TECHNICAL SUPPORT DOCUMENT

This document serves as the statement of basis as required by 40 CFR part 124. This document sets forth the legal and factual basis for permit conditions, including references to applicable statutory or regulatory provisions, including provisions under 40 CFR § 52.21. This Technical Support Document (TSD) is for all interested parties of the permit.

1. GENERAL INFORMATION

1.1 Applicant and Stationary Source Information

Permitting Authority:	United States Environmental Protection Agency Region 5 77 West Jackson Blvd. Chicago, Illinois 60604
Air Quality Permit Number:	PSD-PI-R50003-00-01
Owner/Operator Name and Address:	Energy Alternatives, Inc. 21210 Eaton Avenue, Suite C Farmington, Minnesota 55024
SIC Code:	4911, Electric Services
Facility Location	Treasure Island Resort and Casino 5734 Sturgeon Lake Road Red Wing, Minnesota 55066 Prairie Island Indian Community
Responsible Official:	Dale Gundberg, President Energy Alternatives, Inc. Phone: (612) 242-1887 Fax: (651) 460-7529
Permit Contact:	Philip Kairis, Operations Manager Energy Alternatives, Inc. Phone: (612) 245-3750 Fax: (651) 460-7522

1.2 FACILITY DESCRIPTION

Energy Alternatives, Inc. proposes to install four internal combustion engines at the Treasure Island Resort and Casino at 5734 Sturgeon Lake Road, Red Wing, Goodhue County, Minnesota 55066. The engines will be owned and operated by Energy Alternatives, Inc., and located on the property of the Prairie Island Indian Community. The engines will be installed northeast of the Treasure Island Resort and Casino at the Prairie Island Community Wastewater Treatment Facility. The location of the

facility housing the engines will be near Highways 61 and 316, between the cities of Hastings and Red Wing, in Goodhue County, Minnesota.

The shaft power of each engine will drive a 1825 kW generator to produce electricity. The electricity produced will be used for peak load management and backup power for the Treasure Island Resort and Casino. The total generation capacity of the engines will be 7.3 megawatts (MW). Electricity generated at the facility will not be sold for distribution. The project is major for the Prevention of Deterioration (PSD) permitting because the potential nitrogen oxide (NOx) emissions from the engine generator project is above 250 tons per year.

The four engines will each be Caterpillar Model 3516B turbocharged engines. The Caterpillar 3516B engines each have 16 cylinders. Each engine operates at a rated speed of 1800 revolutions per minute(rpm) and produces shaft power of 2,593 brake horsepower (BHP). Each engine will burn approximately 130.2 gallons per hour of low sulfur (0.05%) diesel fuel when operated at capacity.

A building will house the four engine generator sets and a control room. It will occupy approximately 3,268 square feet. Additional space outside the building will be required for the electrical transformers, related interconnection equipment, and road access. A 10,000 gallon underground diesel fuel tank is proposed for installation adjacent to the building, and will be subject to underground storage tank regulations under the Resource Conservation, and Recovery Act (RCRA).

The emission units, control equipment and emission stacks at the stationary source authorized in this permit are described in the PSD construction permit application submitted to the United States Environmental Protection Agency (EPA) on May 15, 2000.

2. POTENTIAL TO EMIT SUMMARY

Potential Emission Rates	VOC	NOx	CO	PM	PM10	SO2	HAPs
Potential hourly emissions per engine (lb/hr)	1.16	37.44	3.05	0.87	0.72	0.91	0.025
Total potential emissions - 4 engines (lb/hr)	4.64	149.76	12.20	3.48	2.86	3.65	0.100
Total potential emissions - 4 engines (tpy)	20.32	655.95	53.44	15.24	12.53	15.97	0.438
Limited potential emissions - 4 engines (tpy)	0.29	41.18	3.36	0.96	0.79	1.00	0.027

3. PREVENTION OF SIGNIFICANT DETERIORATION REVIEW

3.1 Best Available Control Technology Analysis

Since the total potential emissions from the proposed engines is greater than 250 tons per year for nitrogen oxides (NOx), the facility is considered a major stationary source and subject to Federal Prevention of Significant Deterioration (PSD) permitting which includes a Best Available Control Technology (BACT) analysis. Therefore, the PSD applicant, Energy Alternatives, conducted a BACT analysis for NOx.

The BACT analysis is an analysis of the emissions reductions that can be achieved by any new major stationary source emissions unit and the available pollution control technology that can be used to achieve the emissions reductions. It is a “top-down” process in which all available control technologies are ranked from highest to lowest in order of effectively reducing air emissions. In the “top-down” process, the PSD applicant first examines the most stringent, or “top” control alternative. That alternative is established as BACT unless the applicant demonstrates, and the permitting authority in its informed judgement agrees, that technical considerations, or energy, environmental, or economic impacts justify a conclusion that the most stringent technology is not “achievable” in that case. If the most stringent technology is eliminated in this fashion, then the next most stringent alternative is considered, and so on. The BACT analysis is done on a case-by-case basis. The Environmental Protection Agency (EPA) provides guidance on conducting BACT analyses in the New Source Review Workshop Manual (DRAFT, October 1990).

The BACT analysis for the proposed project is based on a baseline of 8760 operating hours per year at rated capacity. Uncontrolled NOx emissions at rated capacity are 10.15 g/BHP-hr, 58 lb/hr, and 226.2 tons per year for each engine based on the manufacturer’s guarantee.

Energy Alternatives identified the following control options for determining BACT for the proposed engine generator sets:

Engine gas recirculation (EGR)
Fuel Specification (Low Nitrogen Fuel)
Intake air cooling
No controls
Non-selective catalytic reduction (NSCR)
Non-thermal plasma reactor
Pre-ignition chamber combustion
Retard engine timing

Rich burn combustion
Selective Catalytic Reduction (SCR)
Steam/water injection
Turbocharger /w aftercooler
A combination of control techniques

EGR, low nitrogen fuel, intake air cooling, NSCR, non-thermal plasma reactors, pre-chamber combustion ignition, rich burn combustion, SCR, and water/steam injection were eliminated based on technical infeasibility.

Technical infeasibility can include technical difficulties that would preclude successful use of a control option for the emissions unit under review. It can be demonstrated through physical, chemical, and engineering principles. Two key concepts in determining whether a control technology is feasible are whether it is commercially available and whether it can be reasonably installed and operated on the emissions unit under review.

Of the remaining control options, the top alternative or, most effective control option, was determined to be emissions of 6.55 g/HP-hr by using electronic injection timing retardation, and turbochargers with aftercoolers to achieve emissions reductions for nitrogen oxides. Since all compression-ignition (CI) engines, which include diesel engines are lean-burn engines, lean burn combustion is an inherent function of these proposed units. Thus, lean-burn combustion technology was not considered as a separate control option for BACT. Also, since the applicant accepted the top alternative in the list for BACT a cost analysis is not required, nor is a detailed analysis required for the other control options.

3.2 Air Quality Analysis

The PSD review requires the applicant to conduct an air quality analysis of the ambient impacts associated with the construction and operation of the proposed new source. The main purpose of the air quality analysis is to demonstrate that new emissions emitted from the proposed major stationary source, in conjunction with other applicable emissions from existing sources in the area, will not cause or contribute to a violation of any applicable National Ambient Air Quality Standards (NAAQS) or PSD increment. An air quality analysis is also required for any pollutant increases from a proposed new or modified source planning to construct within 10 kilometers of a Class I area and has an ambient impact on such an area equal to or greater than 1 $\mu g/m^3$, based on a 24-hour average.

Energy Alternatives is required to conduct an air quality analysis for NOx. Generally, the analysis involves (1) an assessment of existing air quality, which may include ambient monitoring data and air quality dispersion modeling results, and (2) predictions, using dispersion modeling, of ambient concentrations that will result from the proposed project and future growth associated with the project.

The dispersion modeling analysis usually involves two phases: (1) a preliminary analysis and (2) and a full impact analysis. The preliminary analysis models only the significant increase in potential emissions of a pollutant from the proposed source and the results of this analysis determine whether a PSD applicant must perform a full impact analysis. A full impact analysis involves estimating background pollutant concentrations resulting from existing sources and growth associated with the proposed source. In addition, the applicant must still address additional impact analysis requirements required under 40 CFR 52.21 (o).

ISCST3 modeling was used to conduct the air quality analysis for the Treasure Island Peaking Power Station to assess potential NOx air quality impacts from the four engine generating units. Since Energy Alternatives, Inc. plans to operate each of the peaking units at no more than 550 hours per year, and this operational condition will be enforceable under the PSD permit, this operational condition was included in the air quality analysis. The modeling results showed impact concentrations below the annual significance level of 1 $\mu g/m^3$ at 550 hours per year of operation, and a full impact analysis was not required. Also, the predicted annual impact of 0.97 $\mu g/m^3$ is below 1 $\mu g/m^3$. After adding an estimated background concentration of 8.6 $\mu g/m^3$, the resultant concentration is 9.6 $\mu g/m^3$, which is below the annual air quality standard of 100 $\mu g/m^3$ and the allowable Class II PSD increment of 25 $\mu g/m^3$.

3.3 Additional Impact Analysis

For the additional impact analysis, the applicant to must examine growth in the area due to the project, to analyze the impacts of emissions from the project on the soils and vegetation in the area, and to analyze any visibility impairment due to the project. The additional impact analysis showed no significant impacts on visibility, soils and vegetation in the surrounding area.

3.3 Emissions Limits and Monitoring/Testing

Emissions Limitation	Monitoring	Basis
NOx: 6.55 g/HP-hr per engine NOx: 37.44 lb/hr per engine	Conduct an initial performance test; Conduct a performance/ stack test every three (3) years; Conduct an annual emissions test using a portable emissions analyzer during the calender years between the periodic performance tests	BACT 40 CFR § 52.21
NOx: 10.30 tpy per engine	Recordkeeping of monthly NOx emissions for each engine based on a twelve month rolling sum	BACT 40 CFR § 52.21
550 hr/year per engine	Recordkeeping of monthly operating hours for each engine based on a twelve month rolling sum	Air Quality Analysis 40 CFR § 52.21
Turbocharger /w Aftercooler operation: maintain the aftercooler return water temperature for each engine at less than or equal to 140 degrees Fahrenheit.	Continuously monitor aftercooler temperature of each engine	BACT 40 CFR § 52.21
Electronic injection timing retardation: flash file program #180-1736 shall be set for retard engine timing	Maintain records of flash file program #180-1736 which establishes retard engine timing parameters	BACT 40 CFR § 52.21
Combustion operation: intake manifold pressure at 28.1 to 76.2 in Hg for 40 to 100% load for each engine	Continuously monitor the intake manifold pressure	BACT 40 CFR § 52.21

The permit requires Energy Alternatives to conduct a stack or performance test every three (3) calender years, with the first test required to be conducted three years following the initial compliance test. Energy Alternatives will use a portable emissions analyzer to measure NOx emissions annually during years in which a periodic stack or performance test is not required. The portable emissions analyzer must be set up and used according to the testing methods and principles in the Portable Electrochemical Analyzer Procedure (attachment 2 of the permit).

This method is applicable to the determination of nitrogen oxides (NO and NO_2), carbon monoxide (CO) and oxygen (O_2) concentrations in controlled and uncontrolled emissions from combustion sources using fuels such as natural gas, propane, butane, and fuel oils. This method is designed to provide a reasonable assurance of compliance using periodic monitoring or testing.

The permit requires Energy Alternatives to maintain records of all measurements and other data required in the permit for at a period of least five (5) years after the effective date of the permit. The permit also requires Energy alternatives to submit reports to the EPA Region 5 office, including an annual compliance certification to certify compliance with the emissions limitations and other applicable terms of the permit.