STATEMENT OF BASIS
Prevention of Significant Deterioration
Proposed Permit No.: PSD-ML-R50007-05-01

This document serves as the statement of basis, as required by Title 40 of the Code of Federal Regulations (40 CFR) part 124, for a Prevention of Significant Deterioration (PSD) air pollution construction permit. This document sets forth the legal and factual basis for permit conditions, with references to applicable statutory and regulatory provisions, including provisions under the federal PSD regulations, 40 CFR 52.21. This statement of basis document is for all interested parties of the permit.

1.0 GENERAL INFORMATION

(A). Applicant and Stationary Source Information

Permitting Authority:	United States Environmental Protection Agency Region 5 (AR-18J) 77 West Jackson Boulevard Chicago, Illinois 60604
Owner/Operator Name and Address:	Mille Lacs Band Corporate Commission dba/Grand Casino Mille Lacs 777 Grand Avenue Highway 169 Onamia, Mille Lacs County, Minnesota 56359
SIC Code:	7011, Hotels and motels
Facility Location	Grand Casino Mille Lacs 777 Grand Avenue Highway 169 Onamia, Mille Lacs County, Minnesota 56359 Mille Lacs Band of Ojibwe Indian Reservation
Responsible Official:	Curt Kalk Commissioner of Natural Resources 43408 Oodena Dr., Onamia, MN 65359 Phone: 800-709-6445, ext. 7439 Fax: 320-532-7514

Facility Contact:	Phillip Kairis Vice President Energy Alternatives, Inc. Phone: (651)341-2244 Fax: (651)460-6717
Tribal Environmental Contact:	Charles Lippert Air Quality Technician 43408 Oodena Dr., Onamia, MN 56349 Phone:(320) 532-4704 Fax: (320) 532-7505

(B). Background and Facility Description

The Mille Lacs Band Corporate Commission, dba/Grand Casino Mille Lacs, submitted a Prevention of Significant Deterioration (PSD) permit application to EPA on October 20, 2004, proposing to change the method of operation of three existing internal combustion engines at the Grand Casino Resort and Hotel located on the Mille Lacs Indian Reservation in Mille Lacs County, Minnesota. These engines had been used as back-up generators. This permit will allow the three engines to be put on the peaking program of the local utility, as well as to continue to provide emergency power for the Permittee. The engines will combust low-sulfur diesel fuel and will drive three generators to produce electricity. Electricity generated at the facility will not be sold for distribution. The facility is located approximately 13.5 kilometers (km) north-northwest of the town of Onamia, Minnesota.

In 2001, EPA received notice from Grand Casino Mille Lacs requesting an exemption from PSD and Title V air permitting requirements because their generators were being used only on an emergency basis. In support of the request, the Permittee cited a September 6, 1995 EPA memo, “Calculating Potential to Emit (PTE) for Emergency Generators.” This memo says that a generator whose sole function is to provide back-up power may use the default of 500 hours when calculating PTE.

The shaft power of each of the larger two engines will each drive a 2,000 kilowatt generator to produce electricity, while the smaller engine will drive a 1,400 kilowatt generator. The electricity produced will be used for peak load management and backup power for Grand Casino Mille Lacs. The total electric generation capacity of the three engines will be 5.4 megawatts.

This project is major for PSD permitting because the potential to emit nitrogen oxide (NO_x) emissions from the engine generator project is above 250 tons per year (tpy).

The two larger 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 and produces shaft power of 2,885 brake horsepower. Each engine will burn approximately 139.7 gallons per hour of low sulfur (0.05%) diesel fuel when operated at maximum capacity. The smaller engine is a Caterpillar Model 3512B, which has 12 cylinders, and operates at a rated speed of 1,800 revolutions per minute and produces shaft power of 2,059 brake horsepower while burning approximately 102.8 gallons per hour of low sulfur (0.05%) diesel fuel when operated at maximum capacity.

(C). Area Classification

Grand Casino Mille Lacs is located on land that is held in trust for the Mille Lacs Band of Ojibwe Indians. The EPA is responsible for issuing and enforcing any air quality permits for this source until such time as the Tribe or State has EPA approval to do so.

Mille Lacs County, and all Indian Country within, is designated attainment for all criteria pollutants. There are no PSD Class I areas within 100 kilometers of the Grand Casino Mille Lacs site.

(D). Enforcement Issues

The EPA is not aware of any pending enforcement issues at this facility.

(E). Pollution Control Equipment

Emission control for the engines consists of the engines being turbocharged with aftercoolers, using fuel injection timing retard, using electronic controls for lean burn combustion, and burning low-sulfur diesel fuel.

(F). Emission Unit Summary from Grand Casino Mille Lacs Application to EPA

Emission Unit	**EU 001**	**EU 002**	**EU 003**
Unit Type:	Engine/ Generator	Engine/ Generator	Engine/ Generator
Manufacturer/ Model:	Caterpillar Model 3516B (Dry Manifold)	Caterpillar Model 3516B (Dry Manifold)	Caterpillar Model 3512B
Power Rating:	2,000 kW	2,000 kW	1,400 kW
Exhaust Height:	16 feet	16 feet	16 feet
Exhaust Diameter:	16 feet	16 feet	14 feet
Exhaust Flow:	16,040 acfm	16,040 acfm	11,696 acfm
Exhaust Temperature:	958^0 F	958^0 F	912^0 F
Fuel Type:	low sulfur (0.05%) diesel fuel only	low sulfur (0.05%) diesel fuel only	low sulfur (0.05%) diesel fuel only
Fuel Consumption Rate @ max. capacity:	139.7 gallons per hour	139.7 gallons per hour	102.8 gallons per hour
Shaft Power:	2,885 brake horsepower	2,885 brake horsepower	2,059 brake horsepower
Rated Speed:	1,800 revolutions per minute	1,800 revolutions per minute	1,800 revolutions per minute

(G). Potential Emissions

To determine PSD applicability, the applicant must submit PTE calculations representing the proposed project's worst-case emission scenario. Those emission units whose PTE for any regulated pollutant meets or exceeds the major source threshold are subject to PSD review. Because Grand Casino Mille Lacs is not one of the listed 28 source categories in 40 C.F.R. Part 52.21(b)(1), and because Grand Casino Mille Lacs is located in an attainment area, the major source threshold for any New Source

Review (NSR) regulated pollutant is 250 tons per year. The PTE is based on 8760 operating hours per year.

The PTE of PM-10 was calculated using information on the fraction of PM-10 compared to total particulate matter in Table 3.4-2 of AP-42, 5th Edition, for Large Uncontrolled Stationary Diesel Engines. Equation for PM-10 PTE: (0.0573 lb of PM-10/MMBtu)/(0.0697 lb of PM/MMbtu)*(0.64 lb of Total PM/hr). The sulfur dioxide PTE was based on the rated fuel flow rates of each engine and a sulfur content of 0.05% by weight. Equation for sulfur dioxide PTE for EU01: 139.7 gal/hr x 7 lb/gal x 0.05/100 x 1 lbmol S/32 lbS x 1 lbmol SO2/lb mol S x 64 lb SO2/lbmol SO2 = 0.978 lb/hour of SO2. The emission rates for NOx, VOC, CO, and PM are from stack test results. Emission rates for Hazardous Air Pollutants (HAPs) were calculated using emission factors from tables 3.4-3 and 3.4-4 of AP-42, 5th Edition, for Large Uncontrolled Stationary Diesel Engines.

Emission Factors for HAPs

Pollutant	Benzene	Toluene	Xylene	Formaldehyde	Acetaldehyde	Acrolein	Napthalene
Emission Factor (lb/MMBtu)	7.76E-04	2.81E-04	1.93E-04	7.89E-04	2.52E-04	7.88E-04	1.30E-04

Potential to Emit Summary

Emission Rate	VOC	NOx	CO	PM	PM10	S02	Total HAP's
PTE (Hourly Emissions):	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
EU 001	0.90	68.16	5.21	0.64	0.05	0.98	0.03
EU 002	0.90	68.16	5.21	0.64	0.05	0.98	0.03
EU 003	1.53	50.49	11.15	0.68	0.56	0.72	0.02
PTE (Annual Emissions):	tpy	tpy	tpy	tpy	tpy	tpy	tpy
EU 001	3.94	298.54	22.82	2.80	2.30	4.28	0.12
EU 002	3.94	298.54	22.82	2.80	2.30	4.28	0.12
EU 003	6.70	221.15	48.84	2.98	2.45	3.15	0.09

2.0 APPLICABLE REGULATIONS AND DETERMINATIONS

(A). New Source Review (NSR)

1. Applicability

The potential emissions of NO_x at Grand Casino Mille Lacs are greater than 250 tpy. Mille Lacs county, and all Indian Country within (Mille Lacs Band of Ojibwe Indian Reservation), is designated attainment for all criteria pollutants. Therefore, Grand Casino Mille Lacs is a major source and, as such, is subject to the PSD provisions [40 CFR 52.21(b)(1)(i)(b)].

2. Best Available Control Technology (BACT) Analysis

The BACT analysis is an analysis of the pollution control technology available to any new stationary source that can be used to achieve 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 judgment agrees, that technical considerations, or energy, environmental, or economic impacts justify a conclusion that the most stringent technology is not feasible 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 EPA provides guidance on conducting BACT analyses in the NSR Workshop Manual (DRAFT, October 1990).

i. Identification of NOx Control Technologies

The Permittee used the U.S.EPA RACT/BACT/LAER Clearinghouse (RBLC) to help identify available control technologies. The Permittee provided the

following as control options with potential to control NOx emissions from diesel-fired internal combustion engines:

- Engine Gas Recirculation (EGR)
- Fuel Specification (Low Nitrogen Fuel)
- Intake Air Cooling
- Non-Selective Catalytic Reduction (NSCR)
- Non-Thermal Plasma Reactors
- Pre-Chamber Combustion Ignition (also described as Clean Burn Combustion or Pre-Stratified Charge)
- Rich Burn Combustion
- Selective Catalytic Reduction (SCR)
- Water/Steam Injection
- New Caterpillar Emissions Strategy engine
- Modification of the existing engines
- Electronic Fuel Injection Timing Retard
- Turbocharger with Aftercooler
- A combination of one or more of the above Control Techniques
- No Controls

ii. Review of NOx Control Technologies

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.

Engine gas recirculation (EGR), low nitrogen fuel, intake air cooling, non-selective catalytic reduction, non-thermal plasma reactors, pre-chamber combustion ignition, rich burn combustion, and steam/water injection were eliminated based on technical infeasibility.

Below are the reasons provided by the Permittee for the technical infeasibility for the eight control techniques listed above:

- EGR: EGR would result in increased fouling of the air intake systems, combustion chamber deposits and engine wear rates due to the chemical and physical properties of the exhaust gas. In addition, this control technique is not commercially available from manufacturers of stationary internal combustion engines.
- Low Nitrogen Fuel: The Permittee has not been able to find a supplier of this type of fuel, and states that low nitrogen fuel for diesel-fired internal combustion engines is not available for purchase through commercial channels.
- Intake Air Cooling: The engines at Grand Casino Mille Lacs utilize turbochargers with aftercoolers instead of intake air cooling because they result in lower NOx emissions. It is not possible to have both a turbocharged engine and intake air cooling.
- NSCR: NSCR would not be effective for exhaust gas from reciprocating internal combustion engines (which have exhaust temperatures of approximately 900 degrees Fahrenheit) because the NSCR reaction is effective only within an relatively narrow range of temperatures; typically 1600 to 1800 degrees Fahrenheit. Reheating the exhaust gas to the temperatures at which NSCR is effective would require additional fuel combustion and would generate additional emissions.
- Non-Thermal Plasma Reactors: This control technology is not yet commercially available.
- Pre-Chamber Combustion Ignition: This type of ignition is currently installed only on gas-fired internal combustion engines and is not available for use with diesel-fired engines.
- Rich Burn Combustion: Rich burn combustion is difficult to achieve for diesel-fired internal combustion engines because the ratio of liquid fuel to air is so high. The engines with lowest NOx emissions available from engine vendors utilize lean burn combustion.
- Water/Steam Injection: This control technique is not available from manufacturers of internal combustion diesel-fired engines. The injection of water or steam would quench the flame and promote engine misfiring rather than reduce NOx emissions.

The Permittee determined that the following control techniques are technically feasible for diesel-fired stationary internal combustion engines:

- SCR Technology with new, inherently lower-emitting engines (Caterpillar Emissions Strategy Engines);
- SCR Technology with the existing engines (Caterpillar Low BSFC Engines);
- New, inherently lower-emitting engines (Caterpillar Emissions Strategy);
- Modification of the existing engine to achieve emissions equivalent to a Caterpillar Emissions Strategy Engine; and
- Use of existing engines (Caterpillar Low BSFC Engines)

Summary of Top-Down BACT Analysis
Control of NOx Emissions from Diesel-Fired Internal Combustion Engines

Control Alternatives for emission units EU 001 and EU 002

Control Alternatives	Range of Control (%)	Control Level for BACT (%)	Range of NOx Emissions (g/hp-hr)	Emissions for BACT (g/hp-hr)	Emissions (lb/hr)	Emissions (tpy)[a]	Emissions Reduction (tpy)	Basis
SCR with New Engine Emissions Strategy	75-90	80%	0.84-2.09	1.67	10.63	1.60	8.63	MFR
SCR with Existing Engine (Low BSFC)	75-90	80%	1.04-2.68	2.14	13.61	2.04	8.18	MFR
New 2000 kW Emissions Strategy engine, with new enclosures	-	22%	8.36	8.36	53.17	7.98	2.25	MFR
Modified 2000 kW engine with new enclosure	-	22%	8.36	8.36	53.17	7.98	2.25	MFR
Existing 2000 kW Engine with existing level of Fuel Injection Timing Retard, T/C and A/C (Baseline - Low BSFC)	-	-	10.72	10.72	68.16	10.22	0.00	MFR

Control Alternatives for EU 003

Control Alternatives	Range of Control (%)	Control Level for BACT (%)	Range of NOx Emissions (g/hp-hr)	Emissions for BACT (g/hp-hr)	Emissions (lb/hr)	Emissions (tpy)[a]	Emissions Reduction (tpy)	Basis
SCR with New Engine Emissions Strategy	75-90	80%	1.11-2.77	2.21	9.88	1.48	6.09	MFR
SCR with Existing Engine (Low BSFC)	75-90	80%	1.11-2.78	2.22	10.09	1.51	6.06	MFR
New 2000 kW Emissions Strategy engine, with new enclosures	-	1%	11.06	11.06	49.47	7.42	0.15	MFR
Modified 2000 kW engine with new enclosure	-	1%	11.06	11.06	49.47	7.42	0.15	MFR
Existing 2000 kW Engine with existing level of Fuel Injection Timing Retard, T/C and A/C (Baseline - Low BSFC)	-	-	11.12	11.12	50.49	7.57	0.00	MFR

[a] Potential annual emissions are calculated with federally enforceable limit of 300 hours/year.
MFR = manufacturer's data
Note: All control alternatives are assumed to use lean burn combustion.

Units of grams NOx per brake horsepower-hour were chosen to consistently represent NOx emissions from each control option. Manufacturers' data provided the basis for ranges of control. The level of control for BACT is the percent reduction compared to the baseline emission rate.

Based upon economic impacts, the Permittee eliminated SCR, the installation of Caterpillar Emission Strategy engines, and the modifications to the existing engines as possibilities for BACT. For an SCR and the new Caterpillar Emissions Strategy engines, a new enclosure and other adjustments to the existing mechanical and electrical systems would need to be completed. Where the existing engines would be modified, a larger enclosure would be needed to accommodate

the larger radiators as well as the installation of new software. The Permittee stated that the annualized cost in dollars per ton of NOx removed is $16,573 to install and use SCR; $75,149 to install and use the new Caterpillar Emissions Strategy engines; and $32,945 to modify and then operate the modified Low BSFC engines.

The existing engines have emission reduction and control inherent to their design: fuel injection timing retard, turbo chargers with aftercoolers, and lean burn combustion. Additionally, by taking a 300-hour limit on hours of operation, emissions are kept well below 50% of the PTE. For this reason, the existing engines are determined to be BACT.

iii. BACT Limit

A time-based BACT limit (e.g., lb/hr) is necessary to make sure that a source emitting at its BACT emission concentration limit does not emit more pollutant than assumed in the ambient analysis applicable at time of permit issuance. The lb/hr BACT emission rates were derived from July 30, 2001 emission test data.

BACT Emissions Limitation	**Basis**
EU001: 68.16 lb/hr, and 10.72 g/bhp-hr. EU002: 68.16 lb/hr, and 10.72 g/bhp-hr. EU003: 50.49 lb/hr, and 11.12 g/bhp-hr.	BACT 40 CFR § 52.21
EU001: 10.22 tpy EU002: 10.22 tpy EU003: 7.57 tpy	BACT 40 CFR § 52.21

3. PSD Operational Restrictions

The source is limited to operating the three diesel-fired engines for a maximum of 300 hours per year.

4. Air Quality Analysis

The PSD review requires an applicant to conduct an air quality analysis of the ambient air impacts associated with the construction and operation of the proposed new source. The main purpose of an 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.

The applicant is required to conduct an air quality analysis for NO_x. 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) 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.

The Industrial Source Complex Short-Term Model (ISC-PRIME) was used to conduct the air quality analysis for the Grand Casino Mille Lacs site to assess potential NO_2 air quality impacts from the emission units. Since the applicant plans to operate each of the emission units at no more than 300 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 above the annual significance level of 1 $\mu g/m^3$ at 300 hours per year of operation; therefore, a full impact analysis was required. The full impact analysis included comparing the NO_2 concentrations predicted from the ISC-PRIME model to both the NO_2 NAAQS and the NO_2 PSD Class II increment.

This comparison showed full compliance with both the NO_2 NAAQS and the allowable NO_2 PSD Class II increment.

5. Additional Impact Analysis

For the additional impact analysis, as required by 40 CFR 52.21(o), the applicant must examine growth in the area due to the project, analyze the impacts of emissions from the project on the ambient air quality and the soils and vegetation in the area, and analyze any visibility impairment due to the project. Since the ambient impacts from the proposed project exceed the NOx significant impact level out to only 850 meters from the proposed source, and are far below the NAAQS, there should be no harmful effects to water, vegetation, and soils, and visibility.

6. Class I Area Impact Analysis

For sources that have the potential to impact PSD Class I areas, additional analyses need to be conducted to demonstrate compliance with PSD Class I area increments, as well as any impacts on Air Quality Related Values (AQRV) associated with the PSD Class I area such as, visibility, water quality, flora and fauna.

The Grand Casino Mille Lacs site is located approximately 189 km west of Rainbow Lakes Wilderness Area (RLWA) in northwestern Wisconsin. The Federal Land Manager for the RLWA, the US Forest Service (USFS), was contacted on March 30, 2004. The USFS indicated that additional air modeling would not be required due to the proposed project having only negligible effects on the AQRVs at the RLWA. This was not a requirement because the RLWA is more than 100 km away from the Grand Casino Mille Lacs site, but the USFS was still contacted.

3.0 OPERATING REQUIREMENTS

A. Use a turbocharger and aftercooler at all times during operation of EU 001, 002, and 003.
B. Maintain the aftercooler return water temperature for each engine at less than or equal to 225 degrees Fahrenheit.

C. Operate EU 001, 002, and 003, at all times using lean burn combustion conditions for each engine.
D. At all times operate EU 001, 002, and 003 at Retard Engine Timing which involves delaying the injection of fuel in the engine for each engine.
E. Set the flash files #205-6998 and #205-6942, which electronically control each engine, for retard engine timing. Contact the EPA before modifying any parameters pertaining to retard engine timing for any of the engines.
F. Conduct performance testing on EU 001, 002, and 003 to ascertain compliance with the NO_x emission rates and limits in this section in accordance with the requirements set forth in Section 2(B) of the permit. Determine the NO_x emission rate, expressed as NO_2, using exhaust properties determined by both Method 7E and exhaust gas measurements as set out in Section 2(B)(2) of the permit.
G. Certify that electronic controls are set for low emission strategy.

4.0 TESTING REQUIREMENTS

The permit requires the Permittee to conduct a stack or performance test every five calendar years, with the first test required to be conducted five years following the initial compliance test. The Permittee shall use a portable emissions analyzer to measure NO_x 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 1 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 aftercooler temperature of each engine is to be continuously monitored so that it does not exceed 225 degrees Fahrenheit.

5.0 RECORDKEEPING AND REPORTING REQUIREMENTS

Records are to be kept of the monthly NOx emissions and the operating hours for each engine based on a twelve month

rolling sum. Records are to be maintained of the flash files #205-6998 and #205-6942 which establishes the retard engine timing parameters. The permit requires Grand Casino Mille Lacs to maintain records of all measurements and other data required in the permit for a period of least five years after the effective date of the permit. The permit also requires Grand Casino Mille Lacs to submit reports to the EPA, including an annual compliance certification to certify compliance with the emissions limitations and other applicable terms of the permit.

6.0 ENDANGERED SPECIES ACT

Section 7 of the Endangered Species Act of 1973, as amended, directs federal agencies to consult with the U.S. Fish and Wildlife Service (FWS) if a federal action or activity may affect federally listed threatened or endangered species or adversely modify designated critical habitats. Examples of federal actions and activities include funding and permitting.

There are two animal species in the vicinity of the proposed project that are federally listed as threatened or endangered. The EPA cannot issue a permit to construct if FWS decides to commence a consultation process to determine the adverse impact on the species and the steps the applicant would have to take to mitigate the damage. Permit issuance would have to wait until the consultation process was completed.

In a April 13, 2005 e-mail to EPA, FWS listed two threatened/endangered species that are near the project site:

Common Name	**Scientific Name**	**Classification**	**Habitat**
Bald eagle	Haliaeetus leucocephalus	Threatened	Breeding
Gray Wolf	Canis lupus	Endangered	Northern and central forested areas

In a June 16, 2005 letter to EPA, FWS concurred that the proposed project may affect, but is not likely to adversely affect, any of the threatened or endangered species.