F4B engines would be able to comply with 62-297.310(6)(c) only if sampling ports were installed. However, the stacks are relatively small in diameter (less than 2 feet), so little benefit will be gained by drilling 3-inch diameter holes in the sides of these stacks. Instead, the MDWASD proposes to collect NOx samples through a rake probe, which composites sample volume from 3 locations across the stack diameter.

***FDEP Comment No. 7*** - FDEP inquired if "other" NOx emission control technologies had been considered, such as alternative fuels, duel fuel firing, or engine retrofit kits. A summary of any information

regarding these technologies was requested.

***Response*** - Several NOx emission control technology alternatives were evaluated. The technologies can be divided into three categories: combustion modifications, fuel system conversions, and add-on control. Expected NOx emissions reduction and installed cost per unit are provided for each alternative in Attachment E. A detailed cost effectiveness analysis was not performed for retrofitting of each engine with dual fuel conversion kits because the cost of the retrofit approached the cost of the engines.

***FDEP Comment No. 8*** - FDEP requested a detailed map showing the location, in UTM coordinates, of all fenceline receptors used in the air quality impact analysis. FDEP also requested diskettes containing all air quality impact analysis modeling output files.

***Response*** - A 7.5-minute series USGS map is included in Attachment F showing the location of all fine-grid modeling receptors. Since receptors close to the Preston WTP are located too close together for the scale of the USGS map, a separate diagram showing receptor locations close to the facility is also included. UTM coordinates are displayed along the axis of both maps. The air quality modeling files are provided on the diskette enclosed with this letter.

**U.S. EPA Comments**

CH2M HILL has discussed EPA comments with Region IV staff, specifically Mr. Keith Goff (BACT issues) and Mr. Stan Krivo (dispersion modeling issues) in order to obtain clarification and additional detail. Our responses to EPA's comments reflect these discussions and are provided below:

***EPA Comment No. 1*** - EPA requested that additional information be provided regarding any operational differences between the subject facility and similar facilities in Philadelphia, PA to indicate why SCR would not be feasible for the Preston WTP. EPA also requested that a discussion be included regarding exhaust gas temperatures at reduced loading, and the amount of time that the engines would be operated at reduced load and temperature. Finally, EPA commented that the cost effectiveness of $2,370/ton is typically considered to be acceptable for $NO_x$ reduction costs.

***Response*** - Based on telephone conversations with O'Brien Energy Systems (the operator of the facility in Philadelphia), there are significant operational differences between that facility and the Preston WTP. The diesel generators at the O'Brien facility are reportedly only operated at or near full load capacity. This mode of operation is reported to be necessary to maintain sufficient exhaust temperatures (at least 550°F) for the SCR catalyst to drive the NOx conversion.

Approximate engine exhaust temperature information obtained from the equipment manufacturer (telephone conversation with Mike Thiel, Engine Systems, Inc., on September 3, 1998), and average 20F4B operating loads monitored at the plant during 1998 are provided in Attachment G. The 20E4 engines accommodate similar loads. At the Preston WTP facility, the diesel generators are normally operated in a "standby" mode at partial power output. This type of operation is necessary because the plant's diesel generators does not operate in a "parallel" configuration with the main power supply - plant operators are required assign equipment either to the main power supply or to the diesel generators. Therefore, in order to maintain

continuous water treatment and supply, the generators must be able to accommodate fluctuations in load from the equipment they are suppling power to. Under this mode of operation, the diesel engines are normally operated in a load range of only 25 to 50 percent of full load. Actual operation of the engines during 1998 indicated that the average power output has been only 35 percent of full load.

Under these "average" load conditions, exhaust temperatures would be approximately 550°F (20E4) and 400°F (20F4B). Therefore, the engines could be expected to remain below the minimum temperature necessary for effective NOx conversion using SCR most of the time. In addition, ammonia injection control systems calibrated for operation at higher NOx conversions (for conventional full-load operation) do not perform well at lower NOx conversions. Ammonia slip is expected to become more of a problem at low exhaust temperatures.

In addition to the basic operational differences that exist between the two facilities, it is noted that the O'Brien Energy Systems facility is intended for "peaking duty" only. The facility is located in an ozone non-attainment area where NOx RACT requires a stringent NOx limit of 2 grams per brake horsepower hour. According to O'Brien Energy Systems, this emission limit could only be achieved by using SCR technology and only if the engine was operated at or near full power output. The O'Brien facility is also limited to 250 hours per year as a condition of its operating permit, so little performance data is available. Therefore, we maintain that the O'Brien Energy Systems facility has not demonstrated that it is a successful application of SCR for the control of NOx emissions from variable load diesel engines.

***EPA Comment No. 2*** - EPA noted that the application does not account for emissions while the engines are being operated without producing power. It was requested that a description be provided of the duration and frequency of operation of the engines while not producing power, with an estimate of the annual emission rates during such conditions. The comment was also made that the permit may need to restrict NOx, emissions by a method other than the amount of electricity generated.

***Response*** - See the responses to FDEP Comment Nos. 2 and 3, and the corresponding attachments.

***EPA Comment No. 3*** - EPA notes that the application only provides emission factors for Model 20F4B engines, not the 20E4 engines. It was requested that emission factors be included for the 20E4 engines. It was also noted that it might be necessary to establish different BACT emission limits for each model of engine to reflect achievable emission rates.

***Response*** - See the responses to FDEP Comment No. 5, and emissions calculations provide in Attachment D. Controlled NOx emissions are 2.15 lb/MMBTU (20E4) and 4.12 lb/MMBTU (20F4B).

***EPA Comment No. 4*** - EPA noted that the impact assessment presented in the application was based on the 20F4B engines, as being representative of all engines at the facility, primarily because these engines have the largest emission rate and they are physically located closest to the fence line. It was noted that there are other variables that can have an effect on resulting (off-site) concentrations (e.g. temperature, diameter, etc.). EPA recommended that these other parameters be considered in the selection of which engines are modeled to ensure that the 20F4B engines will result in the highest predicted ground level concentrations.

***Response*** - The air quality impact analysis was based on the conservative assumption that all emissions would result from operation of the 20F4B engines. This was assumed because: 1) for the same amount of fuel consumption, higher emissions are predicted for the 20F4B engine; 2) emissions from both banks of engine models are heavily influenced by building downwash effects; and 3) the 20F4B model engines are located closer to the fence line. It is expected that impacts from operation of the 20F4B engines alone would exceed impacts from operation of the 20E4 engines only, or any scenario involving combined operation of both banks of engines.

While the exit velocity from the 20F4B engines is lower than the exit velocity from the 20E4 engines, the exhaust stacks from both types of engines are of similar heights and are nearly flush with the tops of their adjacent structures. Building downwash heavily influences emissions from both types of engines. Ground-level pollutant concentrations were estimated to be higher for the 20F4B engines because they are closer to the fence line and they emit more NOx. This assumption has since been confirmed by using SCREEN3 to model two emissions scenarios: (1) full load, uncontrolled NOx emissions of 19.68 g/s from a 20F4B stack, and (2) full load, uncontrolled NOx emissions of 10.19 g/s from a 20E4 stack.

The results of the SCREEN3 modeling analysis indicate that the predicted ambient impacts from the 20F4B engines are at least two times greater than those predicted for the 20E4 engines at all downwind locations. Copies of the SCREEN3 modeling analyses for each engine type are provided in Attachment G.

***EPA Comment No. 5*** - EPA noted that rural dispersion coefficients were used in the modeling analysis. EPA also commented that since the area surrounding the facilities is a mix of residential, commercial, and light industry, EPA's guidance procedure should be used to determine whether rural or urban dispersion coefficients should be used.

***Response*** - The area surrounding the facilities is not of a high-rise nature and the area to the east of the facility is open water. The rural dispersion option was originally proposed in the dispersion modeling protocol that was submitted to FDEP for review and approval (see Attachment B of the application). Confirmation of this approach was obtained from FDEP. It is also noted that the use of the rural dispersion option is generally more conservative that the urban option, typically resulting higher predicted concentrations.

***EPA Comment No. 6*** - EPA noted that there are conflicting statements in the application regarding the location of offsite receptors and suggests that some clarification is necessary.

***Response*** - There are offsite receptors within 100 meters of the 20F4B engines, and these receptors have been included in the modeling analysis. Polar grid-based receptors were included in the modeling analysis for offsite receptors with radii of 100 meters, 200 meters, 300 meters, and 400 meters; from the 20F4B engines.

***EPA Comment No. 7*** - EPA commented that the dispersion modeling assessment treated the Preston WTP and the Hialeah WTP as one common facility. The question was raised as to whether or not these two facilities should be treated as one plant for permitting purposes.

***Response*** - The Preston and Hialeah WTPs are both owned and operated by the Miami-Dade Water and Sewer Department. Only a city street separates them, and the modeling analysis included receptors located along this street. In addition, both facilities utilize lime produced at the Hialeah WTP, and both rely on power generated by the diesel engines at the Preston WTP. Furthermore, FDEP has indicated that these two facilities should to be viewed as a single combined facility for the purposes of all air permits.

***EPA Comment No. 8*** - EPA recommended that the Federal Land Manager (FLM) for the Everglades National Park Class I area be notified of this project and its anticipated impact.

***Response*** - It is our understanding that FDEP will make the appropriate notifications to the Federal Land Manager.

If you have any questions regarding this, please contact Ms. Bertha Goldenberg, P.E. at (305) 669-5711 or Mr. David Lindberg, P.E. of CH2M Hill at (619) 687-0110.

Sincerely,

Robert Ready, P.E.
Assistant Director of Treatment Facilities

RCR/RMO/DL/ro

Attachments

c: Isidore Goldman, P.E., FDEP Southeast District
Patrick Wong, P.E., Dade County DERM
David Lindberg, P.E., CH2M HILL
EPA
NPS
C. Holladay, BAR

**ATTACHMENT A**
FDEP and U.S. EPA Comments
Request for Additional Information Regarding Air Construction/Operation Permit Application
Project Number 0250281-006-AC, PSD-FL-248
John E. Preston Water Treatment Plant, Dade County

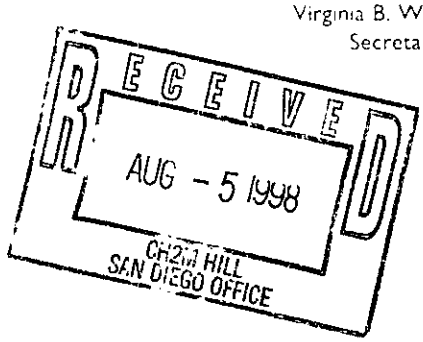
# Department of
# Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

July 29, 1998




Robert C. Ready, P.E.
Assistant Director of Treatment Facility
Miami-Dade Water & Sewer Department
4200 Salzedo Street
Coral Gables, FL 33146-0316

Re: Request for Additional Information Regarding Air Construction/Operation Permit Application
Project Number 0250281-006-AC, PSD-FL-248
John E. Preston Water Treatment Plant, Dade County

Dear Mr. Ready:

The Department has not received your response to the request for additional information dated May 11, 1998. It has been approximately 76 days since the Department requested this information which is required in order to continue processing your application. A copy of the request is enclosed, along with EPA's letter dated July 10, 1998, which was previously sent to you. The Department will consider EPA's comments in its permitting decisions. Feel free to provide your opinions regarding their comments.

If additional time is needed or if you should have any questions, please call Susan DeVore-Fillmore (engineer) or Cleve Holladay (meteorologist) at 850/921-9537 or 850/921-9530, respectively.

Sincerely,

7/29

A.A. Linero, P.E. Administrator
New Source Review Section

AAL/sdf

enclosures

cc: Mr. David E. Lindberg, P.E., CH2M HILL
Mr. Isidore Goldman, SED
Mr. Patrick Wong, DERM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960





4APT-ARB

Mr. Clair H. Fancy, P.E.
Chief
Bureau of Air Regulation
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

SUBJ: PSD Permit Application from Miami-Dade Water and Sewer Department, John E. Preston Water Treatment Plant, Hialeah, Florida (PSD-FL-248)

Dear Mr. Fancy:

Thank you for your letter of April 21, 1998, submitting an application for a Prevention of Significant Deterioration (PSD) permit for the above referenced facility. The application is for a proposal to increase the operation of six existing standby electricity generators to provide power generation capacity as needed to ensure uninterrupted plant operation. Two different models of generator sets exist at the Preston Water Treatment Plant (WTP): EMD Model 20-645E4 (20E4) and EMD Model 20-645F4B (20F4B). The 20E4 and 20F4B generator sets are rated to produce 2,500 and 2,865 kW of electric power at continuous full load operating conditions, respectively, and each is driven by a 3,600 brake-horsepower (bhp) (20E4) or 4,000 bhp (20F4B) diesel engine prime mover. There are three Model 20E4 generators and three Model 20F4B generators. The generators are capable of operating at load conditions ranging from 20 percent to 110 percent (peaking duty for durations not to exceed 2 hours). The engines burn transportation grade diesel fuel, which has a sulfur content of 0.05 weight percent, and all engines are 20-cylinder, 2-cycle, and turbo charged.

The application indicates that the total current allowable annual emissions of $NO_x$ from the Preston WTP are below the PSD major source level of 250 tpy. However, the increase in $NO_x$ emissions (i.e., 375 tpy) associated with the proposed operation of the standby generators constitutes a major source, requiring PSD review. The air quality impacts assessment is based on the production of 19,000,000 kW-hr of electricity, which corresponds with 6,630 hours of 20F4B operation per year at full load conditions, or 7,600 hours per year of 20E4 operation at full load conditions, or an equivalent combination. The proposed best available control technology (BACT) for the control of $NO_x$

emissions is the use of fuel injection timing retard and combustion air precooling to achieve an emission rate of 12.7 g/bhp-hr (a 28 percent reduction in $NO_x$ emissions).

The use of selective catalytic reduction (SCR) to achieve an emission rate of 2.6 g/bhp-hr was rejected in the Preston WTP application due to potential technical problems and the cost effectiveness of SCR. Potential problems addressed in the application include the presence of contaminants in diesel fuel such as sulfur, phosphorus, and ash, which can poison or mask the surface of the catalyst and reduce its activity. Fuel sulfur, which is oxidized to $SO_2$, may react with ammonia to form ammonium sulfate and ammonium bisulfate salts which can form a coating over the catalyst surface and reduce its effectiveness. The application also indicates that the standby generators will accommodate fluctuations in load, which may result in exhaust temperatures outside the range of optimum catalyst performance and result in either reduced $NO_x$ reduction efficiency or the release of unreacted ammonia. The cost effectiveness of using SCR was calculated to be $2,370/ton, versus a cost effectiveness of $212/ton with the use of combustion controls. The use of SCR would remove an additional 294 tpy of $NO_x$.

Based on our review of the application package, we have the following comments:

1. As indicated in the application, SCR has been applied at similar facilities in Philadelphia, PA (Philadelphia SW Water Treatment Plant and Philadelphia NE Water Treatment Plant) for the control of $NO_x$ emissions from diesel-fired internal combustion (IC) engines. Although the Preston WTP application has discussed potential problems which may be associated with the use of SCR, the application does not address any operational differences between the Preston WTP and the facilities in Philadelphia to indicate why SCR would not be feasible for the Preston WTP. To validate the claim that SCR is not technically feasible for the Preston WTP, the application should address any significant differences with the facilities in Philadelphia and should discuss any operational problems which may have been experienced with SCR at the Philadelphia facilities. The application for the Preston WTP should also discuss the expected exhaust gas temperature from the IC engines at reduced loads and the amount of time the engines would be operated at reduced loads to address the concern about achieving an optimum temperature for SCR use. Although the application indicates that the estimated cost effectiveness of $2,370/ton is unreasonable, a cost effectiveness of this magnitude is typically considered to be acceptable for $NO_x$ reduction costs.

2. Although the application bases the potential emissions on a maximum annual power production rate of 19,000,000 kW-hr, the application does not account for emissions while the engines are being operated without producing power. The

application should describe the duration and frequency of operation of the engines while not producing power, and should include an estimate of the annual emission rates during such conditions. The total annual emissions should account for various modes of operation of the engines. Since the engines could be operated a considerable amount of time without producing power, the total annual $NO_x$ emissions allowed by the PSD permit will likely need to be restricted by a method other than a limit on the amount of electricity generated.

3. The PSD application provides emission factors at different loads for the Model 20F4B engines, but does not provide such data for the Model 20E4 engines. Emission factors (and their basis) also need to be provided in the permit application for the Model 20E4 engines. The PSD permit may need to include different BACT emission limits for the two models of engines, to reflect their achievable emission rates.

4. The modeled impact assessment used the 20FA4 generator to represent the two types of generators at the Preston WTP because the location of these generators are closer to the boundary fence line, and they have the largest emission rate. Other emission variables that affect the resultant concentrations are the location of the stacks relative to other buildings and the exit stack parameters (e.g., temperature, diameter, etc.). These other parameters should be considered in the selection to ensure the 20F4B generators produce the highest ground level concentrations.

5. Rural dispersion option was selected for the transport and dispersion calculations. Section 2.2 indicates the impact area as a mixture of residential, commercial, and light industrial - characteristics of urban areas. The guidance procedure for rural/urban classification should be used for this determination.

6. Section 6.3 indicates no offsite receptor located within 100 meters of the standby generators. Section 6.4 indicates the wake cavity region as being 26.5 meters from the stack with one receptor within Generator Building 2 wake zone. These are conflicting statements. If the latter condition is correct, SCREEN3 should be used to estimate the building cavity length and associated concentrations.

7. The modeled impact assessment has treated the Preston WTP and the Hialeah WTP as one common facility - no impact receptors were located on the adjacent Hialeah Water Treatment Plant. Although the Hialeah WTP is also owned by the Miami-Dade Water & Sewer Department, should these two facilities be considered one plant for permitting purposes?

8. The Federal Land Manager (FLM) for the Everglades National Park Class 1 area should be notified of this project and its anticipated impacts.

Thank you for the opportunity to review and comment on the application package. If you have any questions, please contact either Keith Goff or Stan Krivo at (404) 562-9137 or (404) 562-9123 respectively.

Sincerely yours,

Paul Traquair

R. Douglas Neeley
Chief
Air and Radiation Technology Branch
Air, Pesticides, and Toxics Management Division

cc: J. Kahn, BAR
R. Ready, JEP Water Treat. Plant
J. Bunyak, NPS
SED
Dade Co
D. Lindberg; CH2M Hill

# Department of Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

May 11, 1998

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Robert C. Ready, P.E.
Assistant Director of Treatment Facility
Miami-Dade Water & Sewer Department
4200 Salzedo Street
Coral Gables, FL 33146-0316

Re: Request for Additional Information Regarding Air Construction/Operation Permit Application
DRAFT Permit No. 0250281-006-AC, PSD-FL-248
John E. Preston Water Treatment Plant, Dade County

Dear Mr. Ready:

The Department has received your application for an air construction/operation permit for six diesel engine-driven generator sets at the John E. Preston Water Treatment Plant. The application was received on April 13, 1998. In order to continue processing your application, the Department will need the additional information below. Should your response to any of the below items require new calculations, please submit the new calculations, assumptions, reference material and appropriate revised pages of the application form.

1. Please provide a detailed cost analysis in terms of cost effectiveness (annualized dollars/tons reduced) based on the vendor information for the chosen control technology (Fuel Injection Timing Retard/Combustion Air Precooling) for $NO_x$ as well as Selective Catalytic Reduction (SCR) for both sets of generator sources.

2. Please indicate the times (duration) and frequency (i.e. twice per day, five days per week) of startup, shutdown and maintenance of the six diesel engine-driven generator sets, or any other time the engines are running, but do not produce power.

3. Please provide fuel usage information, including the heat input rate (MMBtu/hr) for each diesel generator and indicate the method of compliance for that heat input rate. Also, explain why fuel limitations are not proposed. Please provide emission rate calculations for $NO_x$ in units of lb/MMBtu and compare with emission limits of $NO_x$ RACT, Rule 62-296.570(4), F.A.C.

4. Please verify that the g/bhp-hr factor used for the chosen control technology at 100% load is 17.62 for $NO_x$ for both sets of generator sources. Provide the factor as well as emission rates for $NO_x$ if SCR is selected as the control technology. Also, provide the engine brake horsepower (bhp) curve for both sets of generator sources. Does the emission (g/bhp-hr) factor vary with engine speed or other operating factors? If so, please provide the different emission factors, including at 110% load.

5. Table 3-1 provides a comparison of proposed annual emissions with PSD significant emission rates for the EMD Model 20F4B standby generators. Please provide the supporting calculations for each proposed annual emission. Also, provide the same information for the EMD Model 20E4 standby generators.

6. Please indicate if the diesel generators will be able to comply with the requirements of Rule 62-297.310(6), F.A.C. If not, how will testing be conducted to show compliance with the $NO_X$ emission limit?

7. Have you considered other options towards reducing $NO_X$, such as alternative fuels, duel fuel firing, or engine retrofit kits? If so, please provide a summary, or why not?

8. Please provide a detailed map showing the location of all of the fenceline receptors used in the air quality impact analysis. These receptor locations should be shown in UTM coordinates since the UTM coordinate system is used in the modeling. In addition send us diskettes containing all of the air quality impact analysis modeling output files.

Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. As a result your response should be certified by a professional engineer registered in the State of Florida. A copy of your response should be sent to Isidore Goldman, DEP Southeast District and Patrick Wong, Dade County DERM.

If you should have any questions, please call Susan DeVore-Fillmore (engineer) or Cleve Holladay (meteorologist) [project engineer] at 850/921-9537 or 850/921-9530, respectively.

Sincerely,

A.A. Linero, P.E. Administrator
New Source Review Section

AAL/sdf

cc: Mr. Brian Beals, EPA
Mr. John Bunyak, NPS
Mr. David E. Lindberg, P.E., CH2M HILL
Mr. Isidore Goldman, SED
Mr. Patrick Wong, DERM

**ATTACHMENT B**
Revised FDEP Form 62-210.900 Pages
EMD 20-645E4 and 20-645F4B Engines
John E. Preston Water Treatment Plant, Dade County

4. Professional Engineer Statement :

*I, the undersigned, hereby certify, except as particularly noted herein*, that :*

*(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollutant control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and*

*(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.*

*If the purpose of this application is to obtain a Title V source air operation permit (check here [ ] if so), I further certify that each emissions unit described in this Application for Air Permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance schedule is submitted with this application.*

*If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [ X ] if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.*

*If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [ ] if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.*

Signature 1/26/99 (seal)

26 January 1999
Date

**Owner/Authorized Representative or Responsible Official**

1. Name and Title of Owner/Authorized Representative or Responsible Official :

Name : Robert Ready, P.E.
Title : Director of Treatment Facilities

2. Owner or Authorized Representative or Responsible Official Mailing Address :

Organization/Firm : Miami-Dade Water &Sewer Department
Street Address : 4200 Salzedo Street
City : Coral Gables
State : FL Zip Code : 33146-0316

3. Owner/Authorized Representative or Responsible Official Telephone Numbers :

Telephone : (305)669-7668 Fax : (305)669-3753

4. Owner/Authorized Representative or Responsible Official Statement :

*I, the undersigned, am the ~~owner or authorized representative* of the non-Title V source addressed in this Application for Air Permit or the~~ responsible official, as defined in Rule 62-210.200, F.A.C., of the Title V source addressed in this application, ~~whichever is applicable.~~ I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions units.*

R. Ready 1-29-99

Signature Date

* Attach letter of authorization if not currently on file.

**ATTACHMENT C**
Revised Cost Effectiveness Determination
EMD 20-645E4 and 20-645F4B Engines
John E. Preston Water Treatment Plant, Dade County

**PEERLESS MFG. CO.** FACSIMILE MESSAGE
2819 Walnut Hill Lane • Dallas, Texas 75229 • (214) 357-6181 • FAX: (214) 351-0194

**TO:** CH2MHILL
**ATTN:** Mr. David Lindberg
**FAX:** (619) 687-0111
**RE:** **SCR Pricing for Diesel Gen Sets**
**Your Reference: Miami - Dade County Water & Sewer**
**Peerless Reference: PMC-1967**

**DATE:** June 8, 1998
**PAGES:** One (1)
**CC:** PJB/TTS/PMC-1967

Dear Mr. Lindberg,

I apologize for the delay in getting you this information. We will need more detailed design dat to "firm up" our pricing and sizing.

Below is a table that summarizes the pricing for the various SCR systems. I do not have good estimates for installation, but I assume it to be between 20-35% of contract price.

| | Budget SCR Price (excluding tank) |
|---|---|
| Central District<br>20E4 (3) | $450K |
| Preston WTP<br>20E4 (3)<br>20F4B (3) | $450K<br>$550K |
| Orr WTP<br>20F4B (4) | $780K |

The budget (±20%) price includes catalyst, reactor (external insulation by others), Ammonia Flow Control Unit (AFCU), Ammonia Injection Grid (AIG). We will adjust sizing/pricing upon more detail design/information.

The preliminary size of the bigger reactors (20F4B) is approximately 36'w x 44'h x 12'd. This dimension does not include room for future catalyst. If you have any questions or need any additional information, please call.

Best Regards,

Tim T. Shippy
Sales Engineer
SCR Systems Division
**PEERLESS MFG. CO.**

J:\SCR\SALES\QUOTES\1968\CH26-8.FAX

**PEERLESS MFG. CO.** FACSIMILE MESSAGE
2819 Walnut Hill Lane • Dallas, Texas 75229 • (214) 357-6181 • FAX: (214) 351-0194

**TO:** CH2MHILL
**ATTN:** Mr. David Lindberg
**FAX:** (619) 687-0111
**RE:** **SCR Pricing for Diesel Gen Sets**
**Your Reference: Miami - Dade County Water & Sewer**
**Peerless Reference: PMC-1967**

**DATE:** September 24, 1997
**PAGES:** One (1)
**CC:** PJB/TTS/PMC-1967

Dear Mr. Lindberg,

Below is a table that summarizes the pricing for the various SCR systems. I do not have good estimates for installation, but I assume it to be between 20-35% of contract price.

| | Anhydrous Ammonia Consumption @ 100% Load (lbs/hr) - Estimate | Budget SCR Price per engine (excluding tank) | Price including $NH_3$ Storage Tanks & inst. and vaporizer |
|---|---|---|---|
| Central District<br>20E4<br>16G4A | <br>23 ea.<br>18 ea. | <br>$165K ea.<br>$150K ea. | 6 Systems<br>$1.1M |
| Preston WTP<br>20E4<br>20F4B | <br>23 ea.<br>48 ea. | <br>$165K ea.<br>$200K ea. | 6 Systems<br>$1.35M |
| Orr WTP<br>20F4B | <br>48 ea. | <br>$200K ea. | 4 Systems<br>$1M |

The budget (±20%) price includes catalyst, reactor (external insulation by others) with transition ducting, Ammonia Flow Control Unit (AFCU), Ammonia Injection Grid (AIG). Tanks are included in final column pricing. The tank is sized to hold about 15,000 gallons $H_2O$. It will feed all units. We will adjust sizing/pricing upon more detail design/information.

The preliminary size of the bigger reactors (20F4B) is approximately 9'w x 11'h x 12'd. This dimension does not include room for future catalyst. If you have any questions or need any additional information, please call.

Best Regards,

Tim T. Shippy
Sales Engineer
SCR Systems Division
**PEERLESS MFG. CO.**

J:\SCR\SALES\QUOTES\1998\CH2MHILL.FAX

**Table 1**
**Total Capital Cost Estimates**
**Preston WTP Standby Generators**
**Miami-Dade Water and Sewer Department**

| | Retarded Timing + Aftercoolers | SCR |
|---|---|---|
| **Direct costs** | | |
| Purchased equipment cost (PEC) | | |
| Control devices, auxilary equip, instrumentation[1,2] | $ 66,207 | $ 1,500,000 |
| Two Extractive NOx and O2 CEMS Systems[3] | $ - | $ 320,600 |
| Sales Taxes (3% of PEC) | $ 1,986 | $ 54,618 |
| Freight (5% of PEC) | $ 3,310 | $ 91,030 |
| Direct installation cost[4] | $ 29,793 | $ 675,000 |
| **Total direct cost** | **$ 101,297** | **$ 2,641,248** |
| **Indirect costs** | | |
| Indirect installation costs[5] | $ 21,848 | $ 495,000 |
| Contingencies[6] | $ 13,241 | $ 300,000 |
| **Total indirect cost** | **$ 35,090** | **$ 795,000** |
| **TOTAL CAPITAL COST** | **$ 136,386** | **$ 3,436,248** |

1 Includes catalyst, reactor (external installation by others) with transition ducting, ammonia flow control unit, ammonia injection grid, and a 15,000 gallon anhydrous ammonia tank.
2 20E4 SCR system ($450,000), 20F4B SCR system ($650,000), and two 15,000 gallon ammonia tanks ($200,000 each).
3 Estimate obtained from EPA CEMS Cost Manual, version 3.0 for extractive CEMS at an existing plant with NOx and O2 monitors ($148,300 each system) and fuel flow meters ($4,000 each engine).
4 Direct installation cost assumed equal to 45% of PEC, and includes foundation and supports, handling and erection, electrical, piping, insulation for ductwork, and painting.
5 Indirect installation cost assumed equal to 33% of PEC and include engineering, construction and field expenses, contractors fees, start-up costs, performance testing, model study, and technician training.
6 Contingency costs assumed equal to 20% of PEC and include equipment redesign and modifications, cost escalations, and delays in start-up.

**Table 2**
**Total Annual Cost Estimates**
**Preston WTP Standby Generators**
**Miami-Dade Water and Sewer Department**

| | Cost | Unit | Retarded Timing + Aftercoolers | SCR |
|---|---|---|---|---|
| **Total Operating Hours (all 3 engines)** | | | 9,236 | 9,236 |
| **Direct annual costs** | | | | |
| Utilities | | | | |
| Electricity @ 20 kW[1] | $ 0.06 | kW-hr | $ - | $ 11,084 |
| Diesel fuel[2] | $ 0.77 | gallon | $ (7,007) | $ 5,036 |
| Natural Gas | $ 0.40 | therm | $ - | $ - |
| Anhydrous ammonia @ 48 lb/hr each | $ 275.00 | ton | $ - | $ 60,960 |
| Operating labor | | | | |
| Operating labor[3] | $ 30.39 | hr | $ - | $ 66,369 |
| Supervising labor[4] | | | $ - | $ 9,955 |
| Maintenance[5] | | | $ 1,163 | $ 26,359 |
| CEM O&M | | | $ - | $ 14,800 |
| CEM Annual RATA | | | $ - | $ 12,000 |
| CEM Quarterly CGAs | | | $ - | $ 5,600 |
| CEM Recordkeeping | | | $ - | $ 10,600 |
| CEM Annual Review and Update | | | $ - | $ 10,200 |
| Annual compliance test (two engines) | | | $ 3,500 | $ - |
| Catalyst replacement[6] | | | $ - | $ 173,972 |
| Catalyst disposal[7] | $ 0.15 | lb | $ - | $ 728 |
| **Total direct annual costs** | | | **$ (2,344)** | **$ 407,663** |
| **Indirect annual costs** | | | | |
| Overhead[8] | | | $ 698 | $ 15,816 |
| Property tax[9] | | | $ 1,364 | $ 34,362 |
| Insurance[10] | | | $ 1,364 | $ 34,362 |
| Administrative charges[11] | | | $ 2,728 | $ 68,725 |
| Capital recovery[12] | 0.15582009 | | $ 21,252 | $ 535,436 |
| CEM Capital recovery | 0.15582 | | $ 1 | $ 46,600 |
| **Total indirect annual costs** | | | **$ 27,406** | **$ 735,302** |
| **TOTAL ANNUAL COST** | | | **$ 25,063** | **$ 1,142,965** |

1 Vaporizer and instrumentation electrical requirement, 6632 total hours of operation.
2 Anticipated change in fuel consumption,
hours of operation, and BSFC = 0.346 lb/bhp-hr.
3 Assumes 3 hrs per 8 hr shift for SCR (6 hrs/day). No labor for IR.
4 Supervisor labor is 15% of operator labor.
5 Maintenance costs are 10% of purchased equipment costs, prorated by the number of hours of operation.
6 Catalyst replacement every 8760 hours of operation per engine.
7 Assume catalyst density 100 lb/cf. Total weight = (6634/8760)(4 modules/engine)(1600 lb/module)
= 4,850 lb.
8 Overhead charge rate is 60% of maintenance costs.
9 Property tax is estimated to be 1% of total capital costs.
10 Insurance is estimated to be 1% of total capital costs.
11 Administrative costs are estimated to be 1% of total capital costs.
12 Capital recovery cost applied to add-on control technology only, and is calculated at an interest rate of 9% for a lifetime of 10 years.

**Table 3**
**Cost Effectiveness Comparison**
**Preston WTP Standby Generators**
**Miami-Dade Water and Sewer Department**

| | | Retarded Timing + Aftercoolers | SCR |
|---|---|---|---|
| **NOx Emissions** | | | |
| Uncontrolled | tons/yr | 514 | 514 |
| Control Efficiency | % | 28% | 85% |
| Reduction | tons/yr | 144 | 437 |
| Controlled | tons/yr | 370 | 77 |
| **Total annual cost** | $000/yr | $ 25.1 | $ 2,257 |
| **COST EFFECTIVENESS ($/ton NOx reduction)** | | **$ 174** | **$ 5,169** |

**Table 4**
**Controlled and Uncontrolled NOx Emissions**
**Preston WTP Standby Generators**
**Miami-Dade Water and Sewer Department**

| Control Technology | Reference | Uncontrolled Emissions | | | Controlled Emissions | | | |
|---|---|---|---|---|---|---|---|---|
| | | Factor (lb/MMBTU) | lb/hr | tons/yr | Efficiency | Factor (lb/MMBTU) | lb/hr | tons/yr |
| Retarded Timing + Aftercoolers | EMD | 5.72 | 155.6 | 514 | 28% | 4.12 | 112.0 | 370 |
| SCR | EMD | 5.72 | 155.6 | 514 | 85% | 0.86 | 23.3 | 77 |

1 Annual emissions based on 9,236 hrs/yr operation all generators at full load (1,300,000 gallons/yr).

| **20-645F4B** | | % Load | BSFC (lb/bhp-hr) | gal/hr |
|---|---|---|---|---|
| Prime Mover Power Output (bhp): | 4,000 | 100% | 0.346 | 197 |
| Generator Capacity (kW): | 2,865 | 75% | 0.352 | 150 |
| Total power output (bhp-hr): | 26,462,139 | 50% | 0.373 | 106 |
| Total power output (kW-hr): | 18,953,507 | 25% | 0.465 | 66 |
| Total fuel consumption (gallons): | 1,300,000 | | | |
| Total operation (hrs/yr): | 9,236 | | | |

**ATTACHMENT D**
Emissions Calculations
EMD 20-645E4 and 20-645F4B Engines
John E. Preston Water Treatment Plant, Dade County

**NOx Emissions Calculations**
**Hialeah and John E. Preston Water Treatment Plants**

**Project Emissions Summary**

| Source | NOx Emissions tons/yr | | lb/MMBTU | Monitoring Frequency | Proposed Limitation | Units |
|---|---|---|---|---|---|---|
| *Before Project* | | | | | | |
| 20E4 Generators | 0.0 | | | | | |
| 20F4B Generators | 0.0 | | | | | |
| Hialeah Lime Kiln | 29.1 | | 0.133 | monthly | n/a | |
| Preston WTP | 29.1 | Minor Source | | | | |
| PSD Threshold | 250.0 | | | | | |
| *After Project* | | | | | | |
| ***Scenario 1: all power generated by 20F4B engines*** | | | | | | |
| 20E4 Generators | 0.0 | | 2.15 | monthly | 0 | gallons (0.05 wt% sulfur) |
| 20F4B Generators | 369.7 | New Major PSD Source | 4.12 | monthly | 1,300,000 | gallons (0.05 wt% sulfur) |
| Hialeah Lime Kiln | 29.1 | | 0.13 | monthly | n/a | |
| Preston WTP | 398.9 | PSD Major Source | | | | |
| PSD Threshold | 250.0 | | | | | |
| ***Scenario 2: all power generated by 20E4 engines*** | | | | | | |
| 20E4 Generators | 193.2 | New Minor Source | 2.15 | monthly | 1,300,000 | gallons (0.05 wt% sulfur) |
| 20F4B Generators | 0.0 | | 4.12 | monthly | 0 | gallons (0.05 wt% sulfur) |
| Hialeah Lime Kiln | 29.1 | | 0.13 | monthly | n/a | |
| Preston WTP | 222.3 | Non-PSD Major Source | | | | |
| PSD Threshold | 250.0 | | | | | |

* lime kiln NOx emissions are assumed equal to 140 lb/mmcf, based on an AP-42, Table 1-4.2, natural gas external combustion (commercial/institutional).

**EMD Model 20-645E4**
**John E. Preston Water Treatment Plant (3)**
**Miami-Dade Water and Sewer Department**

| | | 36 API Fuel Consumption | | | NOx Emissions (uncontrolled) | | | | NOx Emissions (controlled)[1] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| bhp | % load | lb/bhp-hr | lb/hr | MMBTU/hr | g/hr | lb/hr | lb/MMBTU | g/bhp-hr | g/hr | lb/hr | lb/MMBTU | g/bhp-hr |
| 3958 | 110% | 0.383 | 1516 | 29.7 | 40,052 | 88.2 | 2.97 | 10.12 | 28,837 | 63.5 | 2.14 | 7.29 |
| 3603 | 100% | 0.383 | 1380 | 27.1 | 36,716 | 80.9 | 2.99 | 10.19 | 26,436 | 58.2 | 2.15 | 7.34 |
| 2705 | 75% | 0.392 | 1060 | 20.8 | 23,589 | 52.0 | 2.50 | 8.72 | 16,984 | 37.4 | 1.80 | 6.28 |
| 1801 | 50% | 0.425 | 765 | 15.0 | 18,366 | 40.5 | 2.69 | 10.20 | 13,224 | 29.1 | 1.94 | 7.34 |
| 891 | 25% | 0.515 | 459 | 9.0 | 9,381 | 20.7 | 2.30 | 10.53 | 6,754 | 14.9 | 1.65 | 7.58 |

36 deg API 7.043 lb/gal
19620 BTU/lb (HHV)

1 NOx emissions reduction through combustion modifications (timing adjustment and turbocharger aftercoolers): 28%

**EMD Model 20-645E4**
**Fuel Use and NOx Emissions Calculations**
**John E. Preston Water Treatment Plant (3)**

| Engine Load | Fuel Consumption (lb/hr) | (gal/hr) | (MMBTU/hr) |
|---|---|---|---|
| 110 % load (3958 bhp) | 0.383 lb fuel/bhp-hr * 3958 bhp = 1,516 lb/hr | 1,516 lb/hr * gal 36-deg API/7.043 lb = 215.2 gal/hr | 1,516 lb/hr * 0.0196 MMBTU/lb = 29.7 MMBTU/hr |
| 100 % load (3603 bhp) | 0.383 lb fuel/bhp-hr * 3603 bhp = 1,380 lb/hr | 1,380 lb/hr * gal 36-deg API/7.043 lb = 195.9 gal/hr | 1,380 lb/hr * 0.0196 MMBTU/lb = 27.1 MMBTU/hr |
| 75 % load (2705 bhp) | 0.392 lb fuel/bhp-hr * 2705 bhp = 1,060 lb/hr | 1,060 lb/hr * gal 36-deg API/7.043 lb = 150.6 gal/hr | 1,060 lb/hr * 0.0196 MMBTU/lb = 20.8 MMBTU/hr |
| 50 % load (1801 bhp) | 0.425 lb fuel/bhp-hr * 1801 bhp = 765 lb/hr | 765 lb/hr * gal 36-deg API/7.043 lb = 108.7 gal/hr | 765 lb/hr * 0.0196 MMBTU/lb = 15.0 MMBTU/hr |
| 25 % load (891 bhp) | 0.515 lb fuel/bhp-hr * 891 bhp = 459 lb/hr | 459 lb/hr * gal 36-deg API/7.043 lb = 65.2 gal/hr | 459 lb/hr * 0.0196 MMBTU/lb = 9.0 MMBTU/hr |

| Engine Load | NOx Emissions - Uncontrolled (lb/MMBTU) | NOx Emissions - Controlled (lb/MMBTU) |
|---|---|---|
| 110 % load (3958 bhp) | 10.12 g/bhp-hr * 3958 bhp * lb/454g * hr/29.7 MMBTU = 2.97 lb/MMBTU | 7.29 g/bhp-hr * 3958 bhp * lb/454g * hr/29.7 MMBTU = 2.14 |
| 100 % load (3603 bhp) | 10.19 g/bhp-hr * 3603 bhp * lb/454g * hr/27.1 MMBTU = 2.99 lb/MMBTU | 7.34 g/bhp-hr * 3603 bhp * lb/454g * hr/27.1 MMBTU = 2.15 |
| 75 % load (2705 bhp) | 8.72 g/bhp-hr * 2705 bhp * lb/454g * hr/20.8 MMBTU = 2.50 lb/MMBTU | 6.28 g/bhp-hr * 2705 bhp * lb/454g * hr/20.8 MMBTU = 1.80 |
| 50 % load (1801 bhp) | 10.20 g/bhp-hr * 1801 bhp * lb/454g * hr/15.0 MMBTU = 2.69 lb/MMBTU | 7.34 g/bhp-hr * 1801 bhp * lb/454g * hr/15.0 MMBTU = 1.94 |
| 25 % load (891 bhp) | 10.53 g/bhp-hr * 891 bhp * lb/454g * hr/9.0 MMBTU = 2.30 lb/MMBTU | 7.58 g/bhp-hr * 891 bhp * lb/454g * hr/9.0 MMBTU = 1.65 lb |

| Engine Load | NOx Emissions Equivalent Hours of Operation |
|---|---|
| 110 % load (3958 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/29.7 MMBTU = 6,040 hrs/yr |
| 100 % load (3603 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/27.1 MMBTU = 6,635 hrs/yr |
| 75 % load (2705 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/20.8 MMBTU = 8,635 hrs/yr |
| 50 % load (1801 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/15.0 MMBTU = 11,962 hrs/yr |
| 25 % load (891 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/9.0 MMBTU = 26,277 hrs/yr - 3 engines @ 25% load operating continuous. |

| | (tons/yr) |
|---|---|
| @ 2.15 lb/MMBTU | 2.15 lb NOx/MMBTU * 0.0196 MMBTU/lb fuel * 7.043 lb/gal * 1300000 gal/yr = 193.2 tons NOx/yr |
| Annual Fuel Consumption | 1,300,000 gallons |

**EMD Model 20-645E4**
**Emissions Calculations - All Pollutants - Based on information provided by EMD**
**John E. Preston Water Treatment Plant (3)**

| | | |
|---|---|---|
| **CO** | | tons CO/yr = gal/yr * lb fuel/gal * MMBTU/lb fuel* lb CO/hr * hr/MMBTU * ton/2000 lb |
| 100 % load (3,603 bhp) | 4.05 lb CO/hr | tons CO/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 4.05lb CO/hr * hr/27.07MMBTU * ton/2000 lb = 13.4 tons CO/yr |
| 75 % load (2,705 bhp) | 2.50 lb CO/hr | tons CO/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 2.50lb CO/hr * hr/20.80MMBTU * ton/2000 lb = 10.8 tons CO/yr |
| 50 % load (1,801 bhp) | 2.34 lb CO/hr | tons CO/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 2.34lb CO/hr * hr/15.02MMBTU * ton/2000 lb = 14.0 tons CO/yr |
| 25 % load (891 bhp) | 2.85 lb CO/hr | tons CO/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 2.85lb CO/hr * hr/9.00MMBTU * ton/2000 lb = 28.4 tons CO/yr |
| **NOx (controlled)** | | tons NOx/yr = gal/yr * lb fuel/gal * MMBTU/lb fuel* lb NOx/MMBTU * ton/2000 lb |
| 100 % load (3,603 bhp) | 2.15 lb NOx/MMBTU | tons NOx/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 2.15lb NOx/MMBTU * ton/2000 lb = 193 tons NOx/yr |
| 75 % load (2,705 bhp) | 1.80 lb NOx/MMBTU | tons NOx/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 1.80lb NOx/MMBTU * ton/2000 lb = 162 tons NOx/yr |
| 50 % load (1,801 bhp) | 1.94 lb NOx/MMBTU | tons NOx/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 1.94lb NOx/MMBTU * ton/2000 lb = 174 tons NOx/yr |
| 25 % load (891 bhp) | 1.65 lb NOx/MMBTU | tons NOx/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 1.65lb NOx/MMBTU * ton/2000 lb = 148 tons NOx/yr |
| **SO2 (0.05 weight % fuel sulfur content)** | | tons SO2/yr = gal/yr * lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb |
| 100 % load (3,603 bhp) | 0.05 weight % S | tons SO2/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb = 4.6 tons SO2/yr |
| 75 % load (2,705 bhp) | 0.05 weight % S | tons SO2/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb = 4.6 tons SO2/yr |
| 50 % load (1,801 bhp) | 0.05 weight % S | tons SO2/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb = 4.6 tons SO2/yr |
| 25 % load (891 bhp) | 0.05 weight % S | tons SO2/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb = 4.6 tons SO2/yr |
| **PM-10 (controlled)** | | tons PM-10/yr = gal/yr * lb fuel/gal * MMBTU/lb fuel* lb PM-10/MMBTU * ton/2000 lb |
| 100 % load (3,603 bhp) | 0.057 lb PM-10/MMBTU | tons PM-10/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.057lb NOx/MMBTU * ton/2000 lb = 5.1 tons PM-10/yr |
| 75 % load (2,705 bhp) | 0.057 lb PM-10/MMBTU | tons PM-10/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.057lb NOx/MMBTU * ton/2000 lb = 5.1 tons PM-10/yr |
| 50 % load (1,801 bhp) | 0.057 lb PM-10/MMBTU | tons PM-10/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.057lb NOx/MMBTU * ton/2000 lb = 5.1 tons PM-10/yr |
| 25 % load (891 bhp) | 0.057 lb PM-10/MMBTU | tons PM-10/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.057lb NOx/MMBTU * ton/2000 lb = 5.1 tons PM-10/yr |
| **NMHC** | | tons NMHC/yr = gal/yr * lb fuel/gal * MMBTU/lb fuel* lb NMHC/MMBTU * ton/2000 lb |
| 100 % load (3,603 bhp) | 0.08 lb NMHC/MMBTU | tons NMHC/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.080lb NOx/MMBTU * ton/2000 lb = 7.2 tons NMHC/yr |
| 75 % load (2,705 bhp) | 0.08 lb NMHC/MMBTU | tons NMHC/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.080lb NOx/MMBTU * ton/2000 lb = 7.2 tons NMHC/yr |
| 50 % load (1,801 bhp) | 0.08 lb NMHC/MMBTU | tons NMHC/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.080lb NOx/MMBTU * ton/2000 lb = 7.2 tons NMHC/yr |
| 25 % load (891 bhp) | 0.08 lb NMHC/MMBTU | tons NMHC/yr = 1300000 gal/yr * 7.043lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.080lb NOx/MMBTU * ton/2000 lb = 7.2 tons NMHC/yr |

**EMD Model 20-645F4B**
**John E. Preston Water Treatment Plant (3)**
**Miami-Dade Water and Sewer Department**

| | | 36 API Fuel Consumption | | | NOx Emissions (uncontrolled) | | | | NOx Emissions (controlled)[1] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| bhp | % load | lb/bhp-hr | lb/hr | MMBTU/hr | g/hr | lb/hr | lb/MMBTU | g/bhp-hr | g/hr | lb/hr | lb/MMBTU | g/bhp-hr |
| 4398 | 110% | 0.346 | 1522 | 29.9 | 78,812 | 173.6 | 5.81 | 17.92 | 56,745 | 125.0 | 4.19 | 12.90 |
| 4008 | 100% | 0.346 | 1387 | 27.2 | 70,621 | 155.6 | 5.72 | 17.62 | 50,847 | 112.0 | 4.12 | 12.69 |
| 3001 | 75% | 0.352 | 1056 | 20.7 | 44,445 | 97.9 | 4.72 | 14.81 | 32,000 | 70.5 | 3.40 | 10.66 |
| 2000 | 50% | 0.373 | 746 | 14.6 | 27,140 | 59.8 | 4.08 | 13.57 | 19,541 | 43.0 | 2.94 | 9.77 |
| 999 | 25% | 0.465 | 465 | 9.1 | 14,705 | 32.4 | 3.55 | 14.72 | 10,588 | 23.3 | 2.56 | 10.60 |
| | *0%* | *0.346* | *0* | *0.0* | | | *4.12* | | | *80.7* | *2.97* | |

36 deg API 7.043 lb/gal
19620 BTU/lb (HHV)

1 NOx emissions reduction through combustion modifications (timing adjustment and turbocharger aftercoolers): 28%

**EMD Model 20-645F4B**
**Fuel Use and NOx Emissions Calculations**
**John E. Preston Water Treatment Plant (3)**

| Engine Load | Fuel Consumption (lb/hr) | (gal/hr) | (MMBTU/hr) |
|---|---|---|---|
| 110 % load (4398 bhp) | 0.346 lb fuel/bhp-hr * 4398 bhp = 1,522 lb/hr | 1,522 lb/hr * gal 36-deg API/7.043 lb = 216.1 gal/hr | 1,522 lb/hr * 0.0196 MMBTU/lb = 29.9 MMBTU/hr |
| 100 % load (4008 bhp) | 0.346 lb fuel/bhp-hr * 4008 bhp = 1,387 lb/hr | 1,387 lb/hr * gal 36-deg API/7.043 lb = 196.9 gal/hr | 1,387 lb/hr * 0.0196 MMBTU/lb = 27.2 MMBTU/hr |
| 75 % load (3001 bhp) | 0.352 lb fuel/bhp-hr * 3001 bhp = 1,056 lb/hr | 1,056 lb/hr * gal 36-deg API/7.043 lb = 150.0 gal/hr | 1,056 lb/hr * 0.0196 MMBTU/lb = 20.7 MMBTU/hr |
| 50 % load (2000 bhp) | 0.373 lb fuel/bhp-hr * 2000 bhp = 746 lb/hr | 746 lb/hr * gal 36-deg API/7.043 lb = 105.9 gal/hr | 746 lb/hr * 0.0196 MMBTU/lb = 14.6 MMBTU/hr |
| 25 % load (999 bhp) | 0.465 lb fuel/bhp-hr * 999 bhp = 465 lb/hr | 465 lb/hr * gal 36-deg API/7.043 lb = 66.0 gal/hr | 465 lb/hr * 0.0196 MMBTU/lb = 9.1 MMBTU/hr |

| Engine Load | NOx Emissions - Uncontrolled (lb/MMBTU) | NOx Emissions - Controlled (lb/MMBTU) |
|---|---|---|
| 110 % load (4398 bhp) | 17.92 g/bhp-hr * 4398 bhp * lb/454g * hr/29.9 MMBTU = 5.81 lb/MMBTU | 12.90 g/bhp-hr * 4398 bhp * lb/454g * hr/29.9 MMBTU = 4.1 |
| 100 % load (4008 bhp) | 17.62 g/bhp-hr * 4008 bhp * lb/454g * hr/27.2 MMBTU = 5.72 lb/MMBTU | 12.69 g/bhp-hr * 4008 bhp * lb/454g * hr/27.2 MMBTU = 4.1 |
| 75 % load (3001 bhp) | 14.81 g/bhp-hr * 3001 bhp * lb/454g * hr/20.7 MMBTU = 4.72 lb/MMBTU | 10.66 g/bhp-hr * 3001 bhp * lb/454g * hr/20.7 MMBTU = 3.4 |
| 50 % load (2000 bhp) | 13.57 g/bhp-hr * 2000 bhp * lb/454g * hr/14.6 MMBTU = 4.08 lb/MMBTU | 9.77 g/bhp-hr * 2000 bhp * lb/454g * hr/14.6 MMBTU = 2.94 |
| 25 % load (999 bhp) | 14.72 g/bhp-hr * 999 bhp * lb/454g * hr/9.1 MMBTU = 3.55 lb/MMBTU | 10.60 g/bhp-hr * 999 bhp * lb/454g * hr/9.1 MMBTU = 2.56 l |

| Engine Load | NOx Emissions Equivalent Hours of Operation |
|---|---|
| 110 % load (4398 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/29 9 MMBTU = 6,017 hrs/yr |
| 100 % load (4008 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/27.2 MMBTU = 6,602 hrs/yr |
| 75 % load (3001 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/20.7 MMBTU = 8,667 hrs/yr |
| 50 % load (2000 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/14.6 MMBTU = 12,273 hrs/yr |
| 25 % load (999 bhp) | 1300000 gal/yr * 7.043 lb/gal * 0.0196 MMBTU/lb * hr/9.1 MMBTU = 19,710 hrs/yr |

| | (tons/yr) |
|---|---|
| @ 4.12 lb/MMBTU | 4.12 lb NOx/MMBTU * 0.0196 MMBTU/lb fuel * 7.043 lb/gal * 1300000 gal/yr = 370 tons NOx/yr |
| Annual Fuel Consumption | 1,300,000 gallons |

**EMD Model 20-645F4B**
**Emissions Calculations - All Pollutants - Based on information provided by EMD**
**John E. Preston Water Treatment Plant (3)**

| | | |
|---|---|---|
| **CO** | | tons CO/yr = gal/yr * lb fuel/gal * MMBTU/lb fuel* lb CO/hr * hr/MMBTU * ton/2000 lb |
| 100 % load (4,008 bhp) | 2.47 lb CO/hr | tons CO/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 2.47 lb CO/hr * hr/27.21 MMBTU * ton/2000 lb = 8.2 tons CO/yr |
| 75 % load (3,001 bhp) | 1.98 lb CO/hr | tons CO/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 1.98 lb CO/hr * hr/20.73 MMBTU * ton/2000 lb = 8.6 tons CO/yr |
| 50 % load (2,000 bhp) | 1.41 lb CO/hr | tons CO/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 1.41 lb CO/hr * hr/14.64 MMBTU * ton/2000 lb = 8.7 tons CO/yr |
| 25 % load (999 bhp) | 1.94 lb CO/hr | tons CO/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 1.94 lb CO/hr * hr/9.11 MMBTU * ton/2000 lb = 19.1 tons CO/yr |
| **NOx (controlled)** | | tons NOx/yr = gal/yr * lb fuel/gal * MMBTU/lb fuel* lb NOx/MMBTU * ton/2000 lb |
| 100 % load (4,008 bhp) | 4.12 lb NOx/MMBTU | tons NOx/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 4.12 lb NOx/MMBTU * ton/2000 lb = 370 tons NOx/yr |
| 75 % load (3,001 bhp) | 3.40 lb NOx/MMBTU | tons NOx/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 3.40 lb NOx/MMBTU * ton/2000 lb = 305 tons NOx/yr |
| 50 % load (2,000 bhp) | 2.94 lb NOx/MMBTU | tons NOx/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 2.94 lb NOx/MMBTU * ton/2000 lb = 264 tons NOx/yr |
| 25 % load (999 bhp) | 2.56 lb NOx/MMBTU | tons NOx/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 2.56 lb NOx/MMBTU * ton/2000 lb = 230 tons NOx/yr |
| **SO2 (0.05 weight % fuel sulfur content)** | | tons SO2/yr = gal/yr * lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb |
| 100 % load (4,008 bhp) | 0.05 weight % S | tons SO2/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb = 4.6 tons SO2/yr |
| 75 % load (3,001 bhp) | 0.05 weight % S | tons SO2/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb = 4.6 tons SO2/yr |
| 50 % load (2,000 bhp) | 0.05 weight % S | tons SO2/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb = 4.6 tons SO2/yr |
| 25 % load (999 bhp) | 0.05 weight % S | tons SO2/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.0005 lb S/lb fuel * 2 lb SO2/lb S * ton/2000 lb = 4.6 tons SO2/yr |
| **PM-10 (controlled)** | | tons PM-10/yr = gal/yr * lb fuel/gal * MMBTU/lb fuel* lb PM-10/MMBTU * ton/2000 lb |
| 100 % load (4,008 bhp) | 0.057 lb PM-10/MMBTU | tons PM-10/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.06 lb PM-10/MMBTU * ton/2000 lb = 5.1 tons PM-10/yr |
| 75 % load (3,001 bhp) | 0.057 lb PM-10/MMBTU | tons PM-10/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.06 lb PM-10/MMBTU * ton/2000 lb = 5.1 tons PM-10/yr |
| 50 % load (2,000 bhp) | 0.057 lb PM-10/MMBTU | tons PM-10/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.06 lb PM-10/MMBTU * ton/2000 lb = 5.1 tons PM-10/yr |
| 25 % load (999 bhp) | 0.057 lb PM-10/MMBTU | tons PM-10/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.06 lb PM-10/MMBTU * ton/2000 lb = 5.1 tons PM-10/yr |
| **NMHC** | | tons NMHC/yr = gal/yr * lb fuel/gal * MMBTU/lb fuel* lb NMHC/MMBTU * ton/2000 lb |
| 100 % load (4,008 bhp) | 0.08 lb NMHC/MMBTU | tons NMHC/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.08 lb NMHC/MMBTU * ton/2000 lb = 7.2 tons NMHC/yr |
| 75 % load (3,001 bhp) | 0.08 lb NMHC/MMBTU | tons NMHC/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.08 lb NMHC/MMBTU * ton/2000 lb = 7.2 tons NMHC/yr |
| 50 % load (2,000 bhp) | 0.08 lb NMHC/MMBTU | tons NMHC/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.08 lb NMHC/MMBTU * ton/2000 lb = 7.2 tons NMHC/yr |
| 25 % load (999 bhp) | 0.08 lb NMHC/MMBTU | tons NMHC/yr = 1300000 gal/yr * 7.043 lb fuel/gal * 0.01962 MMBTU/lb fuel * 0.08 lb NMHC/MMBTU * ton/2000 lb = 7.2 tons NMHC/yr |

**ATTACHMENT E**
Engine Population NOx Emissions Reduction Alternatives
Information Provided by Engine Systems, Inc.
All Engines, All Plants

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMISSIONS REDUCTIONS ALT. #1

| ENGINE MODEL (# OF ENGINES) | BASIC NOX EMISSIONS (*TONS) | 20% NOX REDUCTION (TONS) | REVISED NOX EMISSIONS (TONS) | REVISED OPERATING HOURS | ESTIMATED COST |
|---|---|---|---|---|---|
| 20E4 (11) | 177.5 | 35.5 | 142 | | $ 56,100 |
| 20E4B (4) | 88.3 | 17.7 | 70.64 | | $ 20,400 |
| 20F4B (8) | 247.8 | 49.6 | 198.24 | | $ 40,800 |
| 16G4A (2) | 31.3 | 6.3 | 25.04 | | $ 10,380 |
| 12E4B (1) | 13.3 | 2.7 | 10.64 | | $ 3,600 |
| TOTAL (26) | 558.2 | 111.6 | 446.6 | 500 | $ 131,280 |
| | | | | | |
| *NOTE: BASED ON 400/YR OPERATION-FULL LOAD | | | | | |

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMISSIONS REDUCTIONS ALT. #1
NOTES

**ALL EMISSIONS FIGURES QUOTED ARE MINIMUM REDUCTIONS ANTICIPATED**

**REQUIRES**

**1) RETARDED INJECTOR TIMING 4 DEGREES NO MATERIAL REVISIONS**

**OPERATING IMPACT**

**1) INCREASED FUEL CONSUMPTION + 2 %**

**2) INCREASED PARTICULATE MATTER + 25 %**

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMISSIONS REDUCTIONS ALT.#2

| ENGINE MODEL (# OF ENGINES) | BASIC NOX EMISSIONS (*TONS) | 28% NOX REDUCTION (TONS) | REVISED NOX EMISSIONS (TONS) | REVISED OPERATING HOURS | ESTIMATED COST |
|---|---|---|---|---|---|
| 20E4 (11) | 177.5 | 49.7 | 127.8 | | $ 176,605 |
| 20E4B (4) | 88.3 | 24.7 | 63.6 | | $ 64,220 |
| 20F4B (8) | 247.8 | 69.4 | 178.4 | | $ 128,440 |
| 16G4A (2) | 31.3 | 8.8 | 22.5 | | $ 31,490 |
| 12E4B (1) | 13.3 | 3.7 | 9.6 | | $ 15,650 |
| TOTAL (26) | 558.2 | 156.3 | 401.9 | 556 | $ 416,405 |
| | | | | | |
| *NOTE: BASED ON 400/YR OPERATION-FULL LOAD | | | | | |

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMISSIONS REDUCTIONS ALT. 2
NOTES

ALL EMISSIONS FIGURES QUOTED ARE MINIMUM REDUCTIONS ANTICIPATED

REQUIRES

1) RETARDED INJECTOR TIMING 4 DEGREES
2) RETRO FIT OF 4-PASS AFTERCOOLERS

OPERATING IMPACT

1) REDUCED PARTICULATE MATTER 7 %

2) REDUCED FUEL CONSUMPTION .7 %

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMISSIONS REDUCTIONS ALT. #3

| ENGINE MODEL (# OF ENGINES) | BASIC NOX EMISSIONS (*TONS) | 36% NOX REDUCTION (TONS) | REVISED NOX EMISSIONS (TONS) | REVISED OPERATING HOURS | ESTIMATED COST |
|---|---|---|---|---|---|
| 20E4 (11) | 177.5 | 63.9 | 113.6 | | $ 423,280 |
| 20E4B (4) | 88.3 | 31.8 | 56.5 | | $ 153,920 |
| 20F4B (8) | 247.8 | 89.2 | 158.6 | | $ 307,840 |
| 16G4A (2) | 31.3 | 11.3 | 20.0 | | $ 77,620 |
| 12E4B (1) | 13.3 | 4.8 | 8.5 | | $ 38,070 |
| TOTAL (26) | 558.2 | 201.0 | 357.2 | 625 | $ 1,000,730 |
| | | | | | |
| *NOTE: BASED ON 400/YR OPERATION-FULL LOAD | | | | | |

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMISSSIONS REDUCTIONS ALT. #3
NOTES

ALL EMISSIONS FIGURES QUOTED ARE MINIMUM REDUCTIONS ANTICIPATED

REQUIRES

1) RETARDED INJECTOR TIMING 4 DEGREES
2) SEPERATE AFTERCOOLING OF AFTERCOOLER CIRCUIT
   CURRENT ASSUMPTION: MKW PROVIDES/INSTALLS PIPING & PUMP
   FROM FRONT OR REAR OF ENGINE
   TO HEAT EXCHANGER. DEPARTMENT PROVIDES PIPING
   FROM HEAT EXCHANGER TO WATER SOURCE

OPERATING IMPACT

1) REDUCED FUEL CONSUMPTION 1.2 %
2) REDUCED PARTICULATE MATTER 4 %

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMISSIONS REDUCTION ALT. #4

| ENGINE MODEL (# OF ENGINES) | BASIC NOX EMISSIONS (*TONS) | 50% NOX REDUCTION (TONS) | REVISED NOX EMISSIONS (TONS) | REVISED OPERATING HOURS | ESTIMATED COST |
|---|---|---|---|---|---|
| 20E4 (11) | 177.5 | 88.75 | 88.75 | | $ 3,167,340 |
| 20E4B (4) | 88.3 | 44.15 | 44.2 | | $ 948,560 |
| 20F4B (8) | 247.8 | 123.9 | 123.9 | | $ 515,120 |
| 16G4A (2) | 31.3 | 15.65 | 15.7 | | $ 298,000 |
| 12E4B (1) | 13.3 | 6.65 | 6.7 | | $ 152,670 |
| TOTAL (26) | 558.2 | 279.1 | 279.1 | 800 | $ 5,081,690 |
| | | | | | |
| *NOTE: BASED ON 400/YR OPERATION-FULL LOAD | | | | | |

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMISSIONS REDUCTION ALT. #4

ALL EMISSIONS FIGURES QUOTED ARE MINIMUM REDUCTIONS ANTICIPATED

REQUIRES

645 E ENGINES

1) ALL PREVIOUS MODIFICATIONS
2) HIGH COMPRESSION PISTON & HUB LINERS
3) CBOI INJECTORS
4) 17.9:1 TURBOCHARGERS ( IF NOT SO EQUIPPED)
5) RETARDED ENGINE TIMING

645E4B ENGINES

1) ALL PREVIOUS MODIFICATIONS
2) HIGH COMPRESSION PISTON & HUB LINERS
3) CBOI INJECTORS
5) RETARDED ENGINE TIMING

645 FB ENGINES

1) ALL PREVIOUS MODIFICATIONS
2) CBOI INJECTORS
3) RETARDED ENGINE TIMING

710 ENGINES

1) SEPARATELY COOLED AFTERCOOLERS
2) EMD ENGINE EMDEC FUEL SYSTEM

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMMISSIONS REDUCTIONS ALT. #5

| ENGINE MODEL (# OF ENGINES) | BASIC NOX EMISSIONS (*TONS) | 70% NOX REDUCTION (TONS) | REVISED NOX EMISSIONS (TONS) | REVISED OPERATING HOURS | ESTIMATED COST |
|---|---|---|---|---|---|
| 20E4 (11) | 177.5 | 124.25 | 53.25 | | $ 4,712,895 |
| 20E4B (4) | 88.3 | 61.8 | 26.5 | | $ 1,713,780 |
| 20F4B (8) | 247.8 | 173.5 | 74.3 | | $ 3,585,960 |
| 16G4A (2) | 31.3 | 15.65 | 15.7 | | |
| 12E4B (1) | 13.3 | 9.3 | 4.0 | | $ 360,530 |
| TOTAL (26) | 558.2 | 384.5 | 173.7 | 1445 | $ 10,373,165 |
| | | | | | |
| *NOTE: BASED ON 400/YR OPERATION-FULL LOAD | | | | | |

MIAMI DADE WATER SEWER
ENGINE POPULATION Nox EMISSIONS REDUCTIONS ALT #5
NOTES

ALL EMISSIONS FIGURES QUOTED ARE MINIMUM REDUCTIONS ANTICIPATED

REQUIRES

1) ALL 645 SERIES ENGINES BE RETROFITTED WITH ECI
DUAL FUEL CONVERSION KIT

CONVERSION KIT NOT CURRENTLY AVAILABLE FOR SERIES 710 ENGINE
UNDER DEVELOPMENT WITH EMD ASSISTANCE

OPERATING IMPACT

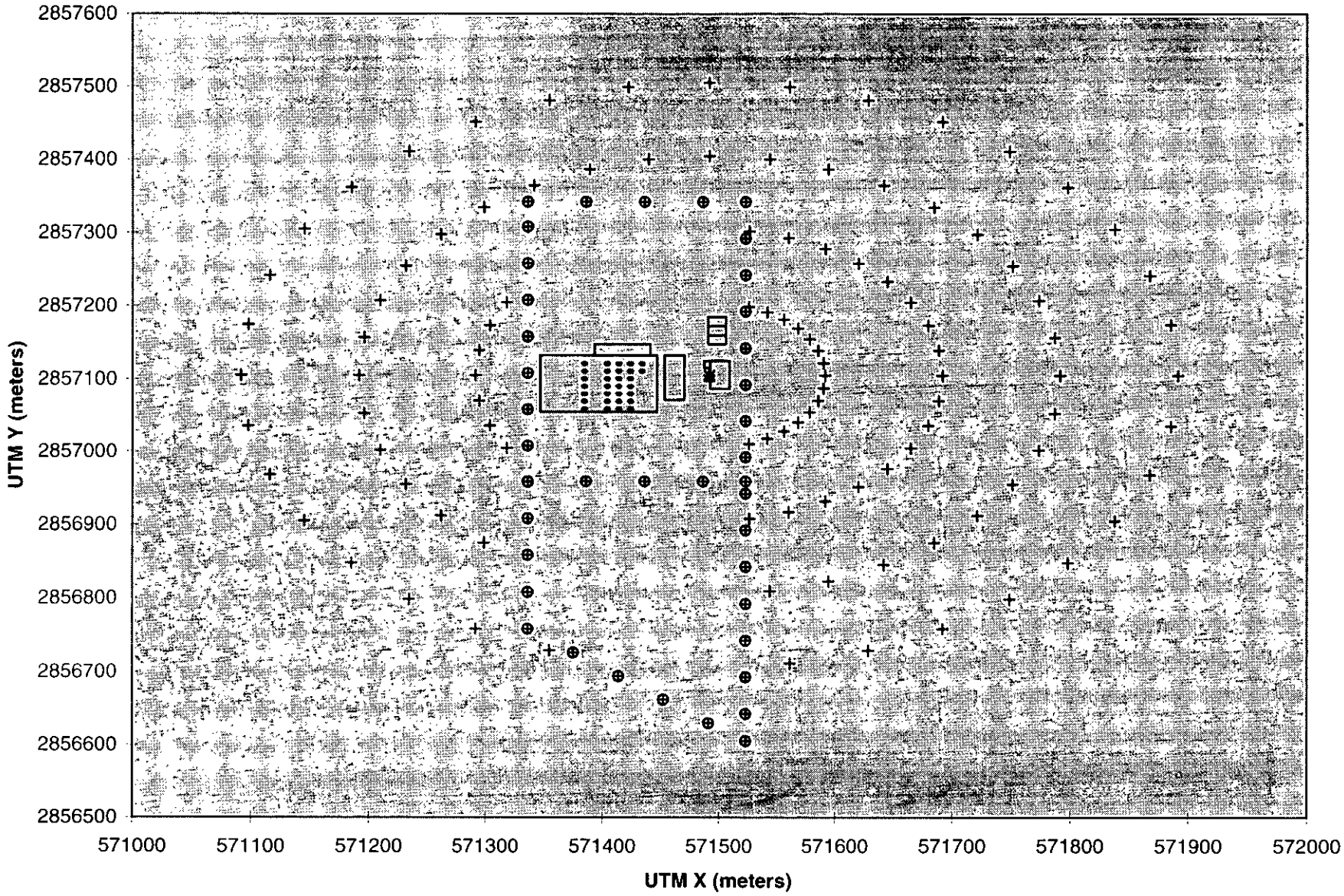
1) MAJOR INCREASE IN TIMES BETWEEN OVERHAULS

2)LOWER FUEL COSTSi GAS VERSUS DIESEL FUEL

3) LESS FREQUENT OIL CHANGES

**ATTACHMENT F**
Preston ISCST3 Receptor Locations Superimposed onto USGS Map of Hialeah Quadrangle
Close-up Printout of ISCST3 Receptor Locations at Preston WTP
John E. Preston Water Treatment Plant, Dade County

ISC Modeling Receptor Locations
John E. Preston WTP




hppsdno2 Chart8

**ATTACHMENT G**
Average 20F4B Operating Loads – 1998
EMD 20-645E4 and 20-645F4B Engines
John E. Preston Water Treatment Plant, Dade County

**John E. Preston WTP**
**Power Production Summary**
**Miami-Dade Water and Sewer Department**

| Date | 20F4B Operating Hours: Gen #4: EMD 20F4B | Gen #5: EMD 20F4B | Gen #6: EMD 20F4B | TOTAL | 4, 5, & 6 (kW-hr) | 20F4B Avg Load: (kW) | % | Total Fuel Consumption (gal) |
|---|---|---|---|---|---|---|---|---|
| **1996** | **294** | **328** | **253** | **875** | **902,420** | **1,031** | **41%** | **674,969** |
| **1997** | **1,116** | **1,123** | **1,159** | **3,398** | **3,495,000** | **1,029** | **40%** | **1,442,229** |
| Dec-97 | | | | 0 | | #DIV/0! | #DIV/0! | 0 |
| Jan-98 | 47 | 69 | 78 | 194 | 192,000 | 990 | 39% | 51,180 |
| Feb-98 | 81 | 55 | 73 | 209 | 216,000 | 1,033 | 41% | 78,877 |
| Mar-98 | 39 | 46 | 43 | 128 | 120,000 | 938 | 37% | 39,087 |
| Apr-98 | 12 | 19 | 11 | 42 | 24,000 | 571 | 22% | 13,497 |
| May-98 | 35 | 46 | 46 | 127 | 120,000 | 945 | 37% | 74,586 |
| Jun-98 | 83 | 83 | 83 | 249 | 312,000 | 1,253 | 49% | 78,434 |
| Jul-98 | 140 | 91 | 88 | 319 | 264,000 | 828 | 33% | 217,101 |
| Aug-98 | 186 | 244 | 254 | 684 | 672,000 | 982 | 39% | 79,733 |
| Sep-98 | 240 | 231 | 174 | 645 | 744,000 | 1,153 | 45% | 491,780 |
| Oct-98 | 18 | 24 | 11 | 53 | 24,000 | 453 | 18% | 15,864 |
| Nov-98 | 40 | 40 | 29 | 109 | 96,000 | 881 | 35% | 61,089 |
| **1998** | **921** | **948** | **890** | **2,759** | **2,784,000** | **1,009** | **40%** | **1,201,229** |

CH2MHILL SUBJECT 20E4 & 20F4B EXHAUST TEMPS, SCR CATALYST TEMP RANGE. BY D. LINDBERG SHEET NO. 1 of ____ DATE 9/3/98 PROJECT NO. 148

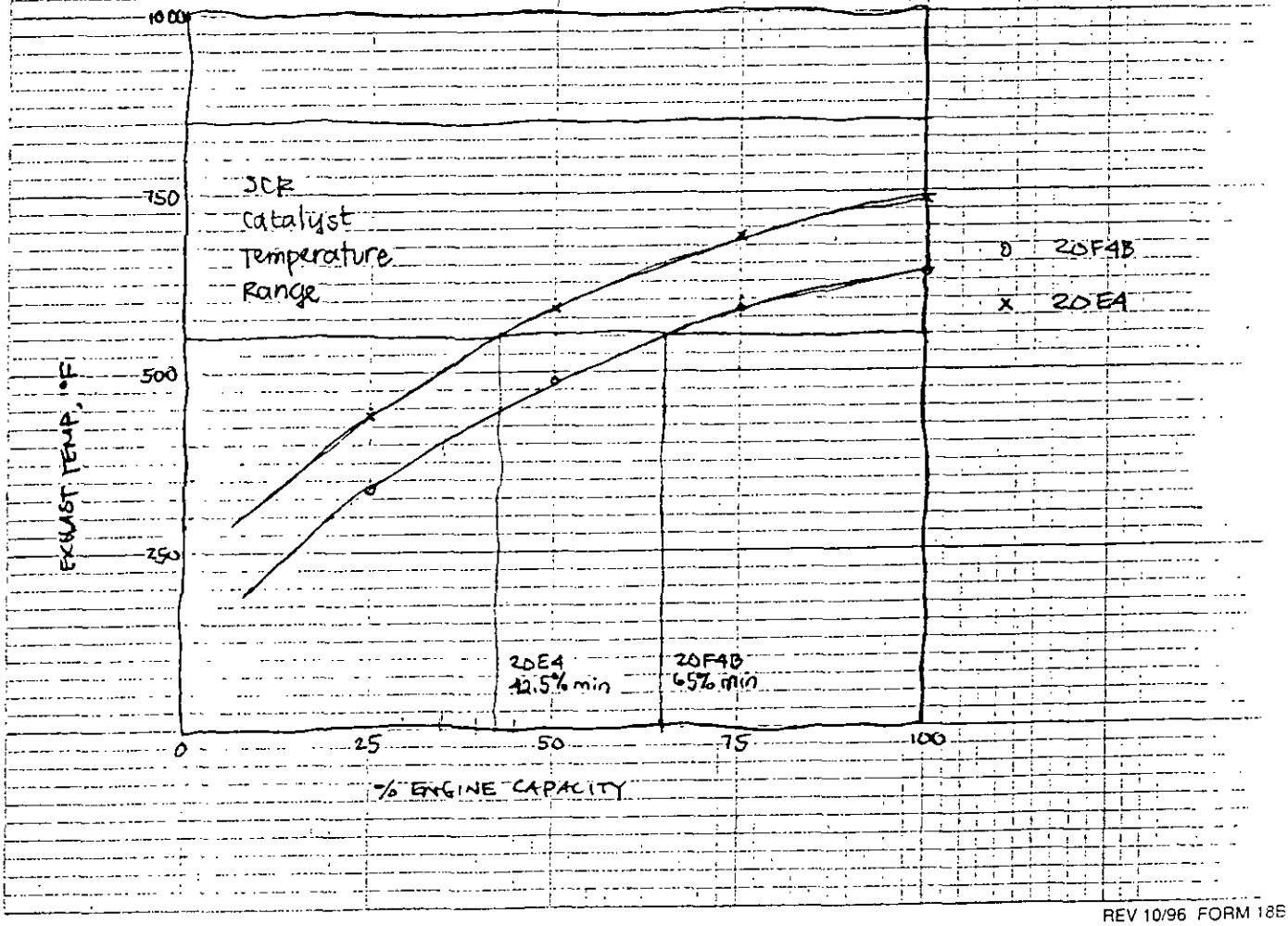
According to Mike Thiel, ESI, exhaust temps decrease with load as follows. EMD did not provide written documentation...

## 20F4B EXHAUST TEMPS

| | | | |
|---|---|---|---|
| 100% load | 635°F | | from EMD (verbal) |
| 75% load | 635°F | − 50°F ≅ | 585°F |
| 50% load | 635°F | − 150°F ≅ | 485°F |
| 25% load | 635°F | − 300°F ≅ | 335°F |

## 20E4 EXHAUST TEMPS

| | | | |
|---|---|---|---|
| 100% load | 735°F | | |
| 75% load | 735°F | − 50°F ≅ | 685°F |
| 50% load | 735°F | − 150°F ≅ | 585°F |
| 25% load | 735°F | − 300°F ≅ | 435°F |



**ATTACHMENT H**
SCREEN3 Results
All Emissions from 20E4 Engines vs. All Emissions from 20F4B Engines
John E. Preston Water Treatment Plant, Dade County

09/03/98
12:20:52

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

Preston WTP 20F4B Gens

SIMPLE TERRAIN INPUTS:

| | | |
|---|---|---|
| SOURCE TYPE | = | POINT |
| EMISSION RATE (G/S) | = | 19.5800 |
| STACK HEIGHT (M) | = | 8.8400 |
| STK INSIDE DIAM (M) | = | .5330 |
| STK EXIT VELOCITY (M/S) | = | 45.1593 |
| STK GAS EXIT TEMP (K) | = | 608.0000 |
| AMBIENT AIR TEMP (K) | = | 293.0000 |
| RECEPTOR HEIGHT (M) | = | .0000 |
| URBAN/RURAL OPTION | = | RURAL |
| BUILDING HEIGHT (M) | = | 8.8400 |
| MIN HORIZ BLDG DIM (M) | = | 17.2200 |
| MAX HORIZ BLDG DIM (M) | = | 38.8000 |

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 21350.000 (ACFM)

BUOY. FLUX = 16.295 M**4/S**3; MOM. FLUX = 69.800 M**4/S**2.

*** FULL METEOROLOGY ***

**********
*** SCREEN AUTOMATED DISTANCES ***
**********

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

| DIST (M) | CONC (UG/M**3) | STAB | U10M (M/S) | USTK (M/S) | MIX HT (M) | PLUME HT (M) | SIGMA Y (M) | SIGMA Z (M) | DWASH |
|---|---|---|---|---|---|---|---|---|---|
| 30. | 6766. | 4 | 15.0 | 15.0 | 4800.0 | 8.97 | 2.68 | 5.21 | SS |
| 100. | 3989. | 4 | 10.0 | 10.0 | 3200.0 | 10.58 | 8.20 | 8.08 | SS |
| 200. | 1666. | 4 | 10.0 | 10.0 | 3200.0 | 14.04 | 15.56 | 11.70 | SS |
| 300. | 961.9 | 4 | 10.0 | 10.0 | 3200.0 | 16.99 | 22.61 | 14.71 | SS |
| 400. | 754.0 | 4 | 10.0 | 10.0 | 3200.0 | 16.99 | 29.45 | 17.76 | SS |
| 500. | 599.2 | 4 | 8.0 | 8.0 | 2560.0 | 21.69 | 36.15 | 20.17 | SS |

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 30. M:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 30. | 6766. | 4 | 15.0 | 15.0 | 4800.0 | 8.97 | 2.68 | 5.21 | SS |

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

```
**********************************
*** SCREEN DISCRETE DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
```

| DIST (M) | CONC (UG/M**3) | STAB | U10M (M/S) | USTK (M/S) | MIX HT (M) | PLUME HT (M) | SIGMA Y (M) | SIGMA Z (M) | DWASH |
|---|---|---|---|---|---|---|---|---|---|
| 40. | 6507. | 4 | 10.0 | 10.0 | 3200.0 | 9.36 | 3.50 | 5.11 | SS |
| 50. | 6373. | 4 | 10.0 | 10.0 | 3200.0 | 9.36 | 4.31 | 5.59 | SS |
| 60. | 5872. | 4 | 10.0 | 10.0 | 3200.0 | 9.53 | 5.11 | 6.08 | SS |
| 70. | 5331. | 4 | 10.0 | 10.0 | 3200.0 | 9.76 | 5.89 | 6.56 | SS |
| 80. | 4829. | 4 | 10.0 | 10.0 | 3200.0 | 10.01 | 6.67 | 7.04 | SS |
| 90. | 4459. | 4 | 10.0 | 10.0 | 3200.0 | 10.29 | 7.44 | 7.71 | SS |
| 125. | 3090. | 4 | 10.0 | 10.0 | 3200.0 | 11.38 | 10.08 | 9.00 | SS |
| 150. | 2460. | 4 | 10.0 | 10.0 | 3200.0 | 12.23 | 11.93 | 9.91 | SS |
| 175. | 2005. | 4 | 10.0 | 10.0 | 3200.0 | 13.13 | 13.76 | 10.81 | SS |

```
 DWASH=   MEANS NO CALC MADE (CONC = 0.0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)      =    .0000        CONC (UG/M**3)      =    .0000
  CRIT WS @10M (M/S)  =   99.99        CRIT WS @10M (M/S)  =   99.99
  CRIT WS @ HS (M/S)  =   99.99        CRIT WS @ HS (M/S)  =   99.99
  DILUTION WS (M/S)   =   99.99        DILUTION WS (M/S)   =   99.99
  CAVITY HT (M)       =    9.96        CAVITY HT (M)       =    8.89
  CAVITY LENGTH (M)   =   26.42        CAVITY LENGTH (M)   =   20.27
  ALONGWIND DIM (M)   =   17.22        ALONGWIND DIM (M)   =   38.80

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

     ****************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ****************************************
```

| CALCULATION PROCEDURE | MAX CONC (UG/M**3) | DIST TO MAX (M) | TERRAIN HT (M) |
|---|---|---|---|
| SIMPLE TERRAIN | 6766. | 30. | 0. |

```
**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```

```
Preston WTP 20F4B Gens
P
   19.5800
   8.84000
   .533000
VF=21350
   608.000
   293.000
   .000000
R
y
   8.84000
   17.2200
   38.8000
n
n
           1
y
    30.00,  500.00
y
       40.000000
       50.000000
       60.000000
       70.000000
       80.000000
       90.000000
      125.000000
      150.000000
      175.000000
    0.000000E+00
y
```

09/03/98
12:29:25

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

Preston WTP 20E4 Gens

SIMPLE TERRAIN INPUTS:

| | | |
|---|---|---|
| SOURCE TYPE | = | POINT |
| EMISSION RATE (G/S) | = | 10.1900 |
| STACK HEIGHT (M) | = | 8.1500 |
| STK INSIDE DIAM (M) | = | .4060 |
| STK EXIT VELOCITY (M/S) | = | 83.8455 |
| STK GAS EXIT TEMP (K) | = | 663.0000 |
| AMBIENT AIR TEMP (K) | = | 293.0000 |
| RECEPTOR HEIGHT (M) | = | .0000 |
| URBAN/RURAL OPTION | = | RURAL |
| BUILDING HEIGHT (M) | = | 8.1500 |
| MIN HORIZ BLDG DIM (M) | = | 16.7600 |
| MAX HORIZ BLDG DIM (M) | = | 45.7200 |

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 23000.000 (ACFM)

BUOY. FLUX = 18.909 M**4/S**3; MOM. FLUX = 128.028 M**4/S**2.

*** FULL METEOROLOGY ***

**********
*** SCREEN AUTOMATED DISTANCES ***
**********

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

| DIST (M) | CONC (UG/M**3) | STAB | U10M (M/S) | USTK (M/S) | MIX HT (M) | PLUME HT (M) | SIGMA Y (M) | SIGMA Z (M) | DWASH |
|---|---|---|---|---|---|---|---|---|---|
| 65. | 2316. | 4 | 15.0 | 15.0 | 4800.0 | 8.64 | 5.50 | 5.98 | SS |
| 100. | 1741. | 4 | 15.0 | 15.0 | 4800.0 | 8.94 | 8.20 | 7.64 | SS |
| 200. | 780.3 | 4 | 15.0 | 15.0 | 4800.0 | 10.78 | 15.56 | 11.28 | SS |
| 300. | 442.8 | 4 | 15.0 | 15.0 | 4800.0 | 12.98 | 22.61 | 14.33 | SS |
| 400. | 317.1 | 4 | 15.0 | 15.0 | 4800.0 | 13.16 | 29.45 | 17.39 | SS |
| 500. | 268.8 | 4 | 10.0 | 10.0 | 3200.0 | 20.22 | 36.15 | 19.42 | SS |

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 65. M:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 65. | 2316. | 4 | 15.0 | 15.0 | 4800.0 | 8.64 | 5.50 | 5.98 | SS |

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

```
Preston WTP 20E4 Gens
P
   10.1900
   8.15000
   .406000
VF=23000
   663.000
   293.000
   .000000
R
y
   8.15000
   16.7600
   45.7200
n
n
           1
y
    65.00,  500.00
y
       70.000000
       80.000000
       90.000000
      125.000000
      150.000000
      175.000000
    0.000000E+00
y
```

# Department of Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

July 29, 1998

Robert C. Ready, P.E.
Assistant Director of Treatment Facility
Miami-Dade Water & Sewer Department
4200 Salzedo Street
Coral Gables, FL 33146-0316

Re: Request for Additional Information Regarding Air Construction/Operation Permit Application
Project Number 0250281-006-AC, PSD-FL-248
John E. Preston Water Treatment Plant, Dade County

Dear Mr. Ready:

The Department has not received your response to the request for additional information dated May 11, 1998. It has been approximately 76 days since the Department requested this information which is required in order to continue processing your application. A copy of the request is enclosed, along with EPA's letter dated July 10, 1998, which was previously sent to you. The Department will consider EPA's comments in its permitting decisions. Feel free to provide your opinions regarding their comments.

If additional time is needed or if you should have any questions, please call Susan DeVore-Fillmore (engineer) or Cleve Holladay (meteorologist) at 850/921-9537 or 850/921-9530, respectively.

Sincerely,

A.A. Linero, P.E. Administrator
New Source Review Section

AAL/sdf

enclosures

cc: Mr. David E. Lindberg, P.E., CH2M HILL
Mr. Isidore Goldman, SED
Mr. Patrick Wong, DERM

# Department of Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

May 11, 1998

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Robert C. Ready, P.E.
Assistant Director of Treatment Facility
Miami-Dade Water & Sewer Department
4200 Salzedo Street
Coral Gables, FL 33146-0316

Re: Request for Additional Information Regarding Air Construction/Operation Permit Application
DRAFT Permit No. 0250281-006-AC, PSD-FL-248
John E. Preston Water Treatment Plant, Dade County

Dear Mr. Ready:

The Department has received your application for an air construction/operation permit for six diesel engine-driven generator sets at the John E. Preston Water Treatment Plant. The application was received on April 13, 1998. In order to continue processing your application, the Department will need the additional information below. Should your response to any of the below items require new calculations, please submit the new calculations, assumptions, reference material and appropriate revised pages of the application form.

1. Please provide a detailed cost analysis in terms of cost effectiveness (annualized dollars/tons reduced) based on the vendor information for the chosen control technology (Fuel Injection Timing Retard/Combustion Air Precooling) for $NO_X$ as well as Selective Catalytic Reduction (SCR) for both sets of generator sources.

2. Please indicate the times (duration) and frequency (i.e. twice per day, five days per week) of startup, shutdown and maintenance of the six diesel engine-driven generator sets, or any other time the engines are running, but do not produce power.

3. Please provide fuel usage information, including the heat input rate (MMBtu/hr) for each diesel generator and indicate the method of compliance for that heat input rate. Also, explain why fuel limitations are not proposed. Please provide emission rate calculations for $NO_X$ in units of lb/MMBtu and compare with emission limits of $NO_X$ RACT, Rule 62-296.570(4), F.A.C.

4. Please verify that the g/bhp-hr factor used for the chosen control technology at 100% load is 17.62 for $NO_X$ for both sets of generator sources. Provide the factor as well as emission rates for $NO_X$ if SCR is selected as the control technology. Also, provide the engine brake horsepower (bhp) curve for both sets of generator sources. Does the emission (g/bhp-hr) factor vary with engine speed or other operating factors? If so, please provide the different emission factors, including at 110% load.

5. Table 3-1 provides a comparison of proposed annual emissions with PSD significant emission rates for the EMD Model 20F4B standby generators. Please provide the supporting calculations for each proposed annual emission. Also, provide the same information for the EMD Model 20E4 standby generators.

6. Please indicate if the diesel generators will be able to comply with the requirements of Rule 62-297.310(6), F.A.C. If not, how will testing be conducted to show compliance with the $NO_X$ emission limit?

7. Have you considered other options towards reducing $NO_X$, such as alternative fuels, duel fuel firing, or engine retrofit kits? If so, please provide a summary, or why not?

8. Please provide a detailed map showing the location of all of the fenceline receptors used in the air quality impact analysis. These receptor locations should be shown in UTM coordinates since the UTM coordinate system is used in the modeling. In addition send us diskettes containing all of the air quality impact analysis modeling output files.

Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. As a result your response should be certified by a professional engineer registered in the State of Florida. A copy of your response should be sent to Isidore Goldman, DEP Southeast District and Patrick Wong, Dade County DERM.

If you should have any questions, please call Susan DeVore-Fillmore (engineer) or Cleve Holladay (meteorologist) [project engineer] at 850/921-9537 or 850/921-9530, respectively.

Sincerely,

A.A. Linero, P.E. Administrator
New Source Review Section

AAL/sdf

cc: Mr. Brian Beals, EPA
Mr. John Bunyak, NPS
Mr. David E. Lindberg, P.E., CH2M HILL
Mr. Isidore Goldman, SED
Mr. Patrick Wong, DERM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

RECEIVED
JUL 10 1998
JUL 17 1998
BUREAU OF
AIR REGULATION

4APT-ARB

Mr. Clair H. Fancy, P.E.
Chief
Bureau of Air Regulation
Florida Department of Environmental
Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

SUBJ: PSD Permit Application from Miami-Dade Water and Sewer Department, John E. Preston Water Treatment Plant, Hialeah, Florida (PSD-FL-248)

Dear Mr. Fancy:

Thank you for your letter of April 21, 1998, submitting an application for a Prevention of Significant Deterioration (PSD) permit for the above referenced facility. The application is for a proposal to increase the operation of six existing standby electricity generators to provide power generation capacity as needed to ensure uninterrupted plant operation. Two different models of generator sets exist at the Preston Water Treatment Plant (WTP): EMD Model 20-645E4 (20E4) and EMD Model 20-645F4B (20F4B). The 20E4 and 20F4B generator sets are rated to produce 2,500 and 2,865 kW of electric power at continuous full load operating conditions, respectively, and each is driven by a 3,600 brake-horsepower (bhp) (20E4) or 4,000 bhp (20F4B) diesel engine prime mover. There are three Model 20E4 generators and three Model 20F4B generators. The generators are capable of operating at load conditions ranging from 20 percent to 110 percent (peaking duty for durations not to exceed 2 hours). The engines burn transportation grade diesel fuel, which has a sulfur content of 0.05 weight percent, and all engines are 20-cylinder, 2-cycle, and turbo charged.

The application indicates that the total current allowable annual emissions of $NO_x$ from the Preston WTP are below the PSD major source level of 250 tpy. However, the increase in $NO_x$ emissions (i.e., 375 tpy) associated with the proposed operation of the standby generators constitutes a major source, requiring PSD review. The air quality impacts assessment is based on the production of 19,000,000 kW-hr of electricity, which corresponds with 6,630 hours of 20F4B operation per year at full load conditions, or 7,600 hours per year of 20E4 operation at full load conditions, or an equivalent combination. The proposed best available control technology (BACT) for the control of $NO_x$

emissions is the use of fuel injection timing retard and combustion air precooling to achieve an emission rate of 12.7 g/bhp-hr (a 28 percent reduction in $NO_x$ emissions).

The use of selective catalytic reduction (SCR) to achieve an emission rate of 2.6 g/bhp-hr was rejected in the Preston WTP application due to potential technical problems and the cost effectiveness of SCR. Potential problems addressed in the application include the presence of contaminants in diesel fuel such as sulfur, phosphorus, and ash, which can poison or mask the surface of the catalyst and reduce its activity. Fuel sulfur, which is oxidized to $SO_2$, may react with ammonia to form ammonium sulfate and ammonium bisulfate salts which can form a coating over the catalyst surface and reduce its effectiveness. The application also indicates that the standby generators will accommodate fluctuations in load, which may result in exhaust temperatures outside the range of optimum catalyst performance and result in either reduced $NO_x$ reduction efficiency or the release of unreacted ammonia. The cost effectiveness of using SCR was calculated to be $2,370/ton, versus a cost effectiveness of $212/ton with the use of combustion controls. The use of SCR would remove an additional 294 tpy of $NO_x$.

Based on our review of the application package, we have the following comments:

1. As indicated in the application, SCR has been applied at similar facilities in Philadelphia, PA (Philadelphia SW Water Treatment Plant and Philadelphia NE Water Treatment Plant) for the control of $NO_x$ emissions from diesel-fired internal combustion (IC) engines. Although the Preston WTP application has discussed potential problems which may be associated with the use of SCR, the application does not address any operational differences between the Preston WTP and the facilities in Philadelphia to indicate why SCR would not be feasible for the Preston WTP. To validate the claim that SCR is not technically feasible for the Preston WTP, the application should address any significant differences with the facilities in Philadelphia and should discuss any operational problems which may have been experienced with SCR at the Philadelphia facilities. The application for the Preston WTP should also discuss the expected exhaust gas temperature from the IC engines at reduced loads and the amount of time the engines would be operated at reduced loads to address the concern about achieving an optimum temperature for SCR use. Although the application indicates that the estimated cost effectiveness of $2,370/ton is unreasonable, a cost effectiveness of this magnitude is typically considered to be acceptable for $NO_x$ reduction costs.

2. Although the application bases the potential emissions on a maximum annual power production rate of 19,000,000 kW-hr, the application does not account for emissions while the engines are being operated without producing power. The

application should describe the duration and frequency of operation of the engines while not producing power, and should include an estimate of the annual emission rates during such conditions. The total annual emissions should account for various modes of operation of the engines. Since the engines could be operated a considerable amount of time without producing power, the total annual $NO_x$ emissions allowed by the PSD permit will likely need to be restricted by a method other than a limit on the amount of electricity generated.

3. The PSD application provides emission factors at different loads for the Model 20F4B engines, but does not provide such data for the Model 20E4 engines. Emission factors (and their basis) also need to be provided in the permit application for the Model 20E4 engines. The PSD permit may need to include different BACT emission limits for the two models of engines, to reflect their achievable emission rates.

4. The modeled impact assessment used the 20FA4 generator to represent the two types of generators at the Preston WTP because the location of these generators are closer to the boundary fence line, and they have the largest emission rate. Other emission variables that affect the resultant concentrations are the location of the stacks relative to other buildings and the exit stack parameters (e.g., temperature, diameter, etc.). These other parameters should be considered in the selection to ensure the 20F4B generators produce the highest ground level concentrations.

5. Rural dispersion option was selected for the transport and dispersion calculations. Section 2.2 indicates the impact area as a mixture of residential, commercial, and light industrial - characteristics of urban areas. The guidance procedure for rural/urban classification should be used for this determination.

6. Section 6.3 indicates no offsite receptor located within 100 meters of the standby generators. Section 6.4 indicates the wake cavity region as being 26.5 meters from the stack with one receptor within Generator Building 2 wake zone. These are conflicting statements. If the latter condition is correct, SCREEN3 should be used to estimate the building cavity length and associated concentrations.

7. The modeled impact assessment has treated the Preston WTP and the Hialeah WTP as one common facility - no impact receptors were located on the adjacent Hialeah Water Treatment Plant. Although the Hialeah WTP is also owned by the Miami-Dade Water & Sewer Department, should these two facilities be considered one plant for permitting purposes?

8. The Federal Land Manager (FLM) for the Everglades National Park Class 1 area should be notified of this project and its anticipated impacts.

Thank you for the opportunity to review and comment on the application package. If you have any questions, please contact either Keith Goff or Stan Krivo at (404) 562-9137 or (404) 562-9123 respectively.

Sincerely yours,

Paul Hepper

R. Douglas Neeley
Chief
Air and Radiation Technology
Branch
Air, Pesticides, and Toxics
Management Division

cc: J. Kahn, BAR
R. Ready, JEP Water Treat. Plant
J. Bunyak, NPS
SED
Dade Co
D. Lindberg, CH2M Hill

# Memorandum

**To:** Mike Thiel
Sent Via Fax, 919/446-3830 Phone 919-977-2720

**From:** Susan DeVore-Fillmore, State of Florida Department of Environmental Protection
Bureau of Air Regulation, New Source Review Section

**Date:** July 29, 1998

**Re:** Diesel Engines

---

I would greatly appreciate information on EMD Model 20-645E4 and Model 20-645F4B internal combustion engines. Our section works on PSD permits and BACT determinations. We are currently processing several permit applications for facilities that operate GM Electromotive engine and generator sets. We would like information on GM's newest engines or technology, specifically, engine diagrams and any process changes or equipment add ons to reduce emissions of nitrogen oxides.

Please contact me at 850/921-9537 if you have any questions.

Fold at line over top of envelope to

**SENDER:**
- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "*Return Receipt Requested*" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
Robert C. Ready, P.E.
Assistant Director, J.T.
Miami-Dade Water & Sewer
4200 Salzedo St.
Coral Gables, Fl
33146-0316

4a. Article Number
P 265 659 396

4b. Service Type
☐ Registered ☒ Certified
☐ Express Mail ☐ Insured
☐ Return Receipt for Merchandise ☐ COD

7. Date of Delivery
8 4 98

5. Received By: *(Print Name)*
L. Banfield

6. Signature: *(Addressee or Agent)*
X L. BANFIELD

8. Addressee's Address *(Only if requested and fee is paid)*

PS Form **3811**, December 1994 102595-97-B-0179 Domestic Return Receipt

Is your RETURN ADDRESS completed on the reverse side?

Thank you for using Return Receipt Service.

P 265 659 396

US Postal Service
**Receipt for Certified Mail**
No Insurance Coverage Provided.
Do not use for International Mail *(See reverse)*

| | |
|---|---|
| Sent to Robert Ready | |
| Street & Number Miami Dade Water & Sewer | |
| Post Office, State, & ZIP Code Coral Gables, Fl | |
| Postage | $ |
| Certified Fee | |
| Special Delivery Fee | |
| Restricted Delivery Fee | |
| Return Receipt Showing to Whom & Date Delivered | |
| Return Receipt Showing to Whom, Date, & Addressee's Address | |
| **TOTAL** Postage & Fees | $ |
| Postmark or Date 7-30-98 PSD-FI-248 025025I-006-AC | |

PS Form **3800**, April 1995

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
PUBLIC HEALTH SERVICES
AIR MANAGEMENT SERVICES

JUL 24 1998

RECEIVED
Hand Delivered
APR 4 1997
1/10/97 RMF
AIR MANAGEMENT SERVICES
ADMINISTRATION

Air Management Services
321 University Avenue
Philadelphia PA 19104-4543
Phone: (215) 685-7572
FAX: (215) 685-7593

# APPLICATION FOR PLAN APPROVAL TO CONSTRUCT, MODIFY OR REACTIVATE AN AIR CONTAMINATION SOURCE AND/OR AIR CLEANING DEVICE

AIR REGULATION

*(Prepare all information completely in print or type in triplicate)*

## SECTION A - APPLICATION INFORMATION

| | | |
|---|---|---|
| Location of source ( Street Address)<br>3900 Richmond St., Philadelphia, PA 19137 | Facility Name<br>O'Brien Philadelphia Cogeneration Northeast FACILITY | |
| Owner<br>O'Brien (Philadelphia) Cogeneration, Inc. | | Tax ID No<br>51-0110544 |
| Mailing Address<br>920 Church St., WILMINGTON, DE, 19899 | Telephone No.<br>(302) 658-7100 | Fax No.<br>(302) 654-2133 |
| Contact Person<br>MR. TOM CURRIE | Title<br>PROJECT MANAGER | |
| Mailing Address<br>920 Church St., WILMINGTON, DE 19899 | Telephone No.<br>(302) 658-7100 | Fax No<br>(302) 654-2133 |

## SECTION B - DESCRIPTION OF ACTIVITY

Application type

☐ New source ☐ Modification ☒ Replacement ☐ Reactivation ☐ Air cleaning device ☐ Other _____

SIC Code: 4911

Completion Date: IMMED.

Applicable requirement

☐ NSPS ☐ NESHAP ☐ Case by Case MACT ☒ NSR ☐ PSD

Does Facility submit Compliance Review Form biannually ? ☐ Yes ☒ No

If No attach Air Pollution Control Act Compliance Review Form with this application.

Source Description

Power Generation for Wastewater facility.

## SECTION C - PERMIT COORDINATION (ONLY REQUIRED FOR LAND DEVELOPMENT)

| Question | YES | NO |
|---|---|---|
| 1. Will the project involve construction activity that disturbs five or more acres of land? | | |
| 2. Will the project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system? | | |
| 3. Will the project involve the construction and operation of industrial waste treatment facility? | | |
| 4. Is onsite sewage disposal proposed for your project? | | |
| 5. Will the project involve construction of sewage treatment facilities, sanitary sewer, or sewage pumping station? | | |
| 6. Is a stormwater collection and discharge system proposed for this project? | | |
| 7. Will any work associated with this project take place in or near a stream, waterway, or wetland? | | |
| 8. Does the project involve dredging or construction of any dam, pier, bridge or outfall pipe? | | |
| 9. Will any solid waste or liquid wastes be generated as a result of the project? | | |
| 10. Is a State Park located within two miles from your project? | | |

## SECTION D - CERTIFICATION

**I certify that I have the authority to submit this Permit Application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.**

Signature _____ Date 1/8/97 Address 920 Church St., Wilmington, DE 19899

Name & Title WILLIAM D. GLOCKNER, V.P. Phone 302-658-7100 Fax 302-654-2133

## SECTION E - OFFICIAL USE ONLY

| Application No. | Plant ID | Health District | Census Tract | Fee | Date Received |
|---|---|---|---|---|---|
| 97039 | 9513 | 7 | 182 | 750. | |

| Approved by | Date | Conformance by | Date |
|---|---|---|---|
| Roger N. Fey | 5/16/97 | | |

**O'BRIEN ENERGY SERVICES CO.**
PH. 302-658-7100 FAX 302-654-2133
P. O. BOX 2345
WILMINGTON, DE 19899

1765

62-9/311

PAY TO THE ORDER OF city & philadelphia

January 9 1997

$ 750.00

seven hundred fifty and 00/100 DOLLARS

Security features included Details on back

WILMINGTON TRUST
WILMINGTON, DE

FOR permit ENG

Robert A. Roy

⑈001765⑈ ⑆031100092⑆ 2658 5767⑈

MP

⑆HARLAND STYLE 2

# CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC HEALTH
PUBLIC HEALTH SERVICES
AIR MANAGEMENT SERVICES

321 University Avenue
Philadelphia, PA 19104-4543
Telephone - (215) 685-7572
Fax - (215) 685-7593

**ESTELLE B. RICHMAN**
*Health Commissioner*

**JOHN F. DOMZALSKI**
*Deputy Health Commissioner For Public Health Services*

*ROBERT T. OSTROWSKI*
*Director For Air Management Services*


May 16, 1997

Mr. William D. Glockner, V.P.
O'Brien Cogeneration, Inc.
Philadelphia Northeast Facility
920 Church St.
Wilmington, DE 19899

**RE: PERMIT APPROVAL CONDITIONS FOR THREE CATERPILLAR GAS ENGINES FOR POWER GENERATION AT THE PHILADELPHIA NORTHEAST SEWAGE TREATMENT PLANT (FILE #: 97039)**

Dear Mr. Glockner:

Air Management Services (AMS) has approved your plan approval application (File No.: 97039) for three caterpillar gas engines having rated capacities 650kw, 500kw. and 225kw, which are to be installed and operated at the Philadelphia Northeast Sewage Treatment Plant located at 3900 Richmond St., Philadelphia, PA, with the following conditions:

1. O'Brien (Philadelphia) Cogeneration (O'Brien) shall operate the three Caterpillar engines, referenced above, for a maximum of 8000 hours per twelve month rolling period.

2. The emission from the facility shall be limited to:

| Pollutant | Grams/BHP-Hr | Pounds per Hr | Tons per 12 month rolling period |
|---|---|---|---|
| Particulate | 0.32 | 12.0 | 1.5 |
| PM10 | 0.32 | 12.0 | 1.5 |
| Nitrogen Dioxide | 2.00 | 80.0 | 40 |
| Carbon Monoxide | 6.40 | 241.5 | 71 |
| Non-Methane Hydrocarbons | 1.12 | 31 | 21 |
| Sulfur Dioxide | 1.16 | 26.1 | 20.9 |

3. O'Brien shall test for proper combustion performance of the engines described above within 120 days of receipt of this letter. A testing protocol shall be submitted to AMS for approval at least 30 days before the actual test date.

NEWPCP ✓

October 15, 1992

Mr. Frank Wright
O'Brien Cogeneration Inc.
225 S. Eighth Street
Philadelphia, PA 19106

Dear Mr. Wright:

**RE: PERMIT APPROVAL CONDITIONS**

This is to inform you that the installation permit applications for three Dorman gas engines, seven Detroit Diesel engines with the Selective Catalyst Reduction (SCR) for O'Brien Cogeneration Inc. (O'Brien) at the North East Water Treatment Plant have been approved on the following conditions:

1. O'Brien shall operate the three Dorman engines and the seven standby Detroit Diesel engines with SCR control at the maximum of 8000 hours per year and 250 hours per year, respectively.

2. The emission from the facility shall be limited to:

| Pollutants | Gr/BHP-Hr | Lbs/Hr | Tons/yr |
|---|---|---|---|
| Particulate | 0.32 | 12.0 | 1.5 |
| PM10 | 0.32 | 12.0 | 1.5 |
| Nitrogen Dioxide | 2.00 | 80.0 | 40 |
| Carbon Monoxide | 6.40 | 241.5 | 71 |
| Non-Methane Hydrocarbon | 1.12 | 31 | 21 |
| Sulfur Dioxide | 1.16 | 19 | 20 |

3. The Ammonia slip from the SCR is limited to 20 parts per millions by volume, dry referenced to 15 percent oxygen. The ammonia control system shall be equipped with interlock and alarm system to assure compliance with the ammonia slip level.

4. O'Brien shall install a safety water spray suppression system for the ammonia storage area.

5. Within 60 days of commencement, full performance tests by an independent firm are required for these engines. A testing protocol has to be submitted to Air Management Services for approval at least 30 days before the actual test date.

6. O'Brien shall evaluate the catalyst to determine its performance on an annual basis.

CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC HEALTH
Environmental Protection Division
321 University Avenue
Philadelphia, PA 19104

Telephone — 215-823-7414

ROBERT K. ROSS, M.D.
*Health Commissioner*

JOHN F. DOMZALSKI
*Deputy Health Commissioner For Environmental Protection*

NE WPCP

November 25, 1992

Mr. Frank Wright
O'Brien Cogeneration Inc.
225 S. Eighth Street
Philadelphia, PA 19106

Dear Mr. Wright:

This letter is an amendment to the permit approval conditions for the installation of the three Dorman gas engines, seven Detroit Diesel engines with the Selective Catalyst Reduction (SCR) at the Northeast Water Treatment Plant. The following conditions shall replace the conditions specified in the October 15, 1992 letter.

1. Condition 2: The sulfur dioxide emission shall be changed to 26.1 lbs. per hour and 20.9 tons per year.

2. Condition 3: The ammonia control system shall be equipped with an interlock and alarm system. The set points for the interlock system shall be established during the compliance test. In addition, O'Brien shall operate the portable nitrogen oxide and oxygen gas analyzer to verify the calculated ammonia slip each day the diesel engines are in operation.

3. Condition 7: The calculated compression ratio based on other operating parameters shall be documented daily.

If you have any questions, please do not hesitate to call me at 215-823-7572.

Sincerely yours,

Thomas Huynh
Permit Engineer

:th:if

CC: B. Scott

# CITY OF PHILADELPHIA

**DEPARTMENT OF PUBLIC HEALTH**
**PUBLIC HEALTH SERVICES**
**AIR MANAGEMENT SERVICES**

321 University Avenue
Phiadelphia, PA 19104-4543
Telephone - (215) 685-7572
Fax - (215) 685-7593

**ESTELLE B. RICHMAN**
*Health Commissioner*

**JOHN F. DOMZALSKI**
*Deputy Health Commissioner For Public Health Services*

*ROBERT T. OSTROWSKI*
*Director For Air Management Services*

## NOTICE OF VIOLATION

**Via Certified Mail: z 124 049 729**

Thomas Currie
Operations Manager
O' Brien Cogeneration Inc.
920 Church Street
Wilmington, DE 19899

**DATE:** October 8, 1996

**RE: Facility Located at 3900 Richmond Street Philadelphia**
**Plant ID: 01533**

You are hereby notified that Air Management Services (AMS) has reviewed the compliance status of your facility and cited the following violations:

| No. | Description of Violation | Code/Statute Reference |
|---|---|---|
| 1. | Failure to submit 1996 Annual Air Emission Inventory and Emission Statement for **1995** Calendar Year Emissions. | Title 25 Pa. Code 135 & Air Management Regulation I Section II. B. |

You are hereby directed to submit to AMS, within 15 days from receipt of this Notice of Violation (NOV), documentation that the above noted violations have been corrected or a plan to correct the violations as expeditiously as practical, including milestones and expected final compliance date, prepared for approval by AMS. Please note that statutory penalty liability shall accrue for the duration of the violations.

You may request, within 10 days from the receipt of this NOV, a meeting with AMS to discuss this NOV. You should direct any compliance notification, corrective action plan, request for a conference, or questions to:

Mr. Thomas Elliott, Jr.
Engineering Supervisor
Air Management Services
Spellman Building
321 University Avenue, Second Floor
Philadelphia, PA 19104
(215) 685-7580

Please note that you have the right to appeal this NOV pursuant to Section 5-1005 of the Philadelphia Home Rule Charter. However, be advised that the exercise of your appeal rights does not prevent the State and/or the U. S. EPA from taking separate enforcement action, will not stay the above directed action nor stay other enforcement remedies available to the City, including, but not limited to, license revocation, assessment of penalties up to $25,000.00 per day of violation, remedial action, and/or criminal prosecution.

**THIS NOTICE IS FINAL AND EFFECTIVE IMMEDIATELY UPON RECEIPT**

Norman Glazer
Regulatory Services Program Manager

**BCC:**
Satish Suri
Abbas Gholami
File

CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC HEALTH
Environmental Protection Division
321 University Avenue
Philadelphia, PA 19104

Telephone - 215-685-7572
Fax - 215-685-7593

ESTELLE B. RICHMAN
*Health Commissioner*

JOHN F. DOMZALSKI
*Deputy Health Commissioner For Environmental Protection*

Robert T. Ostrowski
*Director For Air Management Services*

March 7, 1995

Mr. William Glockner
O'Brien Cogeneration Inc.
225 S. Eighth Street
Philadelphia, PA 19106

Dear Mr. Glockner:

AMS concurs with the March 18, 1994 report by AirRecon on air emission tests for the Dorman and Detroit Diesels at the Northeast Water Pollution Control Plant. Formal review of the report was delayed during preparation of the lead (PB) SIP submittal affecting the smelting facility adjacent to the NEWPCP.

While the above-mentioned combustion units did comply with mass emission rate limits during tests conducted during the fourth quarter of 1993, AMS has not granted any variance or alternate opacity limit for smoke which may emit from the units. AMS continues to require that O'Brien meet its commitment to resolve any ongoing opacity excesses and to maintain the equipment within complying opacity levels.

Please contact me at (215) 685-7572 if you have any questions. Also, an update on the opacity compliance status for engines at the NEWPCP and the SWWPCP would be appreciated.

Sincerely,

Robert W. Scott
Staff Engineer

RWS:if

cc: S. Suri
Eng File

GT/File

# CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC HEALTH
Environmental Protection Division
321 University Avenue
Philadelphia, PA 19104

Telephone - 215-685-7572
Fax - 215-685-7593

ESTELLE B. RICHMAN
*Health Commissioner*

JOHN F. DOMZALSKI
*Deputy Health Commissioner For Environmental Protection*

Robert T. Ostrowski
*Director For Air Management Services*

March 7, 1995

Mr. William Glockner
O'Brien Cogeneration Inc.
225 S. Eighth Street
Philadelphia, PA 19106

Dear Mr. Glockner:

AMS concurs with the March 18, 1994 report by AirRecon on air emission tests for the Dorman and Detroit Diesels at the Northeast Water Pollution Control Plant. Formal review of the report was delayed during preparation of the lead (PB) SIP submittal affecting the smelting facility adjacent to the NEWPCP.

While the above-mentioned combustion units did comply with mass emission rate limits during tests conducted during the fourth quarter of 1993, AMS has not granted any variance or alternate opacity limit for smoke which may emit from the units. AMS continues to require that O'Brien meet its commitment to resolve any ongoing opacity excesses and to maintain the equipment within complying opacity levels.

Please contact me at (215) 685-7572 if you have any questions. Also, an update on the opacity compliance status for engines at the NEWPCP and the SWWPCP would be appreciated.

Sincerely,

Robert W. Scott
Staff Engineer

RWS:if

cc: S. Suri
Eng File

# O'BRIEN (PHILADELPHIA) COGENERATION, INC.

*St. James Place at 8th Street*
*Philadelphia, PA 19106*


April 3, 1995

Mr. Thomas Huynh
**AIR MANAGEMENT SERVICES**
Philadelphia Department of Public Health
321 University Avenue
Spelman Building
Philadelphia, PA 19104

Re: RACT Requirements at the Southwest Water Treatment Plant

Dear Tom:

As a result of your recent conversations with Dr. Raufer, I have enclosed in this letter documentation concerning the RACT requirement for the digester gas cogeneration and standby diesel facility at the Northeast Wastewater Treatment plant, which is owned and operated by O'Brien (Philadelphia) Cogeneration, Inc.

As you know, this is a relatively new facility, which received its air management permit in October, 1992. As part of the application for that permit, we included a section in the proposal (Section 5.0) which documented how the facility was in compliance with all applicable air quality requirements. For the Best Available Technology (BAT) requirements, the application stated:

> Under Section 127.1 of the Pennsylvania Code, new sources are required to control emissions of air pollutants to the maximum extent, consistent with the best available technology as of the date of the permit issuance. The use of gaseous fuels and lean combustion in the gas-fired engines constitutes BAT. One could easily argue that the use of selective catalytic reduction on the standby diesels is more stringent than BAT, and represents Lowest Achievable Emission rate (LAER) technology.

We believe that such an argument still holds, and that we easily meet any RACT requirements for this facility. The levels of technology meet BAT requirements at a minimum, and the SCR for NOx control on a standby unit -- which was so stringent that we were able to document only one other comparable case at the time of the permit submission -- actually constitutes LAER.

In addition to the control technology, we will abide by the emission limitations and operating requirements in the permit, which were similarly justified in the application. These emission constraints are as follows:

| Pollutants | Gr/BHP-Hr | Lbs/Hr | Tons/Year |
|---|---|---|---|
| Particulate | 0.32 | 12.0 | 1.5 |
| PM-10 | 0.32 | 12.0 | 1.5 |
| Nitrogen Dioxide | 2.00 | 80.0 | 40 |
| Carbon Monoxide | 6.40 | 241.5 | 71 |
| Non-Methane HC | 1.12 | 31 | 21 |
| Sulfur Dioxide | 1.16 | 26.1 | 20.9 |

Other operating parameters include:

1. Ammonia slip is limited to 20 ppm.

2. A safety water spray suppression system for ammonia storage was installed at the facility.

3. Operating parameters are monitored and recorded.

4. Portable NOx and 02 analyzers are used to verify ammonia slip during operation.

I trust that this information will make it clear that the O'Brien facility at the Northeast Wastewater Treatment Plant meets all of the objectives of RACT compliance.

Please don't hesitate to contact me or Dr. Raufer if you have any questions.

Sincerely,

William Glockner
Vice President, Energy Group

**RACT**
**PLAN APPROVAL**

Facility: O'Brien Cogeneration (Southwest) PLID: 1534

Address: 8200 Enterprise Ave. (Southwest Water Treatment Plant)
Philadelphia, PA 19153

Owner: O'Brien Cogeneration, Inc.

Attention: William Glockner

Source(s): Gas engines, Diesel engines

In accordance with provisions of the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, Air Management Services (AMS) has approved the RACT proposal plans for O'Brien (SW) on the above indicated air contamination source(s).

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx) Reasonably Available Control Technology (RACT) for O'Brien (SW). This includes the following emission sources and control equipment:

A. Emission Sources

(1) Two Dorman gas engines. Each is rated at 593 HP and burns digester gas.

(2) Eleven standby Dietroit Diesel engines. Each is rated at 1550 HP and burns diesel fuel.

B. Control Equipment

(1) The Detroit Diesel engines all vent to a selective catalytic reduction system (SCR).

2. This approval authorizes:

A. The Detroit Diesel engines shall continue to be vented to the SCR.

B. The Dorman engines shall each operate at a maximum of 8,000 hours per year. The Detroit Diesel engines shall each operate at a maximum of 250 hours per year.

C. The operating parameters of the engines such as operating hours, fuel and lube oil consumption, compression ratio, fuel-to-air ratio, kilowatt hours produced, flow rate, temperature and pressure drop across the SCR, and the ammonia flow rate shall be those established as operating conditions during stack tests.

3. Stack Emission Limitations

A. The maximum air contaminant emissions from these sources, controlled by the equipment above shall be limited at stack outlet to:

(1) Nitrogen Oxides (NOx):

The facility emission rate of NOx shall not exceed 2.00 grams per brake horsepower-hour, 80.32 pounds per hour, and 30 tons per year.

(2) Non-Methane Hydrocarbons:

The facility emission rate of non-methane hydrocarbons shall not exceed 1.12 grams per brake horsepower-hour, 31 pounds per hour, and 15 tons per year.

4. RACT Implementation Schedule

A. Upon issuance of this approval, O'Brien (SW) shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

5. Testing and Monitoring Requirements

A. The engines were stack tested after installation.

B. The engines' calculated compression ratio based on other operating parameters shall be documented daily.

6. Recordkeeping and Reporting Requirements

A. O'Brien (SW) shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NOx RACT requirements of 25 PA Code §129.91-129.94. These records shall include operating hours, fuel and lube oil consumption, compression ratio, fuel-to-air ratio, kilowatt hours produced, flow rate, temperature and pressure drop across the SCR, and the ammonia flow rate.

B. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met.

C. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

D. Records shall be retained for at least two years and shall be made available to the Department on request.

7. The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

8. The company shall not impose conditions upon or otherwise restrict the Department's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow the Department to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the Department deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

9. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h).

# RACT
# PLAN APPROVAL

Facility: O'Brien Cogeneration (Northeast) PLID: 1533

Address: 3900 Richmond St. (Northeast Water Treatment Plant)
Philadelphia, PA 19137

Owner: O'Brien Cogeneration, Inc.

Attention: William Glockner

Source(s): Gas engines, Diesel engines

In accordance with provisions of the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, Air Management Services (AMS) has approved the RACT proposal plans for O'Brien (NE) on the above indicated air contamination source(s).

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx) Reasonably Available Control Technology (RACT) for O'Brien (NE). This includes the following emission sources and control equipment:

A. Emission Sources

(1) Three Dorman gas engines. Each is rated at 593 HP and burns digester gas.

(2) Seven standby Dietroit Diesel engines. Each is rated at 2340 HP and burns diesel fuel.

B. Control Equipment

(1) The Detroit Diesel engines all vent to a selective catalytic reduction system (SCR).

2. This approval authorizes:

A. The Detroit Diesel engines shall continue to be vented to the SCR.

B. The Dorman engines shall each operate at a maximum of 8,000 hours per year. The Detroit Diesel engines shall each operate at a maximum of 250 hours per year.

C. The operating parameters of the engines such as operating hours, fuel and lube oil consumption, compression ratio, fuel-to-air ratio, kilowatt hours produced, flow rate, temperature and pressure drop across the SCR, and the ammonia flow rate shall be those established as operating conditions during stack tests.

3. Stack Emission Limitations

A. The maximum air contaminant emissions from these sources, controlled by the equipment above shall be limited at stack outlet to:

(1) Nitrogen Oxides (NOx):

The facility emission rate of NOx shall not exceed 2.00 grams per brake horsepower-hour, 80.00 pounds per hour, and 40 tons per year.

(2) Non-Methane Hydrocarbons:

The facility emission rate of non-methane hydrocarbons shall not exceed 1.12 grams per brake horsepower-hour, 31 pounds per hour, and 21 tons per year.

4. RACT Implementation Schedule

A. Upon issuance of this approval, O'Brien (NE) shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

5. Testing and Monitoring Requirements

A. The engines were stack tested after installation.

B. The engines' calculated compression ratio based on other operating parameters shall be documented daily.

6. Recordkeeping and Reporting Requirements

A. O'Brien (NE) shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NOx RACT requirements of 25 PA Code 129.91-129.94. These records shall include operating hours, fuel and lube oil consumption, compression ratio, fuel-to-air ratio, kilowatt hours produced, flow rate, temperature and pressure drop across the SCR, and the ammonia flow rate.

B. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of 129.91-129.94 are met.

C. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

D. Records shall be retained for at least two years and shall be made available to the Department on request.

7. The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

8. The company shall not impose conditions upon or otherwise restrict the Department's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow the Department to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the Department deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

9. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code 129.91(h).

**Air Pollution Control Act Compliance Review Form (Addendum)**

A. Related Parties Operating in the Commonwealth of Pennsylvania:

1. NRG Generating, Inc.
   1221 Nicollet Mall, Suite 700
   Minneapolis, Minnesota 55403-2445

   Phone: 612-373-5300
   Relationship: Parent company of O'Brien (Philadelphia) Cogeneration, Inc.

2. N.E.O. Corporation
   1221 Nicollet Mall, Suite 700
   Minneapolis, Minnesota 55403-2445

   Phone: 612-373-5300
   Relationship: Subsidiary of NRG Energy, Inc.

3. Grays Ferry Cogeneration Partnership
   2600 Christian Street
   Philadelphia, Pennsylvania 19146

   Phone: 215-985-0380
   Relationship: NRG Generating (Schuylkill) Cogeneration, Inc. is a one-third general partner in GFCP, and managing partner until late 1997.

B. Plan Approvals and Operating Permits for Applicant and Related Parties:

1.

| | |
|---|---|
| Source: | N.E. Facility |
| Permit #: | N/A |
| Location: | N.E. Philadelphia, PA |
| Issuance Date: | 10/15/92 |
| Expiration Date: | N/A |

2.

| | |
|---|---|
| Source: | S.W. Facility |
| Permit #: | N/A |
| Location: | S.W. Philadelphia, PA |
| Issuance Date: | 10/15/92 |
| Expiration Date: | N/A |

3. Source: Grays Ferry Cogeneration Project
Permit #: 92181 through 92184
Location: Schuylkill Station, Philadelphia, PA
Issuance Date: 11/4/92
Expiration Date: N/A

4. Source: Landfill Gas Project
Permit #: 46-399-056
Location: Swedeland, PA
Issuance Date: 7/20/93
Expiration Date: 4/30/98

5. Source: Landfill Gas Project
Permit #: 402-3082-000
Location: Clinton, PA
Issuance Date: 10/9/92
Expiration Date: N/A

6. Source: Landfill Gas Project (Since Sold to New Owner)
Permit #: 100932
Location: Taylor, PA
Issuance Date: 3/12/87
Expiration Date: N/A

7. Source: Landfill Gas Project (No Longer in Operation)
Permit #: 06-399-017
Location: Birds Boro, PA
Issuance Date: 5/16/90
Expiration Date: 12/31/94

C. Additional Incidents of Deviations of the APCA:

1. Date: 6/6/95
Location: Swedeland, PA
Permit #: 46-399-056
Nature of Dev.: Fuel Test Not Up-to-Date
Status: Corrected; 7/5/95 (no penalty)

2.

| | |
|---|---|
| Date: | 6/21/93 |
| Location: | Swedeland, PA |
| Permit #: | 46-399-056 |
| Nature of Dev.: | Fuel Test Not Up-to-Date |
| Status: | Corrected; 7/15/93 (no penalty) |

# CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC HEALTH
PUBLIC HEALTH SERVICES
AIR MANAGEMENT SERVICES

Air Management Services
321 University Avenue
Philadelphia PA 19104-4543
Phone: (215) 685-7572
FAX: (215) 685-7593

## AIR POLLUTION CONTROL ACT COMPLIANCE REVIEW FORM

| | | |
|---|---|---|
| Filing Date: 1/10/97 | ☒ New Filing ☐ Amended Filing of __/__/__ | ☐ New Operating Permit ☐ Periodic |
| Application No: | ☒ New Plan Approval ☐ Renew Plan Approval | ☒ Operating Permit ☐ Change Owner |

| | | |
|---|---|---|
| Applicant: ( non-corporations attach documentation of legal name) O'Brien (Philadelphia) Cogeneration, Inc. | Address: 920 Church St. Wilmington DE 19899 | Tax ID No.: 51-0110544 Telephone No.: 302-658-7100 |

Form of Management:
☐ Individual ☐ Fictitious name ☐ Partnership ☒ Corporation ☐ Government ☐ Other: _____

If applicant is a corporation attach list of names, business addresses, states of incorporation, taxpayer IDs , and relationships to applicant.

Describe Business Activities:

OWN & OPERATE POWER GENERATING EQUIPMENT.

Does the applicant have any other related parties operating in the Commonwealth of Pennsylvania? ☒ Yes ☐ No

If Yes attach a list of :
- Name, Mailing Address, Telephone, and Relationship to the applicant of all related parties, and
- Name and Business Address of the plant manager and general partners of the applicant.

List all plan approvals or operating permits issued by the Department or an approved local air pollution control agency under the APCA to the applicant or related parties that are currently in effect or have been in effect at any time 5 years prior to the date on which this form is notarized. Attach additional sheets as necessary.

| Air Contamination Source | Plan Approval/ Operating Permit Number | Location | Issuance Date | Expiration Date |
|---|---|---|---|---|
| See attached. | | | | |

List all incidents of deviations of the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. This list must include items both currently known and unknown to the Department. Attach additional sheets as necessary. See the definition of "deviations" for further clarification.

| Date | Location | Plan Approval/ Operating Permit # | Nature of Deviation | Incident Status: Litigation Existing/Continuing; or Corrected/Date |
|---|---|---|---|---|
| 10/8/96 | N.E. Philadelphia | | Failure to submit 1995 Emissions Data | CORRECTED 10/11/96 |
| 10/8/96 | S.W. Philadelphia | | " | " " |
| Other: | See attached letter & addendum. | | | |

**CONTINUING OBLIGATION:** Applicant is under a continuing obligation to update this form if any additional documented conduct occurs between the date of submission and Department action on the application

I, WILLIAM D. GLOCKNER, being duly sworn according to law, depose and state under penalty of law as provided in 18 Pa. C.S. §4944 and Section 9(b)(2) of the Air Pollution Control Act, 35 P.S. §4009(b)(2), that I am the representative of the Applicant/Permittee, identified above, authorized to make this affidavit. I further state that the information provided with this form, after reasonable inquiry, is true and complete to the best of my belief and that there are reasonable procedures in place to insure that documented conduct and deviations are identified and made part of the compliance review information contained in the Compliance Review Form.

(Signature)

WILLIAM D. GLOCKNER
(Print or Type Name)

VICE PRESIDENT
(Print or Type Title)

Sworn to and subscribed before me this 8 day of JANUARY, 19 97

Notary Public

Affix Corporate Seal and attach copy of Articles of Incorporation

(Regarding corporate seal and signatures, please refer to Item 4 in instructions.)

## SECTION F 2 - COMBUSTION UNITS INFORMATION

1. COMBUSTION UNITS

| A. Manufacturer | B. Model No. | C. Unit No. |
|---|---|---|
| CATERPILLAR | G 399 | N/A |
| **D. Rated heat input (Btu/hr)** | **E. Peak heat input (Btu/hr)** | **F. Use** |
| 7.0 mmBTU/hr | 7.0 mmBTU/hr | N/A |

G. Method firing

☐ Pulverized ☐ Spreader Stoker ☐ Cyclone ☐ Tangential ☐ Normal ☐ Fluidized bed ☒ Other GAS ENGINE

2. FUEL REQUIREMENTS

| TYPE | *QUANTITY HOURLY* | *QUANTITY ANNUALLY* | *SULFUR* | *ASH* | *BTU CONTENT* |
|---|---|---|---|---|---|
| OIL NUMBER _____ | GPH @ 60 °F | x10³ Gal. | % by wt. | % by wt. | Btu/Gal. & lbs/Gal. @ 60°F |
| NATURAL GAS | SCFH | x10⁶ SCF | gr/100 SCF | | Btu/SCF |
| OTHER DIGESTER GAS | 7700 scfh | 61.6 x 10⁶ scf | < 0.1% | NEG | 625 BTU/scf |

3. COMBUSTION AIDS, CONTROLS, AND MONITORS

| | | | |
|---|---|---|---|
| ☐ A. Overfire jets N/A | Type | Number | Height above grate |
| ☐ B. Draft controls | Type | | |
| ☐ C. Oil preheat | | | |
| ☐ D. Soot cleaning | Temperature (° F) | Frequency | |
| ☐ E. Stack sprays | Method | | |
| ☐ F. Opacity monitoring device | | Method | Cost |
| ☐ G. Sulfur oxides monitoring device | Type | Method | Cost |
| ☐ H. Nitrogen oxides monitoring device | Type | Method | Cost |
| ☐ I. Fuel metering and/or recording devices | Type | Method | Cost |
| ☐ J. Atomization interlocking device | Type | Method | Cost |
| ☐ K. Collected flyash reentrainment preventative device | Type | | |

☐ L. Modulating controls ☐ Step ☐ Automatic

4. ☐ Flyash reinjection. (Describe operation)

N/A

5. Describe method of supplying make up air to the furnace room.

Ventilated outdoor enclosure.

- Use this page for Combustion source, otherwise remove this page from this application.
- If there are more than one unit, copy this page and fill in the information as indicated.

## SECTION F 2 - COMBUSTION UNITS INFORMATION, CONTINUED

6. OPERATING SCHEDULE

Intermittent hours/day  Intermittent days/week  Intermittent weeks/year

7. SEASONAL PERIODS (MONTHS)

Operating using primary fuel Digester gas  Operating using secondary fuel N/A

JAN. to DEC.  _____ to _____

Non-operating

N/A to _____

8. If heat input is in excess of 250 x 10 ° Btu/hr., describe fully the methods used to record the following: rate of fuel burned; heating value, sulfur and ash content of fuels; smoke, sulfur oxides and nitrogen oxides emissions; and if electric generating plant, the average electrical output and the minimum and maximum hourly generation rate.

< 250 mmBTU/hr.

Avg. electrical output : 600 kw
min. " " : 163 "
MAX. " " : 650 "

9. Describe modifications to boiler in detail.

Replaced poorly functioning Dorman engine.

10. Type and method of disposal of all waste materials generated by this boiler.
(Is a Solid Waste Disposal Permit needed? ☐ Yes ☒ No)

11. Briefly describe the method of handling the waste water from this boiler and its associated air pollution control equipment.
(Is a Water quality Management Permit needed? ☐ Yes ☒ No)

12. Attach any and all additional information necessary to perform a thorough evaluation of this boiler.

See attached specification sheets.

• Use this page for Combustion source. otherwise remove this page from this application.

## SECTION F 2 - COMBUSTION UNITS INFORMATION

1. COMBUSTION UNITS

| A. Manufacturer | B. Model No. | C. Unit No. |
|---|---|---|
| CATERPILLAR | G398 | N/A |
| **D. Rated heat input (Btu/hr)** | **E. Peak heat input (Btu/hr)** | **F. Use** |
| 5.5 mmBTU/hr | 5.5 mmBTU/hr | N/A |

G. Method firing

☐ Pulverized ☐ Spreader Stoker ☐ Cyclone ☐ Tangential ☐ Normal ☐ Fluidized bed ☒ Other DIGESTER GAS ENGINE

2. FUEL REQUIREMENTS

| TYPE | *QUANTITY HOURLY* | *QUANTITY ANNUALLY* | *SULFUR* | *ASH* | *BTU CONTENT* |
|---|---|---|---|---|---|
| OIL NUMBER _____ | GPH @ 60 °F | x10³ Gal. | % by wt. | % by wt. | Btu/Gal. & lbs/Gal. @ 60°F |
| NATURAL GAS | SCFH | x10⁶ SCF | gr/100 SCF | | Btu/SCF |
| OTHER DIGESTER GAS | 6093 scfh. | 48.7x10⁶sf | < 0.1% | NEG. | 625 BTU/sf. |

3. COMBUSTION AIDS, CONTROLS, AND MONITORS

| | | | |
|---|---|---|---|
| ☐ A. Overfire jets N/A | Type | Number | Height above grate |
| ☐ B. Draft controls | Type | | |
| ☐ C. Oil preheat | | | |
| ☐ D. Soot cleaning | Temperature (°F) | Frequency | |
| ☐ E. Stack sprays | Method | | |
| ☐ F. Opacity monitoring device | | Method | Cost |
| ☐ G. Sulfur oxides monitoring device | Type | Method | Cost |
| ☐ H. Nitrogen oxides monitoring device | Type | Method | Cost |
| ☐ I. Fuel metering and/or recording devices | Type | Method | Cost |
| ☐ J. Atomization interlocking device | Type | Method | Cost |
| ☐ K. Collected flyash reentrainment preventative device | Type | | |

☐ L. Modulating controls ☐ Step ☐ Automatic

4. ☐ Flyash reinjection. (Describe operation)

N/A

5. Describe method of supplying make up air to the furnace room.

Ventilated outdoor enclosure.

- Use this page for Combustion source. otherwise remove this page from this application.
- If there are more than one unit, copy this page and fill in the information as indicated.

## SECTION F 2 - COMBUSTION UNITS INFORMATION, CONTINUED

6. OPERATING SCHEDULE

INTERMITTENT hours/day INTERMITTENT days/week INTERMITTENT weeks/year

7. SEASONAL PERIODS (MONTHS)

Operating using primary fuel DIGESTER GAS Operating using secondary fuel N/A

JAN. to DEC. _____ to _____

Non-operating

N/A to _____

8. If heat input is in excess of 250 x 10 ⁶ Btu/hr., describe fully the methods used to record the following: rate of fuel burned; heating value, sulfur and ash content of fuels; smoke, sulfur oxides and nitrogen oxides emissions; and if electric generating plant, the average electrical output and the minimum and maximum hourly generation rate.

< 250 MM BTU/hr.

AVG. ELECTRICAL OUTPUT: 450 KW.
MIN. " " : 125 KW.
MAX. " " : 500 KW.

9. Describe modifications to boiler in detail.

Replaced poorly functioning Dorman engine.

10. Type and method of disposal of all waste materials generated by this boiler.
(Is a Solid Waste Disposal Permit needed? ☐ Yes ☒ No)

11. Briefly describe the method of handling the waste water from this boiler and its associated air pollution control equipment.
(Is a Water quality Management Permit needed? ☐ Yes ☒ No)

12. Attach any and all additional information necessary to perform a thorough evaluation of this boiler.

See attached specification sheets.

• Use this page for Combustion source, otherwise remove this page from this application.

## SECTION F 2 - COMBUSTION UNITS INFORMATION

1. COMBUSTION UNITS

| A. Manufacturer | B. Model No. | C. Unit No. |
|---|---|---|
| CATERPILLAR | G353 | N/A |
| **D. Rated heat input (Btu/hr)** | **E. Peak heat input (Btu/hr)** | **F. Use** |
| 2.5 mmBTU/hr | 2.5 mmBTU/hr. | N/A |

G. Method firing

☐ Pulverized ☐ Spreader Stoker ☐ Cyclone ☐ Tangential ☐ Normal ☐ Fluidized bed ☒ Other GAS ENGINE

2. FUEL REQUIREMENTS

| TYPE | *QUANTITY HOURLY* | *QUANTITY ANNUALLY* | *SULFUR* | *ASH* | *BTU CONTENT* |
|---|---|---|---|---|---|
| OIL NUMBER _____ | GPH @ 60 °F | x10³ Gal. | % by wt. | % by wt. | Btu/Gal. & lbs/Gal. @ 60°F |
| NATURAL GAS | SCFH | x10⁶ SCF | gr/100 SCF | | Btu/SCF |
| OTHER DIGESTER GAS | 2700 scfh. | 21.6x10⁶scf. | <0.1% | NEG. | 625 BTU/scf. |

3. COMBUSTION AIDS, CONTROLS, AND MONITORS

| | | | |
|---|---|---|---|
| ☐ A. Overfire jets N/A | Type | Number | Height above grate |
| ☐ B. Draft controls | Type | | |
| ☐ C. Oil preheat | | | |
| ☐ D. Soot cleaning | Temperature (°F) | Frequency | |
| ☐ E. Stack sprays | Method | | |
| ☐ F. Opacity monitoring device | | Method | Cost |
| ☐ G. Sulfur oxides monitoring device | Type | Method | Cost |
| ☐ H. Nitrogen oxides monitoring device | Type | Method | Cost |
| ☐ I. Fuel metering and/or recording devices | Type | Method | Cost |
| ☐ J. Atomization interlocking device | Type | Method | Cost |
| ☐ K. Collected flyash reentrainment preventative device | Type | | |

☐ L. Modulating controls ☐ Step ☐ Automatic

4. ☐ Flyash reinjection. (Describe operation)

N/A

5. Describe method of supplying make up air to the furnace room.

Ventilated outdoor enclosure.

- Use this page for Combustion source. otherwise remove this page from this application.

## SECTION F 2 - COMBUSTION UNITS INFORMATION, CONTINUED

6. OPERATING SCHEDULE

Intermittent hours/day  Intermittent days/week  Intermittent weeks/year

7. SEASONAL PERIODS (MONTHS)

Operating using primary fuel DIGESTER GAS  Operating using secondary fuel N/A

JAN. to DEC.  _____ to _____

Non-operating

N/A to _____

8. If heat input is in excess of 250 x $10^6$ Btu/hr., describe fully the methods used to record the following: rate of fuel burned; heating value, sulfur and ash content of fuels; smoke, sulfur oxides and nitrogen oxides emissions; and if electric generating plant, the average electrical output and the minimum and maximum hourly generation rate.

< 250 mm BTU/hr.

AVG. ELECTRICAL OUTPUT: 200 KW

MIN. " " : 60 KW

MAX. " " : 225 KW.

9. Describe modifications to boiler in detail.

Replaced poorly functioning Dorman engine.

10. Type and method of disposal of all waste materials generated by this boiler.
(Is a Solid Waste Disposal Permit needed? ☐ Yes ☒ No)

11. Briefly describe the method of handling the waste water from this boiler and its associated air pollution control equipment.
(Is a Water quality Management Permit needed? ☐ Yes ☒ No)

12. Attach any and all additional information necessary to perform a thorough evaluation of this boiler.

See attached specification sheets.

• Use this page for Combustion source, otherwise remove this page from this application.

## SECTION I - MISCELLANEOUS INFORMATION

1. Specify monitoring and recording devices will be used for monitoring and recording of the emission of air contaminants. Provide detailed information to show that the facilities provided are adequate. Include cost and maintenance information.

- ☐ Opacity monitoring system
- ☐ CO monitoring system
- ☐ HCL monitoring system
- ☐ Temperature monitoring system
- ☐ SOx monitoring system
- ☐ CO2 monitoring system
- ☐ TRS monitoring system
- ☐ Stack flow monitoring system
- ☐ NOx monitoring system
- ☐ Oxygen monitoring system
- ☐ H2S monitoring system
- ☐ Other _____

If checked, provide manufacturer's name, model no. and pertinent technical specifications.

N/A

2. Attach Air Pollution Episode Strategy (if applicable)

N/A

3. If the source is subject to 25 Pa. Code Subchapter E, New Source Review requirements,

a. Demonstrate the availability of emission offset (if applicable)

b. Provide an analysis of alternate sites, sizes, production processes and environmental control techniques demonstrating that the benefits of the proposed source outweigh the environmental and social costs.

4. Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of Article III of the rules and regulations of Philadelphia Air Mangement, Pennsylvania Department of Environmental Protection and those requirements promulgated by the Administrator of the United States Environmental Protection Agency pursuant to the provisions of the Clean Air Act.

Replacement engines; all permit constraints and actual emissions remain unchanged.

5. List all attachments included in this Application.

1. Letter to T. Huynh, 1/10/97.
2. Specification sheets for replacement engines.

SWWPCP

# CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC HEALTH
Environmental Protection Division
321 University Avenue
Philadelphia, PA 19104

Telephone — 215-823-7414

ROBERT K. ROSS, M.D.
*Health Commissioner*

JOHN F. DOMZALSKI
*Deputy Health Commissioner For Environmental Protection*

October 15, 1992

Mr. Frank Wright
O'Brien Cogeneration Inc.
225 S. Eighth Street
Philadelphia, PA 19106

Dear Mr. Wright:

**RE: PERMIT APPROVAL CONDITIONS**

This is to inform you that the installation permit applications for two Dorman gas engines, eleven Detroit Diesel engines with the Selective Catalyst Reduction (SCR) for O'Brien Cogeneration Inc. (O'Brien) at the South West Water Treatment Plant have been approved on the following conditions:

1. O'Brien shall operate the two Dorman engines and the eleven standby Detroit Diesel engines with SCR control at the maximum of 8000 hours per year and 250 hours per year, respectively.

2. The emission from the facility shall be limited to:

| Pollutants | Gr/BHP-Hr | Lbs/Hr | Tons/yr |
|---|---|---|---|
| Particulate | 0.32 | 12.01 | 1.5 |
| PM10 | 0.32 | 12.01 | 1.5 |
| Nitrogen Dioxide | 2.00 | 80.32 | 30 |
| Carbon Monoxide | 6.40 | 247.4 | 58 |
| Non-Methane Hydrocarbon | 1.12 | 31 | 15 |
| Sulfur Dioxide | 1.16 | 18 | 14 |

3. The Ammonia slip from the SCR is limited to 20 parts per million by volume, dry referenced to 15 percent oxygen. The ammonia control system shall be equipped with interlock and alarm system to assure compliance with the ammonia slip level.

4. O'Brien shall install a safety water spray suppression system for the ammonia storage area.

5. Within 60 days of commencement, full performance tests by an independent firm are required for these engines. A testing protocol has to be submitted to Air Management Services for approval at least 30 days before the actual test date.

6. O'Brien shall evaluate the catalyst to determine its performance on an annual basis.

7. The operating parameters of the engines such as operating hours, fuel and lube oil consumption, compression ratio, fuel to air ratio, Kilowatt hours produced, flow rate, temperature and pressure drop across the SCR and the ammonia flow rate shall be established as operating conditions during the stack tests.

8. O'Brien shall retain these records for a period of two years and be available for inspection upon request.

If you have any questions, please do not hesitate to call me at 215-823-7572.

Sincerely yours,

Thomas Huynh
Permit Engineer

:th:if

CC: B. Scott

CITY OF PHILADELPHIA

DEPARTMENT OF PUBLIC HEALTH
Environmental Protection Division
321 University Avenue
Philadelphia, PA 19104

Telephone — 215-823-7414

ROBERT K. ROSS, M.D.
*Health Commissioner*

JOHN F. DOMZALSKI
*Deputy Health Commissioner For Environmental Protection*

SWWPCP

November 25, 1992

Mr. Frank Wright
O'Brien Cogeneration Inc.
225 S. Eighth Street
Philadelphia, PA 19106

Dear Mr. Wright:

This letter is an amendment to the permit approval conditions for the installation of the two Dorman gas engines, eleven Detroit Diesel engines with the Selective Catalyst Reduction (SCR) at the Southwest Water Treatment Plant. The following conditions shall replace the conditions specified in the October 15, 1992 letter.

1. Condition 2: The sulfur dioxide emission shall be changed to 27.1 lbs. per hour and 15.1 tons per year.

2. Condition 3: The ammonia control system shall be equipped with an interlock and alarm system. The set points for the interlock system shall be established during the compliance test. In addition, O'Brien shall operate the portable nitrogen oxide and oxygen gas analyzer to verify the calculated ammonia slip each day the diesel engines are in operation.

3. Condition 7: The calculated compression ratio based on other operating parameters shall be documented daily.

If you have any questions, please do not hesitate to call me at 215-823-7572.

Sincerely yours,

Thomas Huynh
Permit Engineer

:th:if

CC: B. Scott

7/10/98

Teleconference with Susan DeVore-Fillmore, Joe Kahn, Cleve Holladay and David Lindberg (619/687-0110).

Re: Request for Additional Information Regarding Air Construction/Operation Permit Application
Project Number 0250281-006-AC, PSD-FL-248
John E. Preston Water Treatment Plant, Dade County

Facility is considering changing the application to fuel limit basis.

RFI:

1. The data provided is for both generator sets. Data is from Peerless. Did 1 SCR for each generator, rather than 1 SCR for a set of generators.
2. If have a fuel limit, no need to answer.
3. Monitor by banks of genrators, don't want to do individually. Daily recordkeeping, rolling average. Heat input rate in Attachment 5, op data page, last column, 0.375, next page 19,350 But/lb HHV, 26.1 mmBtu/hr. Will submit calculations (math). F4B: NOx uncontrolled 4.12 lb/mmBtu, NOx contrl 2.2 l/mmBtu. Turbocharger is undersized.
4. Other is 10.19. Mike Thiel gave MKW info., Engine Systems Inc. NC 919/977-2720, vendor, bhp curves. Can't run at 110% load for more than 2 hours.
5. No safety factor used.
6. Can't comply because of silencer's with stack. Attachment 6. Velocity transvers more money.
7. ESI/Miami looked at 5 alternatives to reduce NOx. Retrofitting and improving engines, will send report.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960



JUL 10 1998

4APT-ARB

Mr. Clair H. Fancy, P.E.
Chief
Bureau of Air Regulation
Florida Department of Environmental
Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

SUBJ: PSD Permit Application from Miami-Dade Water and Sewer Department, John E. Preston Water Treatment Plant, Hialeah, Florida (PSD-FL-248)

Dear Mr. Fancy:

Thank you for your letter of April 21, 1998, submitting an application for a Prevention of Significant Deterioration (PSD) permit for the above referenced facility. The application is for a proposal to increase the operation of six existing standby electricity generators to provide power generation capacity as needed to ensure uninterrupted plant operation. Two different models of generator sets exist at the Preston Water Treatment Plant (WTP): EMD Model 20-645E4 (20E4) and EMD Model 20-645F4B (20F4B). The 20E4 and 20F4B generator sets are rated to produce 2,500 and 2,865 kW of electric power at continuous full load operating conditions, respectively, and each is driven by a 3,600 brake-horsepower (bhp) (20E4) or 4,000 bhp (20F4B) diesel engine prime mover. There are three Model 20E4 generators and three Model 20F4B generators. The generators are capable of operating at load conditions ranging from 20 percent to 110 percent (peaking duty for durations not to exceed 2 hours). The engines burn transportation grade diesel fuel, which has a sulfur content of 0.05 weight percent, and all engines are 20-cylinder, 2-cycle, and turbo charged.

The application indicates that the total current allowable annual emissions of $NO_x$ from the Preston WTP are below the PSD major source level of 250 tpy. However, the increase in $NO_x$ emissions (i.e., 375 tpy) associated with the proposed operation of the standby generators constitutes a major source, requiring PSD review. The air quality impacts assessment is based on the production of 19,000,000 kW-hr of electricity, which corresponds with 6,630 hours of 20F4B operation per year at full load conditions, or 7,600 hours per year of 20E4 operation at full load conditions, or an equivalent combination. The proposed best available control technology (BACT) for the control of $NO_x$

emissions is the use of fuel injection timing retard and combustion air precooling to achieve an emission rate of 12.7 g/bhp-hr (a 28 percent reduction in $NO_x$ emissions).

The use of selective catalytic reduction (SCR) to achieve an emission rate of 2.6 g/bhp-hr was rejected in the Preston WTP application due to potential technical problems and the cost effectiveness of SCR. Potential problems addressed in the application include the presence of contaminants in diesel fuel such as sulfur, phosphorus, and ash, which can poison or mask the surface of the catalyst and reduce its activity. Fuel sulfur, which is oxidized to $SO_2$, may react with ammonia to form ammonium sulfate and ammonium bisulfate salts which can form a coating over the catalyst surface and reduce its effectiveness. The application also indicates that the standby generators will accommodate fluctuations in load, which may result in exhaust temperatures outside the range of optimum catalyst performance and result in either reduced $NO_x$ reduction efficiency or the release of unreacted ammonia. The cost effectiveness of using SCR was calculated to be $2,370/ton, versus a cost effectiveness of $212/ton with the use of combustion controls. The use of SCR would remove an additional 294 tpy of $NO_x$.

Based on our review of the application package, we have the following comments:

1. As indicated in the application, SCR has been applied at similar facilities in Philadelphia, PA (Philadelphia SW Water Treatment Plant and Philadelphia NE Water Treatment Plant) for the control of $NO_x$ emissions from diesel-fired internal combustion (IC) engines. Although the Preston WTP application has discussed potential problems which may be associated with the use of SCR, the application does not address any operational differences between the Preston WTP and the facilities in Philadelphia to indicate why SCR would not be feasible for the Preston WTP. To validate the claim that SCR is not technically feasible for the Preston WTP, the application should address any significant differences with the facilities in Philadelphia and should discuss any operational problems which may have been experienced with SCR at the Philadelphia facilities. The application for the Preston WTP should also discuss the expected exhaust gas temperature from the IC engines at reduced loads and the amount of time the engines would be operated at reduced loads to address the concern about achieving an optimum temperature for SCR use. Although the application indicates that the estimated cost effectiveness of $2,370/ton is unreasonable, a cost effectiveness of this magnitude is typically considered to be acceptable for $NO_x$ reduction costs.

2. Although the application bases the potential emissions on a maximum annual power production rate of 19,000,000 kW-hr, the application does not account for emissions while the engines are being operated without producing power. The

application should describe the duration and frequency of operation of the engines while not producing power, and should include an estimate of the annual emission rates during such conditions. The total annual emissions should account for various modes of operation of the engines. Since the engines could be operated a considerable amount of time without producing power, the total annual $NO_x$ emissions allowed by the PSD permit will likely need to be restricted by a method other than a limit on the amount of electricity generated.

3. The PSD application provides emission factors at different loads for the Model 20F4B engines, but does not provide such data for the Model 20E4 engines. Emission factors (and their basis) also need to be provided in the permit application for the Model 20E4 engines. The PSD permit may need to include different BACT emission limits for the two models of engines, to reflect their achievable emission rates.

4. The modeled impact assessment used the 20FA4 generator to represent the two types of generators at the Preston WTP because the location of these generators are closer to the boundary fence line, and they have the largest emission rate. Other emission variables that affect the resultant concentrations are the location of the stacks relative to other buildings and the exit stack parameters (e.g., temperature, diameter, etc.). These other parameters should be considered in the selection to ensure the 20F4B generators produce the highest ground level concentrations.

5. Rural dispersion option was selected for the transport and dispersion calculations. Section 2.2 indicates the impact area as a mixture of residential, commercial, and light industrial - characteristics of urban areas. The guidance procedure for rural/urban classification should be used for this determination.

6. Section 6.3 indicates no offsite receptor located within 100 meters of the standby generators. Section 6.4 indicates the wake cavity region as being 26.5 meters from the stack with one receptor within Generator Building 2 wake zone. These are conflicting statements. If the latter condition is correct, SCREEN3 should be used to estimate the building cavity length and associated concentrations.

7. The modeled impact assessment has treated the Preston WTP and the Hialeah WTP as one common facility - no impact receptors were located on the adjacent Hialeah Water Treatment Plant. Although the Hialeah WTP is also owned by the Miami-Dade Water & Sewer Department, should these two facilities be considered one plant for permitting purposes?

8. The Federal Land Manager (FLM) for the Everglades National Park Class 1 area should be notified of this project and its anticipated impacts.

Thank you for the opportunity to review and comment on the application package. If you have any questions, please contact either Keith Goff or Stan Krivo at (404) 562-9137 or (404) 562-9123 respectively.

Sincerely yours,

Paul Hagner

R. Douglas Neeley
Chief
Air and Radiation Technology
Branch
Air, Pesticides, and Toxics
Management Division

cc: J. Kahn, BAB
R. Ready, JEP Water Treat. Plant
J. Bunyak, NPS
SED
Dade Co
D. Lindberg, CH2M Hill

# Memorandum

**To:** Dennis Wyent, General Motors Corporation Electromotive Division
Sent Via Fax, 708/387-5830

**From:** Susan DeVore-Fillmore, State of Florida Department of Environmental Protection
Bureau of Air Regulation, New Source Review Section

**Date:** June 8, 1998

**Re:** Diesel Engines

---

I would greatly appreciate a presentation from your division on large internal combustion diesel engines. Our section works on PSD permits and BACT determinations. We are currently processing several permit applications for facilities that operate GM Electromotive engine and generator sets. We would like information on GM's newest engines or technology, specifically, engine diagrams and any process changes or equipment add ons to reduce emissions of nitrogen oxides.

Please contact me at 850/921-9537 to make arrangements for a presentation.

6/23/98 Dean Buckman called, has info. from a commercial standpoint.
708/387-3937

6/25/98 day 44
Called Richard O'Rourke
Need more time to answer
RFI?
Yes => 30 days.

7/20 Called Dean Buckman

# Public Notice and Hearing

## Proposed Permit Issuance of an Air Pollution Control Construction Permit and Notice of Public Hearing for General Motors Corporation Electromotive Division, McCook, Illinois

General Motors Corporation Electromotive Division (GMC), 9301 West 55th Street in McCook, Illinois, has applied for a construction permit from the Illinois Environmental Protection Agency (Illinois EPA), for three of its five engine durability test cells. The test cells are used to evaluate the performance of the various models of diesel locomotive engine manufactured by GMC in McCook. The permit would allow GMC to modify test cell MU-1 to test a new engine model. It would also address test cells MU-4 and MU-5, which were built in 1982 and 1989, respectively.

The Illinois EPA will hold a public hearing on Tuesday, February 4, 1997, at 7 p.m. at the Village of LaGrange City Hall, 53 South LaGrange Road in LaGrange, Illinois. The hearing will be held by the Illinois EPA to receive comments and data and to answer questions from the public prior to making a final decision concerning the permit. Lengthy comments and questions should be submitted to the Illinois EPA in writing.

Written comments must be postmarked by midnight March 6, 1997, need not be notarized and should be sent to the Hearing Officer, see address below.

The hearing will be held under the provisions of Subpart A of the Illinois EPA's "Procedures for Permit and Closure Plans" 35 Ill. Adm. Code 166. All questions about the hearing procedure, requests for copies of the hearing rules, or requests for special needs interpreters should be directed to the Hearing Officer, see below for address. Requests for special needs interpreters must be made to the Hearing Officer by January 21, 1997.

The Illinois EPA has reviewed the air permit application and has concluded that the project complies with applicable State and Federal air pollution control regulations, including the Illinois Environmental Protection Act, the federal Clean Air Act, Illinois' Rules for Air Pollution, 35 Ill. Admin. Code: Subtitle B and the federal Prevention of Significant Deterioration (PSD) rules, 40 CFR 52.21.

The three test cells are subject to the PSD rules for their emissions of nitrogen oxides ($NO_x$). The emissions of other pollutants from each of the test cells are not significant. The Illinois EPA has determined that the test cells will have BACT for $NO_x$, as the cells will test engines that will reduce $NO_x$ emissions with turbocharging and aftercooling.

GMC also performed an air quality analysis for nitrogen oxides to address compliance with the National Ambient Air Quality Standard (NAAQS) of 100 ppm, annual average. The analysis calculated a maximum annual impact from the test cells at the point of maximum impact of 12.2 parts per million ("ppm"). The current $NO_x$ concentration at this point, combining ambient monitoring data and modelled impacts from existing sources, was estimated to be 82.1 ppm. Based on this analysis, the test cells will not cause or contribute to a violation of the NAAQS for $NO_x$. PSD also sets maximum allowable pollution increases called "allowable increments". The allowable increment for $NO_x$ in this area is 25 ppm. The maximum impact of the test cells is only about half of the allowable

increment.

Persons wanting more information may review GMC's permit application, and Illinois EPA's draft permit and project summary at the following locations:

*Illinois Environmental Protection Agency*
*1701 First Avenue*
*Maywood, Illinois 60153*
*708/338-7900*

*Illinois Environmental Protection Agency*
*1340 North Ninth Street*
*Springfield, IL 62794*
*217/782-2113*
*217/782-9143 TDD*

*LaGrange Public Library*
*10 West Cossitt Avenue*
*LaGrange, Illinois 60525*

For information concerning the applications and draft permit, please contact:

*Brad Frost, Community Relations Coordinator* Called 6/5
*Illinois Environmental Protection Agency*
*2200 Churchill Road, P.O. Box 19506*
*Springfield, Illinois 62794-9506*
*217/782-2113*
*217/782-9143 TDD*

For information concerning the hearing and hearing procedures, please contact:

*John Williams*
*Hearing Officer*
*Illinois Environmental Protection Agency*
*2200 Churchill Road, P.O. Box 19276*
*Springfield, Illinois 62794-9276*
*217/782-5544*
*217/782-9143 TDD*

DISCLAIMER COMMENTS SEARCH IEPA BACK

Date: 06/02/1998 12:57:06 PM
From: Susan DeVore TAL
Subject: FWD: MDW&SD Hialeah/Preston PSD application

Mike,

I asked Jim Pennington about the e-mail from Tom Tittle, but he has not seen the NOx tests. He thought you might know. Have you, or who should I ask? Thanks.

Susan

Date: 06/02/1998 10:00:29 AM
From: Jim Pennington TAL
Subject: Re: FWD: MDW&SD Hialeah/Preston PSD application

:>)Jim,
:>)
:>)I forwarded Tom Tittle's e-mail to you. Joe and I are not aware of
:>)any NOx tests submitted for this facility, are you? I'm assuming
you
:>)would be the person in Tallahassee to know. If not, let me know so
I
:>)can put Tom on the right track and find out myself. Thank you.
:>)
:>)Susan

Susan,

You should check with Mike harley. I am clueless on this.

Jim P.

Date: 06/02/1998 9:31:03 AM
From: Susan DeVore TAL
Subject: FWD: MDW&SD Hialeah/Preston PSD application

Jim,

I forwarded Tom Tittle's e-mail to you. Joe and I are not aware of any NOx tests submitted for this facility, are you? I'm assuming you would be the person in Tallahassee to know. If not, let me know so I can put Tom on the right track and find out myself. Thank you.

Susan

Date: 05/11/1998 5:31:41 PM
From: Thomas Tittle WPB
Subject: MDW&SD Hialeah/Preston PSD application

I see that they completed their application April 13th. I am investigating whether or not they failed to submit NOx tests for their Emergency Generators #1, #2 and #3. ARMS indicates they conducted passing NOx tests on these units on Sep 24, 1996. There is no testing indicated for 1997. Did they submit a 1997 test report to your office? If so, please send us a copy so that we can review it and enter it into ARMS.

If they did not submit a report for 1997 to your office... maybe you or Joe know whether such tests are required by rule annually (because we don't have a permit condition which requires it presently).

I hope that the PSD permit you issue will specify the NOx test frequency (and base date if applicable)... assuming the PSD permit you are issuing involves the permitting of these 3 units as I think it does.

Thanks for any help you can provide,
Tom

PS I'm sure you've heard that Andrew is leaving us to work for a construction firm. : (

**Table 1-1. Emission Factors for Diesel Internal Combustion Engines**[4]

| Air Contaminant (lb/gal) | Emission Factor |
|---|---|
| Reactive Organic Gas (ROG) | 0.0445 |
| Oxides of Nitrogen ($NO_x$) | 0.4690 |
| Oxides of Sulfur ($SO_x$) | 0.0071* |
| Carbon Monoxide (CO) | 0.1020 |
| Particulate Matter (PM) | 0.0335 |

* $SO_x$ emissions corrected to 0.05 percent sulfur.

## 1.4 Calculations

### 1.4.1 Operational Data

The applicant must provide the following information so that emission calculations can be made to determine the compliance status of the IC engine.

Operating Schedule
- Maximum ---------- (hr/day, day/week)
- For Maintenance Purposes ---------- (hr/day, day/week)

Engine Brake Horsepower

Fuel Type

Fuel Consumption Rate ---------- (gal/hr)

Exhaust Volume ---------- (dry standard cubic feet per minute [dscfm] or actual cubic feet per minute [acfm])

### 1.4.2 Emissions Calculations

Emissions must be calculated for both actual (average) and maximum operating conditions. Actual emissions are based on average daily production rates. Maximum emissions are based on the maximum production capacity of the equipment (brake horsepower, fuel consumption rate, etc.). Actual and maximum hourly (lb/hr) emission rates must be converted into daily (lb/day) emission rates by multiplying the hourly rates by the average amount of time in a day that the equipment operates (T, hr/day).

### 1.4.2.1 Uncontrolled Emissions ($R_1$) Calculations

Uncontrolled emissions from the internal combustion engine may be calculated using the following equation:

$$R_1 = EF \times FCR_D \qquad \textbf{(Equation 1.1)}$$

where:

$R_1$ = Uncontrolled emissions (lb/hr)

EF = Emission factor (lb/gal fuel)

$FCR_D$ = Fuel consumption rate (gal/hr)

This procedure is repeated for each air contaminant. By incorporating emission factors shown in Table 1-1, Equation 1.1 can be simplified as follows:

$$\begin{aligned} R_{1,ROG} &= 0.0445(FCR_D) \\ R_{1,NOx} &= 0.4690(FCR_D) \\ R_{1,SOx} &= 0.0071(FCR_D) \\ R_{1,CO} &= 0.1020(FCR_D) \\ R_{1,PM} &= 0.0335(FCR_D) \end{aligned} \qquad \textbf{(Equation 1.2)}$$

where:

$R_1$ = Uncontrolled emissions (lb/hr)

$FCR_D$ = Diesel fuel consumption rate (gal/hr)

### 1.4.3 Total Particulate Matter Emissions — Concentration

The PM emission rate (lb/hr) must be converted into total PM concentration (grains/dscf). If the exhaust gas flow rate is given in terms of "actual" exhaust conditions, the flow rate must be converted into dry "standard" conditions by using the following equation:

$$F_1 = F_2 \times \frac{T_1 \times P_2}{T_2 \times P_1} \times \frac{(1 - M)}{100} \qquad \textbf{(Equation 1.3)}$$

where:

$F_1$ = Dry standard cubic feet per minute (dscfm)

$F_2$ = Actual cubic feet per minute (acfm)

$T_1$ = Standard temperature (degrees Rankine) ($60^{\circ}F + 460$)

$T_2$ = Exhaust temperature (degrees Rankine) ($t_2{}^{\circ}F + 460$)

$P_1$ = Standard pressure (in Hg, typically 29.92 in Hg)

$P_2$ = Actual (or rated) exhaust pressure (in Hg)

M = Percent moisture in exhaust gas (typically 10 percent)

Total PM concentration then is determined using Equation 1.4:

$$C = \frac{(R_1)(7{,}000 \text{ grains/lb})}{(F_1)(60 \text{ min/hr})} \qquad \textbf{(Equation 1.4)}$$

where:

C = Particulate concentration (grains/dscf)

$R_1$ = Particulate mass emission rate (lb/hr)

$F_1$ = Dry standard cubic feet per minute (dscfm)

# REFERENCES


1. "Stationary Internal Combustion Engines," EPA-450/2-78-125a, July 1979.

2. Obert, E. F., "Internal Combustion Engines and Air Pollution Control," Intext Educational Publishers, New York, 1973.

3. Patterson, D. T. and N. A. Henein, "Emissions From Internal Combustion Engines And Their Control," Ann Arbor Service, 1972, pp. 44-45, 117, 128-129.

4. Compilation of Air Pollution Emission Factors (AP-42), 4th Edition, September 1985, Table 3.3-1.

## 1.1 General Description

Stationary reciprocating internal combustion (IC) engines often are used because they require a short construction time, are easy to install and have remote operations capability. Their applications include, but are not limited to, oil and gas piping and production, construction, electrical power generation and industrial applications requiring mechanical work in the form of shaft power. IC engines can operate on a variety of fuels at a wide range of speeds and with varying loads. Typical fuels are gasoline, diesel fuel, natural gas, sewage gas, landfill gas, and certain mixtures of these fuels.

Many diesel-fired IC engines are used to generate non-utility electrical power in the event of utility power failures. In such instances, the engines are paired with electrical generators. These emergency standby engine/generator sets are installed at hospitals, insurance companies, banks, and other facilities where maintaining electrical power is critical. Typically, medium-powered, high-speed (100 horsepower/ cylinder and greater than 1,000 revolutions per minute) engines are used.[1] Many engines are turbo-charged and aftercooled.

IC engines are classified by their ignition methods for the air-fuel mixture. These methods are spark ignition (Otto Cycle) and compression ignition (Diesel Cycle).

All gasoline or gas engines (Otto Cycle) are spark ignition (SI) engines, in which a spark plug is used to ignite a premixed air-fuel mixture. The fuel usually is mixed with air in a carburetor (for gasoline) or at the intake valve (for gaseous fuels), then ignited in the cylinder by the spark of an electrical discharge.

All diesel-fueled engines (Diesel Cycle) are compression ignition (CI) engines. After air is introduced into the cylinders, high-pressure compression raises the air temperature to the ignition temperature of the diesel fuel. The diesel fuel then is injected into the hot air causing fuel combustion.

Figure 1-1 illustrates the operation of the diesel engine if the spark plug is replaced by a fuel injection valve. The diesel cycle involves the following events:[2]

a. An intake stroke to induct air alone into the cylinder (intake valve open);

b. A compression stroke to raise the air temperature to a temperature higher than the ignition point of the fuel; compression ratios of 15:1 to 18:1 are used (both valves closed);

c. Fuel ignition during the first part of the expansion stroke at a rate such that combustion maintains constant pressure, followed by expansion to the initial volume of the cylinder (both valves closed); and

d. An exhaust stroke to purge the burned gases from the cylinder (exhaust valve open).

This description applies to a naturally aspirated engine which uses the vacuum created behind the moving piston to suck in the fresh air charge.

To increase the power output and efficiency of a diesel-fired IC engine two methods can be used: turbocharging or supercharging. Both methods use a blower or compressor to increase the air supply or combustible mixture to the cylinders beyond the level normally pumped or sucked in by the pistons at the prevailing atmospheric pressure. The main difference between turbocharging and supercharging is that a turbocharger uses the energy in the hot exhaust gases to drive the turbine which is mechanically coupled to a compressor, while a supercharger is driven by the engine's crankshaft.[1] Turbocharging is the more common method of air pressurization for diesel-fired IC engines.

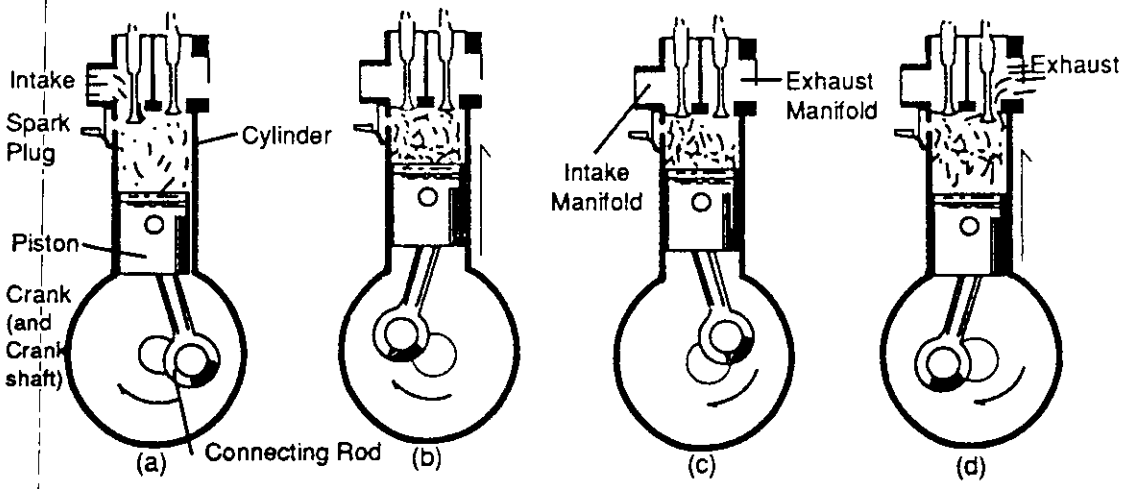



**FIGURE 1-1. THE FOUR-STROKE, SPARK-IGNITION (SI) CYCLE. Four Strokes of 180° of Crankshaft Rotation, or a Total of 720° of Crankshaft Rotation Per Cycle.**

Air pressurization (compressing the air) increases the amount of air that can be introduced into the fixed volume of the cylinders. Although the air-to-fuel ratio is fixed by combustion requirements, overall power can be increased by using high-pressure air (instead of atmospheric pressure air), which allows the use of more fuel while maintaining the air-to-fuel ratio. In turn, increasing the amount of the combustible mixture increases the amount of power obtained from a given cylinder configuration. Turbochargers normally are designed to increase an engine's output to approximately 1.5 times its original power.[1] However, if the engine is constructed to withstand the higher internal pressures, turbocharging can be used to raise the engine's capacity to two to three times its naturally aspirated value.[1]

Larger turbocharged IC engines normally use an intercooler or aftercooler (heat exchanger) to lower the temperature of the intake air after it has been heated by turbocharging. This heat exchanger is located between the turbocharger and the intake manifold. Decreasing the temperature of the air increases its density (and decreases the volume), allowing more air to enter the cylinder. Increasing the mass of air allows higher fuel flow rates. Burning the additional fuel results in higher power output. Also, decreasing the inlet air temperature has a secondary effect of reducing the peak combustion temperature, thus reducing the formation of (thermal) oxides of nitrogen ($NO_x$) emissions.[1]

Many diesel-fired emergency standby engines are four-cycle, turbocharged, and aftercooled. A four-cycle engine completes its power cycle in two revolutions of the crankshaft, compared to one revolution for the two-cycle engine. Two-cycle engines have the advantage of a higher horsepower-to-engine weight ratio compared to four-cycle engines. This is because the two-cycle design has twice as many power strokes per unit of time as the four-cycle. However, combustion can be better controlled in a four-cycle engine, and excess air is not required to purge the cylinders as it is for the two-cycle engine.[3] Therefore, two-cycle engines tend to be less efficient and uncontrolled models tend to emit more pollutants (primarily unburned hydrocarbons) than their four-cycle counterparts.[3]

## 1.2 Permit Unit Description

The following information generally is included in a permit for an I.C. engine:

- the manufacturer's name;
- the model number and serial number;
- the number of cylinders;

- that it is used for emergency electrical generation;
- the type of fuel used (diesel, gasoline etc.);
- whether it is turbocharged;
- whether is aftercooled;
- the type of design (two-cycle or four-cycle engine);
- whether it is naturally aspirated; and
- the brake horsepower.

## 1.3 Emissions

Emission sources in IC engines are crankcase blowby, the fuel tank, and the exhaust. Crankcase blowby emissions are composed of gases that are vented from the oil pan and escape from the cylinders by moving past the piston rings and out through the exhaust valve. Emissions from the crankcase blowby are minor because the fuel (hydrocarbons) is not present during the compression of the charge. Emissions from the fuel tank are insignificant because of diesel fuel's low volatility. Most emissions from diesel engines are from the exhaust.[3]

The primary air contaminants from IC engine exhaust are oxides of nitrogen ($NO_x$), reactive organic gases (ROG), carbon monoxide (CO), oxides of sulfur ($SO_x$) and particulate matter (PM). $NO_x$ formation is a function of temperature and pressure during the combustion process and the nitrogen content of the fuel. $SO_x$ emissions, predominantly sulfur dioxide ($SO_{2)}$, are a function of the sulfur content of the fuel. The other contaminants, ROG, CO, and PM, are primarily the result of incomplete combustion.[1]

### 1.3.1 Emission Factors

Occasionally, engine manufacturers include emission or fuel consumption data with their specifications. If not, the emission factors for diesel IC engines (fuel oil No. 2) listed in Table 1-1 should be used to quantify emissions.

# Department of Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary


May 11, 1998

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Robert C. Ready, P.E.
Assistant Director of Treatment Facility
Miami-Dade Water & Sewer Department
4200 Salzedo Street
Coral Gables, FL 33146-0316

Re: Request for Additional Information Regarding Air Construction/Operation Permit Application
DRAFT Permit No. 0250281-006-AC, PSD-FL-248
John E. Preston Water Treatment Plant, Dade County

Dear Mr. Ready:

The Department has received your application for an air construction/operation permit for six diesel engine-driven generator sets at the John E. Preston Water Treatment Plant. The application was received on April 13, 1998. In order to continue processing your application, the Department will need the additional information below. Should your response to any of the below items require new calculations, please submit the new calculations, assumptions, reference material and appropriate revised pages of the application form.

1. Please provide a detailed cost analysis in terms of cost effectiveness (annualized dollars/tons reduced) based on the vendor information for the chosen control technology (Fuel Injection Timing Retard/Combustion Air Precooling) for $NO_X$ as well as Selective Catalytic Reduction (SCR) for both sets of generator sources.

2. Please indicate the times (duration) and frequency (i.e. twice per day, five days per week) of startup, shutdown and maintenance of the six diesel engine-driven generator sets, or any other time the engines are running, but do not produce power.

3. Please provide fuel usage information, including the heat input rate (MMBtu/hr) for each diesel generator and indicate the method of compliance for that heat input rate. Also, explain why fuel limitations are not proposed. Please provide emission rate calculations for $NO_X$ in units of lb/MMBtu and compare with emission limits of $NO_X$ RACT, Rule 62-296.570(4), F.A.C.

4. Please verify that the g/bhp-hr factor used for the chosen control technology at 100% load is 17.62 for $NO_X$ for both sets of generator sources. Provide the factor as well as emission rates for $NO_X$ if SCR is selected as the control technology. Also, provide the engine brake horsepower (bhp) curve for both sets of generator sources. Does the emission (g/bhp-hr) factor vary with engine speed or other operating factors? If so, please provide the different emission factors, including at 110% load.

5. Table 3-1 provides a comparison of proposed annual emissions with PSD significant emission rates for the EMD Model 20F4B standby generators. Please provide the supporting calculations for each proposed annual emission. Also, provide the same information for the EMD Model 20E4 standby generators.

6. Please indicate if the diesel generators will be able to comply with the requirements of Rule 62-297.310(6), F.A.C. If not, how will testing be conducted to show compliance with the $NO_X$ emission limit?

7. Have you considered other options towards reducing $NO_X$, such as alternative fuels, duel fuel firing, or engine retrofit kits? If so, please provide a summary, or why not?

8. Please provide a detailed map showing the location of all of the fenceline receptors used in the air quality impact analysis. These receptor locations should be shown in UTM coordinates since the UTM coordinate system is used in the modeling. In addition send us diskettes containing all of the air quality impact analysis modeling output files.

Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. As a result your response should be certified by a professional engineer registered in the State of Florida. A copy of your response should be sent to Isidore Goldman, DEP Southeast District and Patrick Wong, Dade County DERM.

If you should have any questions, please call Susan DeVore-Fillmore (engineer) or Cleve Holladay (meteorologist) [project engineer] at 850/921-9537 or 850/921-9530, respectively.

Sincerely,

A.A. Linero, P.E. Administrator
New Source Review Section

AAL/sdf

cc: Mr. Brian Beals, EPA
Mr. John Bunyak, NPS
Mr. David E. Lindberg, P.E., CH2M HILL
Mr. Isidore Goldman, SED
Mr. Patrick Wong, DERM

Is your RETURN ADDRESS completed on the reverse side?

**SENDER:**
- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "*Return Receipt Requested*" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
Mr. Robert C. Ready, PE
Miami Dade Water & SO
4200 Salzedo St.
Coral Gables, Fl
33146-0316

4a. Article Number
P 265 659 347

4b. Service Type
☐ Registered ☒ Certified
☐ Express Mail ☐ Insured
☐ Return Receipt for Merchandise ☐ COD

7. Date of Delivery
5 13 98

5. Received By: *(Print Name)*
L. BANFIELD

8. Addressee's Address *(Only if requested and fee is paid)*

6. Signature: *(Addressee or Agent)*
X L. Banfield

PS Form **3811**, December 1994 Domestic Return Receipt

Thank you for using Return Receipt Service.

P 265 659 347

US Postal Service
**Receipt for Certified Mail**
No Insurance Coverage Provided.
Do not use for International Mail *(See reverse)*

| | |
|---|---|
| Sent to: Robert C Ready | |
| Street & Number: MDW & S D | |
| Post Office, State, & ZIP Code: Coral Gables, Fl | |
| Postage | $ |
| Certified Fee | |
| Special Delivery Fee | |
| Restricted Delivery Fee | |
| Return Receipt Showing to Whom & Date Delivered | |
| Return Receipt Showing to Whom, Date, & Addressee's Address | |
| TOTAL Postage & Fees | $ |
| Postmark or Date: 025021-006-AE 5-11-98 PSD-FI-848 | |

PS Form **3800**, April 1995

# Department of Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

April 21, 1998

Mr. Brian Beals, Section Chief
Air, Radiation Technology Branch
Preconstruction/HAP Section
U.S. EPA - Region IV
61 Forsyth Street
Atlanta, Georgia 30303

Re: Miami-Dade Water & Sewer Department
Six Diesel Engine-Driven Generator Sets
AIRS No. 0250281-006-AC, PSD-FL-248

Dear Mr. Beals:

Enclosed for your review and comment is an application for the above mentioned project. Your comments can be forwarded to my attention at the letterhead address or faxed to the Bureau at (850)922-6979.

If you have any questions, please contact Susan DeVore-Fillmore at (850)921-9537.

Sincerely,

A. A. Linero, P.E.
Administrator
New Source Review Section

AAL/kt

Enclosures

cc: Susan DeVore-Fillmore, BAR

# Department of Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

April 21, 1998

Mr. John Bunyak, Chief
Policy, Planning & Permit Review Branch
NPS-Air Quality Division
Post Office Box 25287
Denver, Colorado 80225

Re: Miami-Dade Water & Sewer Department
Six Diesel Engine-Driven Generator Sets
AIRS No. 0250281-006-AC, PSD-FL-248

Dear Mr. Bunyak:

Enclosed for your review and comment is an application for the above mentioned project. Your comments can be forwarded to my attention at the letterhead address or faxed to the Bureau at (850)922-6979.

If you have any questions, please contact Susan DeVore-Fillmore at (850)921-9537.

Sincerely,

A A Linero 4/21

A. A. Linero, P.E.
Administrator
New Source Review Section

AAL/kt

Enclosures

cc: Susan DeVore-Fillmore, BAR