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# ALASKA LNG

# Liquefaction Plant Best Available Control Technology (BACT) Analysis

April 30, 2018

AKLNG-4030-HSE-RTA-DOC-00001

Alaska LNG

3201 C Street, Suite 200 Anchorage, Alaska 99503 T: 907-330-6300 www.alaska-Ing.com

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# **REVISION HISTORY**

Rev	Date	Description	Originator	Reviewer	Approver
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1	1-16-2018	Issued for ADEC Submittal	J. Pfeiffer		
2	4-30-2018	Added Condensate & Diesel Tanks, and Condensate Loading	B. Leininger		KS
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\*This signature approves the most recent version of this document.

# **MODIFICATION HISTORY**

Rev	Section	Modification
1	All	Updated as an AGDC document, revised to exclude information subject to equipment manufacturer non-disclosure agreements
1	All	Shift from JVA DCN USAL-PL-SRZZZ-00-000002-000 to AGDC DCN
1	Appendices	Security Classifications for Appendices A & D are Public, whereas, Appendices B & C are Confidential/Trade Secret
2	8, 9, and 10	Added Condensate Tank and Diesel Fuel Storage Tank BACT Analyses sections. Security Classification for Appendix E is Public.
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- B: BACT Cost Effectiveness Calculations (Compression Turbines)
- C: BACT Cost Effectiveness Calculations (Power Generation Turbines)
- D: Alaska LNG Minutes of Meeting with ADEC, BACT and Dispersion Modeling Overview, GTP and Liquefaction Facilities, May 18, 2016
- E: Emissions and BACT Cost Effectiveness Calculations (Diesel Tanks, Condensate Tanks, Condensate Loading)

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# ACRONYMS AND ABBREVIATIONS

%	.percent
°F	.degrees Fahrenheit
AAC	.Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
A/F	.air-to-fuel
BACT	.Best Available Control Technology
BOG	.boil-off gas
BP	.British Petroleum
CAA	.Clean Air Act
CCS	.Carbon Capture and Sequestration
CFR	.Code of Federal Regulations
CH4	.methane
СО	.carbon monoxide
CO <sub>2</sub>	.carbon dioxide
CO <sub>2</sub> -e	.carbon dioxide equivalent
DLN	. Dry Low NOx (Oxides of Nitrogen) Combustor
DOD	.U.S. Department of Defense
EOR	.enhanced oil recovery
EPA	.U.S. Environmental Protection Agency
g/bhp-hr	.grams per brake horsepower-hour
GHG	.greenhouse gases
GWP	.global warming potential
GTP	.Gas Treatment Plant
НС	.hydrocarbon
Hp-hr	.horsepower-hour
kW	.kilowatt
kWhr	.kilowatt hour
LAER	.lowest achievable emission rate
lb	.pounds mass
LNG	liquefied natural gas
MMBtu	.million British thermal units
MW	.megawatt
N <sub>2</sub>	.nitrogen
N <sub>2</sub> O	.nitrous oxide
NO	.nitric oxide
NO <sub>2</sub>	.nitrogen dioxide
NOx	.oxides of nitrogen
NSCR	.Non-Selective Catalytic Reduction
NSPS	.New Source Performance Standards

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O <sub>2</sub>	oxygen
PGF	power generation facility
PM	particulate matter
ppm	parts per million
ppmv	parts per million by volume
ppmvd	parts per million by dry volume
ppmvd@15%O2	parts per million by dry volume corrected to 15% oxygen
Pre-FEED	Pre-Front End Engineering and Design
Project	Alaska LNG Project
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RBLC	RACT/BACT/LAER Clearinghouse
scf	standard cubic foot
SCR	Selective Catalytic Reduction
SF <sub>6</sub>	sulfur hexafluoride
SNCR	Selective Non-Catalytic Reduction
SO <sub>2</sub>	sulfur dioxide
SO <sub>X</sub>	oxides of sulfur
tpy	tons per year
UDLN	ultra-dry low NOx combustor
ULSD	ultra-low sulfur diesel
VOC	volatile organic compound

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# **EXECUTIVE SUMMARY**

The Alaska LNG Project (Project) would be subject to Prevention of Significant Deterioration (PSD) permitting under Alaska Administrative Code. Permitting under these regulations would require the Project to install Best Available Control Technology (BACT) on the permitted equipment at the Liquefaction Plant, located in Nikiski, and at the Gas Treatment Plant (GTP) on the North Slope. BACT is determined following the United States Environmental Protection Agency (EPA) "Top-Down" analysis approach, which identifies each control technology, and then considers in the evaluation the technical feasibility, commercial availability, costs, and site-specific factors to ultimately make a control technology determination. BACT determinations are always evaluated on a case-by-case basis.

To support the design for theAlaska Liquefaction Plant, the Pre-Front End Engineering Design (Pre-FEED) and Optimization phase included a BACT analysis for various project options and driver selections. This report provides the BACT analysis for the mechanical drive compression turbines, the power generation turbines, vent gas disposal (flares and thermal oxidizer), as well as for the emergency compression ignition (diesel) engines for firewater and air. This analysis provides a review of the possible technologies and emissions limits that could be imposed as BACT for these devices. The information provided in this analysis would be used to support Liquefaction Plant design decisions regarding emission control technologies and BACT emission limits.

The analysis focuses on the following pollutants: nitrogen oxides (NOx), sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO), particulate matter (PM – in all of its forms), volatile organic compounds (VOCs) and greenhouse gases (GHGs). Emission controls for each of these pollutants are evaluated and a BACT determination is made following the EPA "Top-Down" approach. Based on the information considered in the analysis, the presumptive BACT determinations are shown in Table 1, Table 2, Table 3, and Table 4 below.

# **1. COMPRESSION TURBINES**

Relative to nitrogen oxides (NOx), the Best Available Control Technology (BACT) analysis did not find that installation of Selective Catalytic Reduction (SCR) was cost-effective to reduce NOx emissions below 9 parts per million by volume (ppmv). The cost-effectiveness of this control option was approximately \$15,000 per ton of NOx, which is in excess of the Alaska Department of Environmental Conservation (ADEC)-recommended upper bound cost-effectiveness threshold of \$10,000 per ton.

The Alaska LNG Project's (Project) proposal to install a catalyst bed to control carbon monoxide (CO) emissions achieves the most stringent level of control for this pollutant. BACT determinations for comparable gas compression and liquefied natural gas (LNG) facilities have set emission limits at 10 ppmv CO and lower, thus requiring a catalyst bed.

The BACT determination for sulfur dioxide (SO<sub>2</sub>), particulate matter (PM) or volatile organic compounds (VOCs) is based on use of pipeline-quality natural gas and good combustion practices achieve the most stringent level of controls for these pollutants (Table 1).

The greenhouse gas (GHG) BACT determination relies upon efficiency improvement measures to reduce overall fuel use, which in turn results in lower GHG emissions. One GHG control strategy addressed in the analysis relates to alternative driver selections, such as the use of turbines of an aero-derivative design over modern light high-efficiency industrial turbines such as the compression turbine model evaluated here. Note, the evaluated model has achieved 38 percent (%) efficiency, which is only slightly lower that an aero-derivative machine. The analysis found that while aero-derivative turbines achieve thermal efficiencies greater than comparable industrial turbines, adopting the option as BACT was not cost-effective as compared to current and projected cost benchmarks for carbon pollution. The use of aero-derivative turbine technology would only be considered cost-effective for mitigating GHG emissions at fuel costs of approximately \$7.50 per million British thermal units (MMBtu) and greater.

Pollutant	BACT Determination
NOx	Installation of ultra-dry low NOx (UDLN) technology on the turbines to achieve 9 ppmv NOx @ 15% oxygen (O <sub>2</sub> )
SO <sub>2</sub>	Good Combustion Practices/Clean Fuels
СО	Installation of CO catalyst to achieve 10 ppmv CO or lower @ $15\% O_2$
PM	Good Combustion Practices/Clean Fuels
VOC	Good Combustion Practices/Clean Fuels
GHGs	Use of low-carbon fuel (i.e., natural gas) and implementation of energy efficiency measures (e.g., good combustion practice, periodic burner tunings, instrumentation and controls to optimize fuel gas combustion, etc.)

#### Table 1: BACT Determination for the Compression Turbines

# **1.1.** Power Generation Turbines

For NOx, the BACT analysis did not find that installation of SCR was cost-effective to reduce NOx emissions below 9 ppmv. The cost-effectiveness of this control option was approximately \$28,000 per ton of NOx, which is in excess of the ADEC-recommended upper bound cost-effectiveness threshold of \$10,000 per ton.

For CO, catalyst controls are recommended given the prevalence of this technology employed at other Alaska and comparable liquefaction facilities.

The same BACT observations made for the compression turbines for SO<sub>2</sub>, PM and VOC apply to the power generation turbines.

The GHG BACT determination reflects the most stringent measures implemented by other comparable sources (Table 2).

Pollutant	BACT Determination
NOx	Installation of UDLN technology on the turbines to achieve 9 ppmv NOx @ $15\%$ O <sub>2</sub>
SO <sub>2</sub>	Good Combustion Practices/Clean Fuels
СО	Installation of CO catalyst to achieve 10 ppmv CO or lower @ $15\%$ O <sub>2</sub>
PM	Good Combustion Practices/Clean Fuels
VOC	Good Combustion Practices/Clean Fuels
GHGs	Use of combined cycle turbine using low-carbon fuel (i.e., natural gas) and implementation of energy efficiency measures

#### Table 2: BACT Determination for the Power Generation Turbines

# **1.2.** Vent Gas Disposal (Flare / Thermal Oxidizer)

The BACT determination found that proposed waste gas minimization techniques proposed by the Project meet current BACT (Table 3). The waste gas minimization techniques minimize not only VOC and GHGs, but also combustion contaminants (e.g., NOx, CO, SO<sub>2</sub>, and PM).

Pollutant	BACT Determination
VOC	Waste gas minimization, waste gas recovery and flare/thermal oxidizer design
GHG	Waste gas minimization, waste gas recovery and flare/thermal oxidizer design

# **1.3.** Compression Ignition Engines

The United States (U.S.) Environmental Protection Agency (EPA) has established emissions standards for internal combustion engines. Manufacturers are required to produce engines that meet the EPA Tiered Emission Standards. Meeting EPA standards constitutes current BACT for all pollutants. BACT determination for the compression ignition engines is provided in Table 4.

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Table 4	4: BACT	Determination	for the	Compression	Ignition Engines
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Pollutant	BACT Determination		
NOx	Good Combustion Practices/Clean Fuels Compliance with 40 CFR New Source Performance Standards (NSPS) Subpart IIII or 40 Code of Federal Regulations (CFR) Part 1039, as applicable		
SO <sub>2</sub>	Good Combustion Practices; use of ULSD		
СО	Good Combustion Practices/Clean Fuels Compliance with 40 CFR NSPS Subpart IIII or 40 CFR Part 1039, as applicable		
PM	Good Combustion Practices/Clean Fuels Compliance with 40 CFR NSPS Subpart IIII or 40 CFR Part 1039, as applicable		
VOC	Good Combustion Practices/Clean Fuels Compliance with 40 CFR NSPS Subpart IIII or 40 CFR Part 1039, as applicable		
GHGs	Good Combustion Practices/Clean Fuels		

# 2. PURPOSE AND SCOPE

Per Alaska Administrative Code (AAC) Title 18, Section 50.306 (Prevention of Significant Deterioration [PSD]), evaluation of a stationary source that requires a PSD permit prior to construction must include a control technology review, as required by the CFR Title 40, Section 52.21(j), incorporated by reference per 18 AAC 50.040(h). 40 CFR 52.21(j)(2) specifies that "[a] new major stationary source shall apply best available control technology for each regulated New Source Review pollutant that it would have the potential to emit in significant amounts." BACT analyses are case-by-case evaluations and include consideration of cost, technical feasibility, commercial availability, and site-specific factors. EPA requires a "Top-Down" BACT analysis approach be used in these evaluations.

This report provides the BACT analysis for the mechanical drive compression turbines, the power generation turbines, waste gas mitigating devices (flare and thermal oxidizer), as well as for the emergency compression ignition (diesel) engines. This analysis provides a review of the possible technologies and emission limits that could be imposed as BACT for these devices. The information provided in this analysis would be used to support Liquefaction Plant design decisions regarding emission control technologies and permit emission limits that constitute BACT.

This BACT analysis addresses NOx, SO<sub>2</sub>, CO, PM – including fine particulate (known as  $PM_{10}$ ) and ultrafine particulate (known as  $PM_{2.5}$ ), VOCs) and GHG emissions. The following key assumptions and boundary conditions were used to prepare this analysis:

- This BACT analysis is based on the Project design and equipment emissions at the time of this report's development.
- Vendor cost data were used to the extent feasible in this analysis. Where vendor data were unavailable, data from the EPA *Air Pollution Control Cost Manual*, Sixth Edition, January 2002 were used. The bases for all cost figures are documented in this analysis.
- NOx and CO emissions control limits and expectations for performance are based on vendor quotes, as given for Liquefaction Plant operating conditions.

- Technical data and costs from *Study* 12.3.4 *Liquefaction Compressor Driver Selection Study Report* (USAL-CB-PRTEC-00-000009-000, Revision 1) were relied upon in the analysis.
- Preliminary guidance provided by ADEC during a May 2016 meeting to discuss Project BACT issues was incorporated into this analysis (See Appendix D)

# 3. BACT METHODOLOGY

BACT is defined in the Federal PSD regulations at 40 CFR 52.21(b)(12) as:

...an emission limitation, including a visible emission standard, based on the maximum degree of reduction for each pollutant subject to regulation...which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification...

This BACT analysis follows the "Top-Down" methodology described in the EPA *New Source Review Workshop Manual.*<sup>1</sup> The "Top-Down" process involves the identification of all applicable control technologies according to control effectiveness. The "top", or most stringent, control alternative is evaluated first. If the most stringent alternative is shown to be technically infeasible, economically unreasonable, or if environmental or other impacts are severe enough to preclude its use, then the next most stringent control technology is similarly evaluated. This process continues until the emissions control method under consideration is not eliminated by technical, economic, energy, environmental, or other impacts.

The five steps of a Top-Down BACT Analysis are described in the following steps, below:

- 1. Identify all available control technologies with practical potential for application to the specific emission unit for the regulated pollutant under evaluation.
- 2. Eliminate all technically infeasible control technologies.
- 3. Rank remaining control technologies by control effectiveness and tabulate a control hierarchy.
- 4. Evaluate most effective controls and document results.
- 5. Select BACT, which will be the most effective practical option not rejected, based on economic, environmental, energy and other impacts.

A further summary of each step is provided below.

#### Step 1

Identify potential control technologies for the LNG Plant based on information found on the EPA's Reasonably Available Control Technology (RACT)/BACT/Lowest Achievable Emission Rate (LAER) Clearinghouse (collectively referred to as RBLC), state websites, Freedom of Information Act requests, recent Alaskan projects with similar emissions units, and vendor input.

<sup>&</sup>lt;sup>1</sup> DRAFT New Source Review Workshop Manual, EPA, Office of Air Quality Planning and Standards, October 1990.

#### Step 2

Evaluate the operating principles, control efficiencies and technical feasibility of each potential control technology; technologies determined to be technically infeasible are eliminated in this step.

#### Step 3

The remaining technologies that are technically feasible are ranked based on control effectiveness.

#### Step 4

Under Step 4, energy, environmental, and cost-effectiveness impacts are evaluated. This evaluation begins with the analysis of the most stringent control option and continues until a technology under consideration cannot be eliminated based on adverse energy, environmental, or economic impacts. The factors that are considered in these analyses are as follows:

- Energy Impacts: The energy requirements of a control technology can be examined to determine if the use of that technology results in any significant or unusual energy penalties or benefits. Energy impacts may be in the form of additional energy required to operate the emitting unit, or additional energy required to operate the control device.
- Environmental Impacts: Installation of control devices may result in environmental impacts separate from the pollutant being controlled. Environmental impacts may include solid or hazardous waste generation, discharges of polluted water from a control device, visibility impacts, increased emissions of other criteria or non-criteria pollutants, increased water consumption, and land use impacts from waste disposal. The environmental impact analysis is made taking consideration of site-specific circumstances.
- Economic Impacts: For a technology to be considered BACT, it must be considered "cost effective." The economic or "cost-effectiveness" analysis is conducted in a manner consistent with EPA's *Air Pollution Control Cost Manual*, Sixth Edition and subsequent revisions. For this analysis, the cost data are obtained primarily from vendor supplied information and supplemented with estimates provided in the EPA's *Control Cost Manual* where vendor supplied information was not available.
- Cost effectiveness thresholds are not published, nor guaranteed by regulatory agencies; however, based on other BACT evaluations in Alaska, the threshold at which a NOx, SO<sub>2</sub>, CO, PM or VOC control technology evaluated is likely to be considered cost effective is \$3,000 per ton of pollutant removed or less. If the evaluated cost is greater than \$10,000 per ton of pollutant removed, then the technology will likely not be considered cost effective. Evaluations where the cost-effectiveness is calculated to be between \$3,000 and \$10,000 should be validated with ADEC.

At the time of developing this analysis, ADEC and EPA have not provided formal guidance on a cost-effectiveness threshold for GHG reductions. However, the following benchmarks are considered reasonable measures for determining what would be cost-effective:

- \$21 per ton of carbon dioxide equivalent (CO<sub>2</sub>-e), based on the annual average secondary market price for California and Quebec Cap-and-Trade GHG allowances escalated by 7% in the year 2020.<sup>2</sup>
- $_{\circ}$  \$12 \$40 per ton of CO<sub>2</sub>-e escalating from 2016 to 2030 based on Alaska LNG estimates.

#### Step 5

The most stringent control that has not been eliminated in all prior steps is selected as BACT. With the control technology selection, a BACT emission target is established. The BACT target becomes a limit, which applies at all times, except during specific conditions listed in the permit (e.g., start-up and shutdown). Where a BACT emission limit cannot be achieved in operation, an alternative work practice or emissions limit must be proposed. That alternative limit must go through the same BACT analysis steps noted above.

#### **Greenhouse Gases (GHGs)**

EPA recommends that the same "Top-Down" analysis approach used for criteria pollutants be used in evaluating GHGs subject to BACT.<sup>3</sup> The analysis that follows has been prepared, consistent with this guidance.

With respect to what constitutes "GHGs," Title 40 Code of Federal Regulations Section 52.21 (Prevention of Significant Deterioration) Paragraph (b)(49)(i) defines GHGs to include the following: CO<sub>2</sub>, methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF<sub>6</sub>). Mass emissions of GHGs are converted into carbon dioxide equivalent (CO<sub>2</sub>e) emissions for ease of comparison. CO<sub>2</sub>-e is a quantity that equates the global warming potential (GWP) of a given mixture and amount of GHGs, to the amount of CO<sub>2</sub> that would have the same GWP in the atmosphere over a 100-year period. GWPs for these GHGs are provided in 40 CFR Part 98 (Mandatory Greenhouse Gas Reporting) Table A-1 (Global Warming Potentials).

As direct  $CO_2$  emissions account for more than 99% of the combustion-related GHGs associated with the Project, and  $CH_4$  and NOx account for less than 1% of the combustion-related turbine GHG emissions (measured as  $CO_2e$ ), this analysis of BACT focuses on  $CO_2$  as a surrogate for  $CO_2e$ .

<sup>&</sup>lt;sup>2</sup> See the California Carbon Dashboard [(<u>http://calcarbondash.org/</u>, produced by the Climate Policy Initiative) based on data reported by the Intercontinental Exchange (ICE), End of Day Reports]. The year 2020 was used in the analysis based on the timing of permit issuance. The BACT that is employed for a Project is considered at the time the permit is issued, and is not revisited during the operating life of the facility.

<sup>&</sup>lt;sup>3</sup> See *PSD* and *Title V Permitting Guidance for Greenhouse Gases*, U.S. Environmental Protection Agency, Document No. EPA-457/B-11-001, March 2011, available at <u>www.epa.gov/sites/production/files/2015-12/documents/</u><u>ghgpermittingguidance.pdf</u>

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# 4. COMPRESSION TURBINES

This section of the BACT analysis addresses the control technology options for the mechanical drive turbines, which provide refrigerant compression at the LNG Plant. This analysis is organized as follows:

- Section 4.1 NOx BACT Analysis
- Section 4.2 CO BACT Analysis
- Section 4.3 SO<sub>2</sub> BACT Analysis
- Section 4.4 PM and VOC BACT Analysis
- Section 4.5 GHG BACT Analysis
- Section 4.6 Conclusions

# 4.1. NOx BACT Analysis

NOx is formed during the combustion process due to high temperature zones in the combustion burner or chamber. This BACT analysis evaluates control techniques and technologies used to mitigate NOx emissions from the compression turbines with a rated output of nominally 115 megawatts (MW) per unit.

# 4.1.1. Step 1: Identify All Control Technologies

EPA, state, and local BACT clearinghouses/databases would classify the compression turbines as "Simple Cycle Natural-Gas Fired Combustion Turbines Greater than 25 MW." This class or category of source was used to investigate of the types of controls installed as BACT in recent permitting decisions. Appendix A includes a summary of NOx controls that have been installed between 2010 and the present to satisfy BACT for comparable Alaskan projects and LNG projects in the Continental U.S.

The compression turbines can be equipped with Dry Low-NOx (DLN) burners or UDLN technology. The DLN technology, which represents the "base case" for this analysis achieves 25 ppmv NOx at 15%  $O_2$ . The UDLN technology, which is discussed below, can achieve NOx emission concentrations of 9 ppmv or lower at 15%  $O_2$ .

Control technologies identified for NOx control of simple cycle gas turbines include the following:

- 1. DLN or UDLN Burners
- 2. Water/Steam Injection
- 3. Selective Catalytic Reduction (SCR)
- 4. Selective Non-Catalytic Reduction (SNCR)
- 5. Non-Selective Catalytic Reduction (NSCR)
- 6. XONON™
- 7. SCONOx™

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These control methods may be used alone or in combination to achieve various degrees of NOx emissions control. Each technology is summarized below.

#### **DLN and UDLN Burners**

DLN combustors (marketed under many similar names such as SoLoNOx or DLE) utilize multistage premix combustors where the air and fuel is mixed at a lean (high oxygen) fuel-to-air ratio. The excess air in the lean mixture acts as a heat sink, which lowers peak combustion temperatures and also ensures a more homogeneous mixture, both resulting in greatly reduced NOx formation rates. DLN combustors have the potential to reduce NOx emissions by 40 to 60%; this technology has an expected NOx performance of approximately 25 ppmv at  $15\% O_2$ .

It is possible to equip the base model with compression turbine "Ultra-Low" (UDLN) combustors, reducing NOx emissions from 25 ppmv (DLN) to 9 ppmv (UDLN). This technology is relatively new and performance data is limited; however, for the purpose of this analysis, this option is deemed feasible and examined in the economic analysis below. Note that UDLN combustors have been studied and are considered selectable by the Project.

#### Water or Steam Injection

Water or steam injection is a commonly used control technique for combustion turbine applications (particularly for turbines/services for which dry low NOx combustors are not available). Water/steam injection involves the introduction of water or steam into the combustion zone of the turbine. The injected fluid provides a heat sink, which absorbs some of the heat of reaction, causing a lower flame temperature resulting in lower thermal NOx formation. The process requires approximately 0.8 to 1.0 pound of water or steam per pound of fuel burned. The water source used requires demineralization to avoid leaving deposits and causing corrosion on turbine internals. Demineralization incurs additional cost and complexity to turbine operation and utilities. Water/steam injection also increases CO emissions as it lowers the combustion temperature. Depending on baseline uncontrolled NOx levels, water or steam injection can reduce NOx by 60% or more.

#### Selective Catalytic Reduction (SCR)

SCR is a post-combustion gas treatment technique used to reduce NOx emissions from exhaust streams. In the SCR process, ammonia (anhydrous, aqueous or as urea) is used as the reducing agent and is injected into the flue gas upstream of a catalyst bed. The function of the catalyst is to lower the activation energy of the NOx decomposition reaction. NOx and ammonia combine at the catalyst surface forming an ammonium salt intermediate, which subsequently decomposes to produce elemental nitrogen and water. SCR works best where inlet NOx concentrations and exhaust temperatures are constant. The operating temperature of conventional SCR systems ranges from 400 degrees Fahrenheit (°F) to 800°F. High temperature SCR relies on special material reaction grids and can operate at higher temperature ranges between 700°F to 1,075°F. High temperature SCR is most frequently installed on simple cycle turbines. Depending on the overall ammonia-to-NOx ratio, NOx removal efficiencies can be as high as 80 to 90%. When used in series with DLN combustors, or water/steam injection, SCR can result in low single digit NOx levels in the range of 2 ppmv to 5 ppmv.

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As part of this BACT analysis, installations and operating experience of SCR systems at locations in Alaska were given special consideration. SCR units installed in Alaska have demonstrated a wider range of NOx reduction performance ranging from as low as 25% and up to 90%. Installations of SCR systems in the RACT/BACT/LAER Clearinghouse have shown that SCR can reduce NOx from turbines to as low as 2 ppmv; however, only while under very stringent operational control. Variability of NOx control efficiencies on SCR installations in Alaska are the result of its use on variable load applications, mechanical drive applications, as well as the difficulty in maintaining uniform ammonia injection rates due to varying ambient temperatures and load ranges. Alaska units specifically evaluated in this analysis are listed below.

- Teck Cominco Alaska, Inc. has installed SCR on the most recent engine addition at the Red Dog Mine located 90 miles north of Kotzebue, Alaska. This unit utilizes urea and required an open catalyst cell structure to improve the NOx conversion to ~90% reduction.
- SCR is planned for the Healy Unit 2, which is located in Healy, Alaska, just south of Fairbanks at the edge of Denali National Park. However, the installation is not complete at the time of this analysis so there is no documentation regarding the operations.
- The Southcentral Power Project at the Anchorage Airport (Chugach Electric Association) includes SCR on each of the LM6000PF turbines. These SCR units utilize 29% aqueous ammonia and only reduce NOx emissions by approximately 25% (resulting in 11 ppmv instead of 15 ppmv).
- Kenai Nitrogen Operations (Agrium): Agrium proposed the installation of SCR on each of five simple cycle GGT-744 Solar Turbine/Generator sets. The SCR units have NOx limits of 7 ppmv at 15% O<sub>2</sub>.
- Anchorage Municipal Light & Power permitted in 2013 two LM6000 turbines with DLN and SCR. SCR was used in this case to avoid PSD permitting.

SCR has the potential to reduce NOx emissions by 70 to 90% and is considered technically feasible in this analysis. As noted above, SCR units installed and operated in Alaska face design and operation challenges primarily due to low and wide ranges of ambient temperature. SCR may be combined with DLN and UDLN combustion technology to achieve NOx emission rates as low as 2 ppmv @ 15% O<sub>2</sub>. This analysis conservatively assumes that SCR could be combined with DLN or UDLN, with either combination achieving the same 2 ppmv level of NOx control.

The selected mechanical drive turbines are anticipated to exhaust at a temperature of approximately 1,000°F, which is at the high end of the recommended temperature for high temperature SCR (700°F to 1,075°F). To optimize exhaust temperature, quenching, or air tempering, would be required to lower exhaust gas temperatures to acceptable SCR temperature ranges.

#### Selective Non-Catalytic Reduction (SNCR)

SNCR reduces NOx into nitrogen and water vapor by the reaction of the exhaust gas with a reducing agent, such as urea or ammonia; this technology does not require a catalyst. The SNCR system performance is dependent upon the reagent injector location and temperature in order to achieve proper reagent/exhaust gas mixing for maximum NOx reduction. SNCR systems require a fairly narrow

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temperature range for reagent injection to achieve a specific NOx reduction efficiency. The optimum temperature range for injection of reagent is approximately 1,500°F to 1,900°F. The NOx reduction efficiency of an SNCR system decreases rapidly at temperatures outside the optimum temperature window. In theory, selective non-catalytic reduction can achieve the same efficiency as SCR; however, the practical constraints of temperature, time, and mixing often lead to worse results in practice.

#### Non-Selective Catalytic Reduction (NSCR)

NSCR uses a catalyst to simultaneously reduce NOx, CO, and hydrocarbon (HC) to water, CO<sub>2</sub>, and nitrogen (N<sub>2</sub>). The catalyst is usually a noble metal. The control efficiency achieved for NOx ranges from 80% to 90%. The operating temperature for NSCR ranges from about 700°F to 1,500°F, depending on the catalyst. For NOx reductions of 90%, the temperature must be between 800°F to 1,200°F. In addition, NSCR requires a low excess oxygen concentration in the exhaust gas stream (typically less than 1%) in order to be effective because the oxygen must be depleted before the reduction chemistry can proceed. As such, NSCR is only effective with rich-burn gas-fired units that operate at all times with an air to fuel ratio controller at or close to stoichiometric conditions.

#### SCONOx™

The SCONOX<sup>™</sup> technology was originally developed by Goal Line Environmental Technologies, Inc. to treat exhaust gas of natural gas and diesel fired turbines. Now offered by EmeraChem, the technology is marketed under the name EMx. The EMx catalytic absorption system uses a potassium carbonate coated catalyst to reduce nitrogen oxide emissions. The catalyst oxidizes CO to CO<sub>2</sub>, and NO to NO<sub>2</sub> and potassium nitrates (KNO<sub>2</sub>/KNO<sub>3</sub>). The catalyst is regenerated by passing dilute hydrogen gas over the catalyst bed, which converts the KNO<sub>2</sub> and KNO<sub>3</sub> to K<sub>2</sub>CO<sub>3</sub>, water, and elemental nitrogen. The catalyst is renewed and available for further absorption while the water and nitrogen are exhausted. In order to maintain continuous operation during catalyst regeneration, the system is furnished in arrays of 5 module catalyst sections. During operation, 4 of the 5 modules are online and treating flue gas, while one module is isolated from the flue gas for regeneration. NOx reduction in the system occurs in an operating temperature range of 300°F to 700°F, and therefore, must be installed in the appropriate temperature section of the waste heat recovery unit. Additionally, the EMx catalyst must be recoated, or "washed" every 6 months to 1 year, depending on the sulfur content of the fuel. The "washing" consists of removing the catalyst modules from the unit and placing each module in a potassium carbonate reagent tank, which is the active ingredient of the catalyst.

The EMx catalyst is subject to reduced performance and deactivation due to exposure to sulfur oxides, requiring an additional catalytic oxidation/absorption system (SMx) upstream of the EMx catalyst. The SMx catalyst is regenerated in the same manner as the EMx catalyst.

Commercial experience with EMx is limited, with a majority of the units operating on units of 15 MW or less. No known installations exist in low ambient temperature settings. At least one installation of EMx has reported difficulties meeting permit limits. While EMx might be applicable in theory, it is not considered feasible for the LNG Plant because it has limited commercial experience and has not been demonstrated in low ambient temperature settings.

#### XONON™

XONON<sup>™</sup> is a catalytic technology developed by Catalytica Energy Systems, Inc. and is now owned by Kawasaki. XONON<sup>™</sup> uses partial combustion of fuel in the catalyst module followed by complete combustion downstream of the catalyst in the burnout zone. Partial combustion within the catalyst produces no NOx. Homogeneous combustion downstream of the catalyst usually produces little NOx as combustion occurs at a uniformly low temperature. A small amount of fuel is combusted in a pre-burner, which results in a small amount of NOx emissions.

XONON<sup>™</sup> was not identified as BACT in the RBLC and is considered technically infeasible because it is not yet commercially available. This catalyst technology is currently being tested by turbine manufacturers.

#### 4.1.2. Step 2: Eliminate Technically Infeasible Options

This section summarizes the technical feasibility of each potential NOx control technology; technologies determined to be technically infeasible are summarized in Table 5, below.

Technology Alternative	Basis
Water/Steam	The base model turbine is equipped with DLN combustors. Water/steam injection is not
Injection	compatible with burners equipped with DLN.
SNCR	The exhaust temperature of the combustion turbine is less than the optimum temperature range (1,500°F to 1,900°F) for SNCR.
NSCR	The oxygen concentration of the combustion turbine is approximately 15% O <sub>2</sub> , which is much higher than the optimum oxygen concentration range for NSCR.
SCONOx™	There are no documented installations of this type of control on large combustion turbines.
XONON™	There are no documented installations of this type of control on large combustion turbines.

#### Table 5: Control Technology Options Determined to be Technically Infeasible

#### Water/Steam Injection

Water/steam injection has the potential to reduce NOx emissions by 20% to 30%. Water/steam injection is not used in conjunction with DLN combustors. As the base model compressor turbine is equipped with DLN combustors, water/steam injection is not considered further in this analysis.

#### Selective Non-Catalytic Reduction (SNCR)

The turbine is anticipated to exhaust at a temperature of approximately 1,000°F, which is well below the recommended temperature (1,500°F to 1,900°F) for an SNCR system to achieve the desired NOx reduction efficiency. The NOx reduction efficiency of SNCR decreases rapidly at temperatures outside the optimum temperature window, additionally, operations below this temperature window result in excessive ammonia emissions (ammonia slip). As such, SNCR is not considered technically feasible for this analysis.

#### Non-Selective Catalytic Reduction (NSCR)

NSCR requires a low excess oxygen concentration in the exhaust gas stream (typically below 1%) in order to be effective, as the oxygen must be depleted before the reduction chemistry can proceed. As such,

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NSCR is only effective with rich-burn gas-fired units that operate at all times with an air to fuel ratio controller at or close to stoichiometric conditions. As gas turbines typically operated with an excess oxygen concentration of approximately 15%, the evaluated model is outside of the acceptable operating range for NSCR and is not considered technically feasible for this analysis.

#### SCONOx™

SCONOx<sup>™</sup> technology has an operating temperature range of 300°F to 700°F. As noted above, the turbine is anticipated to exhaust at a temperature of approximately 1,000°F, which is above the recommended temperature for SCONOx<sup>™</sup>. To optimize exhaust temperature, quenching would be required to lower exhaust gas temperatures to acceptable SCONOx<sup>™</sup> temperature ranges. SCONOx<sup>™</sup> technology is still in the early stages of market introduction. Issues that may impact application of the technology include relatively high capital cost, a large reactor size compared to SCR, increased system complexity, high utilities cost and demand (steam, natural gas, compressed air and electricity are required), and a gradual rise in NOx emissions over time requiring a 1 to 2 day renewal of catalyst. Commercial experience with this technology is limited, with a majority of the SCONOx<sup>™</sup> units operating on turbines units of 15 MW or less. No known installations exist in low ambient temperature settings similar to Alaska. At least one installation of SCONOx<sup>™</sup> has reported trouble meeting permit limits. While SCONOx<sup>™</sup> might be applicable in theory, it is not considered feasible for this Project as it has limited commercial experience and has not been demonstrated in low ambient temperature settings.

#### XONON™

The XONON<sup>™</sup> catalyst has only ever been paired with the 1.5 MW Kawasaki M1A-13 simple cycle gas turbine generator. As this catalyst technology has only been applied in the smaller gas turbines manufactured by Kawasaki, and as testing and implementation of this control system among different gas turbine manufacturers and on larger units has not been performed, this technology is unproven for the size class proposed for this Project and is not considered technically feasible for this analysis.

#### 4.1.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 6, below. These technologies are ranked by control efficiency.

Rank	Control Technology	Control Efficiency (%) or Emissions Target (ppmv)
1	DLN plus SCR or UDLN plus SCR	25% to 90% (as low as 2 ppmv @ 15% O <sub>2</sub> )
2	UDLN	9 ppmv @ 15% O <sub>2</sub>

Table 6: Remainin	g Control Options	and Control	Effectiveness
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#### 4.1.4. Step 4: Evaluate Most Effective Controls and Document Results

This section summarizes the energy, environmental, and economic impacts of the control technologies noted above. The cost-effectiveness calculations use a "NOx emission base case" of 25 ppmv (NSPS limit) and emission control endpoints of 2 ppmv (DLN or UDLN plus SCR) or 9 ppmv (UDLN only). It should be noted that a base-case emission rate of 25 ppmv is used because it represents the base-case offering from

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the turbine vendor. An aggressive endpoint of 2 ppmv in the SCR evaluation provides a conservative evaluation of cost-effectiveness. A controlled NOx emission rate of 5 ppmv would be a more achievable performance objective to accommodate fluctuations in operations and site-specific conditions in Alaska (e.g., temperature fluctuations between summer and winter, etc.).

#### 4.1.4.1. Energy Impact Analysis

No unusual energy impacts were identified for the technically feasible NOx controls evaluated in this BACT analysis.

# 4.1.4.2. Environmental Impact Analysis

For this analysis, operation of SCR would result in some "slip" of ammonia releases to the environment as well as disposal of spent catalyst. Neither ammonia slip nor waste disposal considerations are expected to preclude use of SCR as a potential control device for this BACT analysis.

# 4.1.4.3. Economic Analysis

Economic analysis of costs to install NOx control is based on the following key factors:

- Size of the turbine;
- Baseline emissions levels;
- Controlled emissions levels; and
- Emission control installation and operating costs.

The cost-effectiveness of DLN and SCR, and UDLN are summarized in Table 7, below. As shown in this table, DLN plus SCR is not cost-effective, as it exceeds the \$10,000 per ton cost-effectiveness guideline.

Estimated NOx Emissions from Alternate Control Technologies		
	Control Technology Alternatives*	
	DLN and SCR	UDLN
Control Option	1	2
Uncontrolled Baseline ppmvd@15%O <sub>2</sub>	25	25
Uncontrolled emissions (tpy)	467	467
Controlled emissions ppmvd@15%O2 **	2	9
Controlled emissions (tpy)	37	168
NOx emission reduction (tpy)	430	299
Total Annualized Operating Cost	\$6,418,598	\$1,146,328
Cost of NOx removal (\$/ton)	\$14,941	\$3,836
* LIDLN plus SCR was not evaluated for cost-effectiveness since DLN with SCR achieves comparable levels of		

**Table 7: Economic Analysis** 

\* UDLN plus SCR was not evaluated for cost-effectiveness since DLN with SCR achieves comparable levels of control, and cost-effectiveness for DLN with SCR exceeds the BACT cost-effectiveness threshold. UDLN plus SCR would have higher costs and would result in a cost-effectiveness in excess of \$15,000 per ton.

\*\* Anticipated level of control. Permit limits may be set higher to accommodate fluctuations in emissions from variable operations. Analyzing cost-effectiveness at the 2 ppmv level results in more conservative results.

#### 4.1.5. Step 5: Select BACT

The cost-effective analysis of feasible controls shows that UDLN alone constitutes BACT for NOx in this analysis. DLN plus SCR was eliminated at Step 4 as a potential control option.

While UDLN alone constitutes BACT in this analysis, it should be noted that DLN plus SCR is a common BACT emissions control approach for turbine installations, including LNG projects (see Appendix A for other comparable BACT determinations).

# 4.2. CO BACT Analysis

Carbon monoxide is formed during the combustion process as a result of incomplete fuel combustion. Factors contributing to incomplete fuel combustion include, low air temperatures, insufficient combustion zone turbulence and residence times, inadequate amounts of excess air, as well as competing combustion conditions employed to mitigate NOx formation. This BACT analysis evaluates control techniques and technologies used to mitigate CO emissions.

# 4.2.1. Step 1: Identify All Control Technologies

As noted above, EPA, state, and local BACT clearinghouses/databases would classify the compression turbines as "Simple Cycle Natural-Gas Fired Combustion Turbines Greater than 25 MW." This class or category of source was used to investigate of the types of controls installed as BACT in recent permitting decisions. Appendix A includes a summary of CO controls that have been installed between 2010 and present to satisfy BACT for comparable Alaska projects and LNG projects in the Continental U.S.

Control technologies identified for CO control of simple cycle gas turbines include the following:

- Good Combustion Practices/Clean Fuel
- Catalytic Oxidation
- SCONOx<sup>™</sup>
- NSCR

These control methods may be used alone or in combination to achieve the various degrees of CO emissions control. Each technology is summarized below.

#### **Good Combustion Practices/Clean Fuel**

The rate of CO emissions is dependent on fuel choice and good combustion practices including proper mixing of fuel and combustion air, as well as adequate residence time at temperatures to complete the oxidation process. The compression turbine base model is designed to combust natural gas and optimizes CO emissions through use of natural gas and good combustion practices.

#### **CO Oxidation Catalyst**

Catalytic oxidation is a flue gas control that oxidizes CO to  $CO_2$  in the presence of a noble metal catalyst; no reaction reagent is necessary. Catalytic oxidizers can provide oxidation efficiencies of 80% or greater at temperatures between 750°F and 1,000°F; the efficiency of the oxidation temperature quickly deteriorates as the temperature decreases. The temperature of the turbine is expected to exhaust at approximately 1,000°F or less, remaining within the temperature range for CO oxidation catalysts.

#### SCONOx™

As discussed in the NOx BACT analysis above, SCONOx<sup>™</sup> reduces CO emissions by oxidizing the CO to CO<sub>2</sub>. This technology combines catalytic conversion of CO with an absorption and regeneration process without using ammonia reagent. SCONOx<sup>™</sup> catalyst must operate in a temperature range of 300°F to 700°F, and therefore, turbine exhaust temperature must be reduced through the installation of a cooling system prior to entry to the SCONOx<sup>™</sup> system. Notably, demonstrated applications for this technology are currently limited to combined cycle combustion turbine units rated less than 40 MW.

#### **Non-Selective Catalytic Reduction (NSCR)**

As discussed in the NOx BACT analysis, above, NSCR uses a catalyst reaction to reduce CO to  $CO_2$ . The catalyst is usually a noble metal. The operating temperature for NSCR system ranges from about 700°F to 1,500°F, depending on the catalyst. NSCR requires a low excess oxygen concentration in the exhaust gas stream (typically less than 1%) to be effective because the oxygen must be depleted before the reduction chemistry can proceed. As such, NSCR is only effective with rich-burn gas-fired units that operate at all times with an air-to-fuel (A/F) ratio controller at or close to stoichiometric conditions.

# 4.2.2. Step 2: Eliminate Technically Infeasible Options

This section summarizes the potential technical feasibility for CO control of each air pollution control technology; technologies determined to be technically infeasible are summarized in Table 8, below.

Technology Alternative	Basis
SCONOx™	There are no documented installations of this type of control on large simple cycle combustion turbines.
NSCR	The oxygen concentration of the combustion turbine is approximately 15% O <sub>2</sub> , which is much higher than the optimum oxygen concentration range for NSCR.

#### Table 8: Control Technology Options Determined to be Technically Infeasible

#### SCONOx™

SCONOx<sup>™</sup> technology is still in the early stages of market introduction. Issues that may impact application of the technology include relatively high capital cost, a large reactor size, increased system complexity, high utilities cost and demand (steam, natural gas, compressed air and electricity are required), and a gradual decrease in effectiveness over time, requiring a 1 to 2 day renewal of catalyst. Commercial experience with this technology is limited, with a majority of the units operating on units of 15 MW or less. No known installations exist in low ambient temperature settings similar to Alaska. At least one installation of has reported trouble meeting permit limits. While SCONOx<sup>™</sup> may be applicable in theory, it is not considered feasible for the LNG Project because it has limited commercial experience and has not been demonstrated in low ambient temperature settings.

#### Non-Selective Catalytic Reduction (NSCR)

NSCR requires a low excess oxygen concentration in the exhaust gas stream (typically below 1%) to be effective, as the oxygen must be depleted before the reduction chemistry can proceed. As such, NSCR is only effective with rich-burn gas-fired units that operate at all times with an A/F ratio controller at or close to stoichiometric conditions. As gas turbines typically operate with an excess oxygen concentration of approximately 15%, it is outside of the acceptable operating range for NSCR and is not considered technically feasible for this analysis.

# 4.2.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 9, below. These technologies are ranked by control efficiency.

Rank	Control Technology	Control Efficiency (%) or Emissions Target (ppmv)
1	CO Catalyst	10 ppmv (or lower) at 15% $O_2$
2	Good Combustion Practices/Clean Fuels	50 ppmv at 15% $O_2$ (varies with loading and ambient temperature and maintenance of NOx target)

#### **Table 9: Remaining Control Options and Control Effectiveness**

This analysis assumes a 10 ppmv (or lower) controlled emissions level similar to other LNG turbines of this size. This BACT analysis also identifies other installations, which achieve less than 10 ppmv CO (e.g., Point Thompson Production Facility with a CO limit of 2.5 ppmv at 15%  $O_2$ ); therefore, BACT for CO would be based on the vendor guarantee for this unit, which may be lower than 10 ppmv.

# 4.2.4. Step 4: Evaluate Most Effective Controls and Document Results

This section summarizes the energy, environmental, and economic impacts of the control technologies noted above.

#### 4.2.4.1. Energy Impact Analysis

No unusual energy impacts were identified for the technically feasible CO controls evaluated in this BACT analysis.

#### 4.2.4.2. Environmental Impact Analysis

Implementation of good combustion practices/clean fuels is not expected to cause an environmental impact. Operation of a CO catalyst would result in the disposal of spent catalyst; however, waste disposal considerations are not expected to preclude use of a CO catalyst as a potential control device for this BACT analysis. This conclusion is based on comparable BACT determinations for other facilities.

#### 4.2.4.3. Economic Impact Analysis

The Project proposes to install a CO catalyst bed as part of the compression turbine design. Additionally, good combustion practices/clean fuels would be implemented. As both technically feasible options would be implemented for this Project, economic analysis is not required.

#### 4.2.5. Step 5: Select BACT

This BACT analysis concludes, similar to other comparable projects evaluated, that good combustion practices/clean fuels, as well as operation of an oxidation catalyst likely constitutes BACT for a gas turbine of this type and application (see Appendix A for a list of other BACT determinations reviewed).

# 4.3. SO<sub>2</sub> BACT Analysis

SO<sub>2</sub> is formed as a result of the combustion of sulfur compounds in fuels. This BACT analysis evaluates control techniques and technologies used to mitigate SO<sub>2</sub> emissions.

#### 4.3.1. Step 1: Identify All Control Technologies

The only technique identified to mitigate  $SO_2$  emissions for simple cycle gas turbines at an LNG Plant is the use of clean fuels (i.e., pipeline quality natural gas). The compression turbine base model is designed to combust natural gas, which is low in sulfur.

#### 4.3.2. Step 2: Eliminate Technically Infeasible Options

Use of pipeline quality natural gas is a common BACT control for gas turbines and is considered a technically feasible control option for the LNG turbines for the purposes of this analysis.

#### 4.3.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

Use of pipeline quality natural gas is a common BACT control for gas turbines and is considered a technically feasible control option for the LNG turbines for the purposes of this analysis. As this is the only control option considered, ranking by emissions control effectiveness is unnecessary.

#### 4.3.4. Step 4: Evaluate Most Effective Controls and Document Results

Since the use of clean fuels would be implemented for this Project, economic analysis is not required.

#### 4.3.5. Step 5: Select BACT

Use of clean fuels has been chosen to satisfy BACT for reduction of SO<sub>2</sub> emissions. This is consistent with the BACT required of other comparable projects.

#### 4.4. PM and VOC BACT Analysis

PM and VOC are emitted from gas turbines. Excessive amounts of these pollutants can occur from incomplete fuel combustion, including low air temperatures, insufficient combustion zone turbulence and residence times, inadequate amounts of excess air, as well as competing combustion conditions employed to mitigate NOx formation. This analysis evaluates control techniques and technologies used to mitigate PM and VOC emissions.

# 4.4.1. Step 1: Identify All Control Technologies

Good combustion practice/clean fuels is identified as the main technique to mitigate PM and VOC from natural gas combustion. The rate of PM and VOC emissions is dependent on fuel choice and good combustion practices, including proper mixing of fuel and combustion air, as well as adequate residence time at temperatures to complete the oxidation process. The compression turbine base model is designed to combust natural gas and minimize PM and VOC emissions through good combustion practices.

CO catalyst also has the potential to reduce VOC emissions from combustion turbines. As CO catalyst has already been selected for use as BACT (see Section 4.2), no further evaluation of this technology for VOC control is provided.

# 4.4.2. Step 2: Eliminate Technically Infeasible Options

The use of good combustion practices/clean fuels, is a common PM and VOC BACT control for gas turbines and is considered a technically feasible control option for the LNG turbines for the purposes of this analysis.

# 4.4.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

Good combustion practices/clean fuel is a common PM and VOC BACT control for gas turbines and is considered a technically feasible control option for the LNG turbines for the purposes of this analysis. As this is the only control option considered, ranking by emissions control effectiveness is unnecessary.

# 4.4.4. Step 4: Evaluate Most Effective Controls and Document Results

As good combustion practices/clean fuel would be implemented for this Project, economic analysis is not required.

# 4.4.5. Step 5: Select BACT

Good combustion practices/clean fuels constitutes BACT for the reduction of PM and VOC emissions.

# 4.5. GHG BACT Analysis

CO<sub>2</sub>, a GHG, is the main combustion product from gas turbines. Incomplete combustion would also cause methane to be emitted, which is also a GHG. This section describes the techniques that would be employed to reduce GHGs from the compression turbines.

# 4.5.1. Step 1: Identify All Control Technologies

This review focused on simple cycle natural-gas fired combustion turbines greater than 25 MW from year 2010 to the present. A summary of the data collected by this review is included in Appendix A.

Control technologies identified for GHG control of simple cycle gas turbines include the following:

- Use of Low-Carbon Fuel
- Design and Operational Energy Efficiency

- Alternate Design Electric Compressors
- Use of Heat Recovery (Combined Heat and Power or Combined Cycle)
- Alternate Design Use of Aero-Derivative Turbines

These control methods may be used alone or in combination to achieve the various degrees of GHG emissions control. Each of the control methods is described below.

Notably, another emission control technique, which is identified in the EPA GHG BACT guidance, is the use of Carbon Capture and Sequestration (CCS), which is discussed in its own section (see Section 8, Carbon Capture and Sequestration). As shown in the BACT analysis for CCS, the technology is potentially infeasible and is not cost-effective. CCS will not be discussed further in this section of the analysis.

#### Use of Low-Carbon Fuel

Pipeline quality natural gas and boil-off gas (BOG) (i.e., fuel gas predominately consisting of methane) is the cleanest and lowest-carbon fuel available at the LNG Facility.

#### Design and Operational Energy Efficiency

Design and operational energy efficiencies affecting emissions and efficiency include the following:

- Output Efficiency per Heat Input
- Periodic Burner Tuning
- Proper Instrumentation and Controls
- Reliability

Each of these is summarized below.

- Efficiency: Turbine models under consideration should be evaluated for output efficiency compared to the heat input rate. More efficient models require less heat input for the equivalent amount of fuel consumed. Additionally, turbine hot air recirculation should be minimized per vendor recommendations.
- Periodic Burner Tuning: Periodic inspections and tuning should be planned in order to maintain/restore high efficient and low-emissions operation.
- Instrumentation and Controls: Control systems should be of the type to monitor and modulate fuel flow and/or combustion air, and other vital parameters in order to achieve optimal high efficiency low-emission performance for full load and part-load conditions.
- Reliability: Turbine models under consideration should be evaluated for reliability of design for the specific operational design and range of conditions.

#### **Alternate Design – Electric Compressors**

Motor driven gas compression systems use electricity as the power source for the compressor rather than a gas turbine compressor. Electrically driven motors for compressors of this size require a large source of electrical power.

#### Use of Waste Heat Recovery (Combined Heat and Power or Combined Cycle)

Simple Cycle Turbines with heat recovery or turbines with a combined cycle configuration convert exhaust heat into mechanical energy (steam or electricity or both), increasing the overall net efficiency of the system.

#### Alternate Design – Use of Aero-Derivative Turbines

Aero-Derivative turbines are used in gas compression and electrical power generation operations due to their ability to be shut down and handle load changes quickly. They are also used in the marine industry due to their reduced weight. In general, aero-derivative machines are more efficient than industrial machines of comparable size and capacity.

#### 4.5.1.1. Technologies Excluded Based on a Fundamental Change to the Nature of the Source

The EPA has recognized that the list of potential control technologies in Step 1 of a BACT analysis should not redefine the nature of the source proposed by an applicant. As stated by the EPA in its guidance, "BACT should generally not be applied to regulate the applicant's purpose or objective for the proposed facility."<sup>4</sup> Notwithstanding this guideline, permitting agencies are provided discretion in recommending minor changes or adjustments to a BACT proposal, which achieve lower overall emissions without disrupting the applicant's basic business purpose for the facility.

To evaluate whether or not a proposed control technology or strategy "fundamentally redefines the nature of the source," EPA has established a framework to evaluate control technologies during the permitting process.<sup>5</sup> This framework is briefly summarized below, along with its applicability to the LNG Plant and the mechanical drive turbines:

1. **Evaluation of Basic Design and Purpose**: First, the basic design, purpose, and objectives should be evaluated based on the information provided as part of the permitting process.

Relative to the LNG Plant, the purpose or objective of the LNG turbines is to compress refrigerants required for the liquefaction process. The purpose of the turbines is not to produce power; rather, power is generated onsite by a separate and independent power generation facility (PGF), which is designed to specifically meet the power demands of the operation. The facility cannot be connected to the grid due to the significant electrical power needs of the facility, and the

<sup>&</sup>lt;sup>7</sup> *PSD and Title V Permitting Guidance for Greenhouse Gases* (EPA-457/B-11-001), U.S. Environmental Protection Agency, March 2011, page 26, available at <u>http://www.epa.gov/sites/production/files/2015-12/documents/</u><u>ghgpermittingguidance.pdf</u>

IBID, pgs. 26-31

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unavailability of sufficient off site on-demand power to provide anything other than the essential power required by the plant.

2. **Design Features Analysis:** Second, the proposed design is then evaluated to determine which design elements are inherent to the facility purpose and should not be changed, versus the design elements that may be changed to achieve pollutant emissions reductions without disrupting the applicant's basic business purpose for the proposed facility.

With respect to the LNG Plant, simple cycle turbines are the best design in meeting the operational requirements of the refrigerant compressor drivers. Once ready, a simple-cycle combustion turbine can be started and reach full load in a matter of minutes. These units can also be shut down almost instantaneously. As a result, simple cycle turbines are typically used for services that require variable loads and quick recovery time. Additionally, as the majority of the natural gas treatment occurs at the GTP, there would be only minor needs for excess heat or power that could be provided by recovering the heat from the mechanical drive turbines. Specifically, the Project has proposed use of compression turbines operating in simple cycle mode as it is one of the most efficient commercially proven industrial gas turbines available in terms of its heat rate (approximately 39% based on lower heat value).

- 3. Exclusion of Control Technologies that Potentially Redefine the Source: Third, a control technology can be excluded from consideration as BACT if it can be shown that application of the control option would disrupt the facility's basic/fundamental purpose or objective. Justification for excluding an option should not rely upon later steps of the Top-Down BACT process, including:
  - a. Technical Feasibility (Step 2)
  - b. Cost Impacts (Step 4)
  - c. Energy Impacts (Step 4)

Of the potential GHG control technologies noted above in Section 4.5.1, the following technologies redefine the nature of the proposed source and were removed from additional consideration in the BACT analysis:

- Use of Motors to Drive Electric Compressors
- Use of Turbines in Combined Cycle Mode

Use of aero-derivative turbines possibly redefines the nature of the source; however, this option is carried forward in the BACT analysis for the reasons set forth below.

#### **Electric Compressors**

Use of electric motors to drive compressors has been removed from further consideration as a potential control technology, as its use would fundamentally redefine the nature of the proposed source as follows:

• As noted above, the LNG Plant would not be connected to the local electrical power grid as the grid does not provide adequate energy to power the facility.

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- Use of motors to drive compressors may not constitute control technology because use of large electric motors would require installation of significant additional PGF capacity in excess of the equivalent turbine horsepower, which may actually result in increased GHG emissions from the facility.
- Use of electric motors to drive compressors would fundamentally alter the facility's PGF base load profile, requiring the PGF to be redesigned with added capacity to ensure adequate power availability and system reliability.

# Use of Heat Recovery (Combined Heat and Power or Combined Cycle)

Use of heat recovery or turbines in a combined cycle mode has been removed from further consideration as a potential control technology, as its use would fundamentally redefine the nature of the proposed source as follows:

- The heat recovered from the proposed mechanical drive turbines has no useful purpose at the LNG facility. All heat requirements are satisfied by the efficient design of the facilities.
- The proposed facility would not be connected to the local external power grid and must generate its own electric power. The facility has been designed to generate its own electric power including design elements to ensure reliable and consistent electric power availability. The facility's PGF has been designed to have the flexibility to adjust the loads to meet facility demand, independent of the mechanical drive turbines.
- The proposed facility would be supplied with gas already treated at the GTP. As such, very little additional treatment is required, greatly reducing the need for heat within the plant. The heat that is required is low enough to be mostly provided by electricity and the waste heat recovered at the power plant and within the processing facilities. Thus, there is no need for additional waste heat recovery from the mechanical drive turbines.
- The proposed facility chose a simple cycle turbine design to avoid the complications of a combined cycle plant, adding to the reliability of refrigerant compression operations by separating power production from the mechanical drivers and reducing the chance of PGF upset conditions affecting the liquefaction process.
- Simple cycle turbines for mechanical drive provide for added flexibility to variable load conditions avoiding impacts to the liquefaction trains performance demands. Additionally, the selection of simple cycle mechanical driver turbines was based on an engineered process matching power performance and quality requirements with engine models and availability.

#### Aero-Derivative Turbines

Use of natural gas-fired aero-derivative turbines potentially redefines the source, as their use would require a complete redesign of the compression and liquefaction processes at the facility. Turbines vary in size and capacity. The physical capacity of a specific aero-derivative turbine selection alone would necessitate a change in plant configuration (e.g., four aero-derivative gas turbines vs. two turbines of the evaluated model per liquefaction train). Additionally, the performance characteristics of an aero-

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derivative turbine (e.g., operational flexibility, reliability, etc.) would need to be considered in the plant redesign. Turbines of different designs have unique operational and maintenance requirements. Simply put, a "like for like" replacement of an industrial turbine for an aero-derivative turbine is not possible or feasible without completely changing the configuration of the process facilities and revising the emissions profiles from the plant.

Despite arguments supporting the elimination of aero-derivative turbines from further consideration, this BACT analysis carries the aero-derivative turbine type forward as a potential GHG control option or strategy. The turbine type is carried forward because other comparable LNG projects have incorporated them into their design, including:

- Sabine Pass: The proposed combustion turbines for the Sabine Pass Liquefaction Project M3 (finalized December 6, 2011) and the Sabine Pass Liquefaction Project M4 (not yet finalized, submitted September 20, 2013) are aero-derivative compressor turbines.
- **Trunkline Project**: The Lake Charles Liquefaction Export Terminal Project (also referred to as the Trunkline Project not yet finalized, submitted December 20, 2013) proposed aero-derivative compressor turbines.
- **Corpus Christi**: The Corpus Christi Liquefaction Project (GHG BACT draft issued by EPA Region 6 on July 8, 2013) includes 18 aero-derivative compressor turbines.

# 4.5.2. Step 2: Eliminate Technically Infeasible Options

This section summarizes the technical feasibility for GHG control of each air pollution control technology; no technologies evaluated by this analysis (other than those deemed to redefine the source) are determined to be technically infeasible.

#### Low-Carbon Fuels

Low-Carbon Fuel is considered a technically feasible control option for the purposes of this analysis. The proposed compression turbines would be fueled with pipeline quality natural gas, predominantly consisting of methane. This is the cleanest and lowest-carbon fuel available for use in combustion turbines.

# **Operational Energy Efficiencies**

Use of operational energy efficiency measures is considered a technically feasible control option for the purposes of this analysis. Efficiency measures that could be incorporated into the Project include periodic tune-ups to maximize operational efficiency (according to manufacturer's specifications), operating in accordance with general good combustion practices, and/or installing fuel and oxygen sensors to maintain optimum combustion properties to reduce emissions while also considering operational safety.

#### Aero-Derivative Turbines

For the purposes of this analysis, aero-derivative turbines are deemed technically feasible, as they have been incorporated into other LNG facility designs. As referenced in permitting documents for other projects, aero-derivative turbines are an attractive option, as they typically represent the most efficient

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simple-cycle turbine design available. Thermal efficiency increases between 4% and 8% are possible over comparable industrial/frame design turbines.

# 4.5.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 10, below. These technologies are ranked by control efficiency.

#### **Table 10: Remaining Control Options and Control Effectiveness**

Rank	Control Technology	Control Efficiency (%)
1	Aero-Derivative Design	4% – 8% increased thermal efficiency over comparable industrial/frame design turbines
2	Operational Efficiencies/ Low Carbon Fuels	Variable

# 4.5.4. Step 4: Evaluate Most Effective Controls and Document Results

The only technology evaluated for cost-effectiveness is the use of aero-derivative turbines. The other measures identified in Step 3 would already be incorporated into the design and operation of the gas turbines; no analysis of cost is required for these options.

#### 4.5.4.1. Energy Impact Analysis

As GHG controls incorporate energy efficiency elements and do not result in impacts, an energy impact analysis is not required.

#### 4.5.4.2. Environmental Impact Analysis

Relative to GHG controls, none of the proposed GHG measures result in adverse environmental impacts.

#### 4.5.4.3. Economic Analysis

Table 11 summarizes the incremental cost analysis to achieve GHG reductions via changes in turbine design and thermal efficiency. For purposes of calculating the cost of incremental GHG reductions, the analysis treats the evaluated compression turbine model as the base case, and calculates the additional cost per ton of using an aero-derivative design to further reduce GHG emissions. The economic analysis relies upon efficiency improvement measures to reduce overall fuel use, which in turn results in lower GHG emissions. The analysis found that while aero-derivative turbines achieve thermal efficiencies of four to 8% greater than comparable industrial turbines on a per machine basis, adopting the option as BACT was not cost-effective as compared to projected \$12 to \$40 per ton of CO<sub>2</sub>-e projected cost benchmarks for carbon pollution (see Table 11).

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#### Table 11: Economic Analysis

Estimated Cost-Effectiveness for GHG Reductions				
	Turbine Technology Alternatives			
	Evaluated Model (Industrial)	Aero-Derivative	Difference	
GHG Emissions (tons/year)	3,060,573	2,694,852	365,721	
Total Incremental Annualized Cost	\$553,075,457	\$564,678,098	\$11,602,641*	
Incremental Cost of GHG Reductions (\$/ton) Calculated at a Fuel Cost of \$7.50/MMBtu			\$32*	

Note: Incremental annualized cost considers differential capital, operational, and maintenance costs for the evaluated model and the Aero-derivative cases.

\*Aero-derivative turbine technology could be considered cost-effective for mitigating GHG emissions at turbine fuel costs of greater than \$7.50/MMBtu. Note that actual Project economics considers fuel costs negligible.

#### 4.5.5. Step 5: Select BACT

This BACT analysis concludes that use of low-carbon fuel and implementation of operational energy efficiency measures achieve BACT for the evaluated simple cycle gas turbine. The BACT determination is consistent with other comparable projects (see Appendix A for a full list of BACT determinations reviewed).

Notably, EPA encourages comparisons of the proposed design with other similar facilities as a demonstration of efficiency. The compression turbine yields 1,163 pounds carbon dioxide per megawatthour (lb  $CO_2/MWh$ ) as the base case emission level for the evaluated turbine model, which is more efficient than most industrial turbine designs.

#### 4.6. Conclusions

The objective of this analysis was to examine turbines used as the mechanical driver selected for refrigerant compression. The analysis considered the technology, feasibility, cost, and other site-specific factors to control of emissions. The BACT analysis confirmed the following levels of control for the compressor turbine drivers:

- NOx: UDLN achieving 9 ppmv NOx @ 15% O<sub>2</sub>
- CO: CO Catalyst achieving 10 ppmv (or lower) CO @ 15% O<sub>2</sub>
- SO<sub>2</sub>: Clean Fuels
- PM and VOC: Good Combustion Practices/Clean Fuels
- GHGs: Use of pipeline quality natural gas, implementation of measures to improve overall efficiency of the gas turbine operations. Installation of an aero-derivative turbine would only be considered BACT if turbine fuel costs are \$7.50/MMBtu or greater.

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Notably, the BACT determinations for NOx and GHGs did not incorporate the most stringent and feasible control option. The most stringent control options were eliminated in the analysis based on technical feasibility and/or cost-effectiveness.

Relative to CO, the most stringent control option was selected.

Relative to SO<sub>2</sub>, PM and VOC, this BACT analysis did not identify any more stringent control technologies that could impact compression turbine design.

It also should be noted that NOx and GHG BACT determinations made for the compressor turbine driver option cannot be extended to other potential driver selections or options. BACT is always a case-by-case analysis and the conclusions will vary based on design and other site-specific considerations.

# 5. POWER GENERATION TURBINES

This section of the BACT analysis addresses the Power Generation Turbines to be used to generate power at the LNG Plant. These turbines would be in a combined cycle configuration. This analysis provides a review of the possible technologies and emission limits that could be imposed as BACT, including estimated cost of each technology.

The turbines are equipped with DLN technology capable of achieving 15 ppmv NOx and 15 ppmv CO at  $15\% O_2$ . These emissions levels represent the "base case" conditions for this analysis.

This BACT analysis is organized, as follows:

- Section 5.1 NOx BACT Analysis
- Section 5.2 CO BACT Analysis
- Section 5.3 SO<sub>2</sub>, VOC, and PM BACT Analysis
- Section 5.4 GHG BACT Analysis
- Section 5.5 Conclusions

# 5.1. NOx BACT Analysis

NOx is formed during the combustion process due to high temperature zones in the combustion burner or chamber. This BACT analysis evaluates control techniques and technologies used to mitigate NOx emissions from the gas turbine.

# 5.1.1. Step 1: Identify All Control Technologies

This review focuses on natural gas-fired combustion turbines greater than 25 MW from year 2010 to the present. A summary of the data collected by this review is included in Appendix A.

Control technologies identified for NOx control of gas turbines include the following:

- 1. DLN
- 2. Water/Steam Injection

- 3. SCR
- 4. SNCR
- 5. NSCR
- 6. XONON™
- 7. SCONOx™

These control methods may be used alone or in combination to achieve the various degrees of NOx emissions control. A description of each of these control technologies is provided in Section 4.1 of this document. Conditions specific to the turbine are provided below.

#### **Dry Low NOx Burners**

The Power Generation Turbine base model is equipped with DLN combustors; this technology has an expected NOx performance of approximately 15 ppmv @ 15% O<sub>2</sub>.

It is also possible to equip the base model with "Ultra-Low" combustors, reducing NOx emissions from 15 ppmv @ 15%  $O_2$  (DLN) to 9 ppmv @ 15%  $O_2$  (UDLN). This technology is new and performance data is limited, but is considered by the Project to be "selectable" in power generation service.

# 5.1.2. Step 2: Eliminate Technically Infeasible Options

This section summarizes the operating principles, NOx control efficiency and technical feasibility of each potential NOx control technology; technologies determined to be technically infeasible are summarized in Table 12, below.

Technology Alternative	Basis
Water/Steam	The base model turbine is equipped with DLN combustors. Water/steam injection is not
Injection	compatible with burners equipped with DLN.
SNCR	The exhaust temperature of the combustion turbine is less than the optimum temperature range (1 500°E to 1 900°E) for SNCR
NSCR	The oxygen concentration of the combustion turbine is approximately 15% O <sub>2</sub> , which is much higher than the optimum oxygen concentration range for NSCR.
XONON™	There are no documented installations of this type of control on large combustion turbines.
SCONOx™	There are no documented installations of this type of control on large combustion turbines.

#### Table 12: Control Technology Options Determined to be Technically Infeasible

#### Water/Steam Injection

Water/steam injection has the potential to reduce NOx emissions by 20% to 30%. Water/steam injection is not used in conjunction with DLN combustors. As the base model is equipped with DLN combustors, water/steam injection is not considered further in this analysis.
#### Selective Non-Catalytic Reduction (SNCR)

The turbine is anticipated to exhaust at a temperature of approximately 800-900°F, which is well below the recommended temperature (1,500°F to 1,900°F) for an SNCR system to achieve the desired NOx reduction efficiency. The NOx reduction efficiency of SNCR decreases rapidly at temperatures outside the optimum temperature window, additionally, operations below this temperature window result in excessive ammonia emissions (ammonia slip). As such, SNCR is not considered technically feasible for this analysis.

#### **Non-Selective Catalytic Reduction (NSCR)**

NSCR requires a low excess oxygen concentration in the exhaust gas stream (typically below 1%) to be effective, as the oxygen must be depleted before the reduction chemistry can proceed. As such, NSCR is only effective with rich-burn gas-fired units that operate at all times with an A/F ratio controller at or close to stoichiometric conditions. As gas turbines typically operated with an excess oxygen concentration of approximately 15% it is outside of the acceptable operating range for NSCR and is not considered technically feasible for this analysis.

#### XONON™

The XONON<sup>™</sup> catalyst has only ever been paired with the 1.5 MW Kawasaki M1A-13 simple cycle gas turbine generator. As this catalyst technology has only been applied in the smaller gas turbines manufactured by Kawasaki, and as testing and implementation of this control system among different gas turbine manufacturers and on larger units has not been performed, this technology is unproven for the size class proposed for this Project and is not considered technically feasible for this analysis.

#### SCONOx™

SCONOx<sup>™</sup> technology has an operating temperature range of 300°F to 700°F. As noted above, the turbine is anticipated to exhaust at a temperature of approximately 800°F to 900°F, which is above the recommended temperature for SCONOx<sup>™</sup>. To optimize exhaust temperature, quenching would be required to lower exhaust gas temperatures to acceptable SCONOx<sup>™</sup> temperature ranges. SCONOx<sup>™</sup> technology is still in the early stages of market introduction. Issues that may impact application of the technology include relatively high capital cost, a large reactor size compared to SCR, increased system complexity, high utilities cost and demand (steam, natural gas, compressed air and electricity are required), and a gradual rise in NOx emissions over time requiring a 1 to 2 day renewal of catalyst. Commercial experience with this technology is limited, with a majority of the SCONOx<sup>™</sup> units operating on turbines units of 15 MW or less. No known installations exist in low ambient temperature settings similar to Alaska. At least one installation of SCONOx<sup>™</sup> has reported challenges in meeting permit limits in California. While SCONOx<sup>™</sup> might be applicable in theory, it is not considered feasible for this Project

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as it has limited commercial experience and has not been demonstrated in low ambient temperature settings.

## 5.1.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 13, below. These technologies are ranked by control efficiency.

Rank	Control Technology	Control Efficiency (%) or Emissions Target (ppmv)
1	DLN plus SCR or UDLN plus SCR	25% to 90% (as low as 2 ppmv @ 15% O <sub>2</sub> )
2	UDLN	9 ppmv @ 15% O2

#### **Table 13: Remaining Control Options and Control Effectiveness**

## 5.1.4. Step 4: Evaluate Most Effective Controls and Document Results

This section summarizes the energy, environmental, and economic impacts of the control technologies noted above. The cost-effectiveness calculations use a "NOx emission base case" of 15 ppmv (base-case offering from the manufacturer) and emission control endpoints of 2 ppmv (DLN or UDLN plus SCR) or 9 ppmv (UDLN only). It should be noted that a base-case emission rate of 15 ppmv is used because it represents the base-case offering from the manufacturer. An aggressive endpoint of 2 ppmv in the SCR evaluation provides a conservative evaluation of cost-effectiveness. A controlled NOx emission rate of 5 ppmv would be a more likely performance objective to accommodate fluctuations in operations and site-specific conditions in Alaska (e.g., temperature fluctuations between summer and winter, etc.).

## 5.1.4.1. Energy Impact Analysis

No unusual energy impacts were identified for the technically feasible NOx controls evaluated in this BACT analysis.

## 5.1.4.2. Environmental Impact Analysis

For this analysis, operation of SCR would result in some "slip" of ammonia releases to the environment as well as disposal of spent catalyst. Neither ammonia slip nor waste disposal considerations are expected to preclude use of SCR as a potential control device for this BACT analysis.

## 5.1.4.3. Economic Analysis

Economic analysis of costs to install NOx control is based on the following key factors:

- Size of the turbine
- Baseline emissions levels
- Controlled emissions levels
- Emission control installation and operating costs

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The cost-effectiveness of DLN and SCR, and UDLN are summarized in Table 14, below. As shown in this table, DLN plus SCR is not cost-effective, as it exceeds the \$10,000 per ton guideline.

Estimated NOx Emissions from Alternate Control Technologies		
	Control Technology Alternatives*	
	DLN and SCR	UDLN
Control Option	1	2
Uncontrolled Baseline ppmvd@15%O <sub>2</sub>	15	15
Uncontrolled emissions (tpy)	103	103
Controlled emissions ppmvd@15%O2 **	2	9
Controlled emissions (tpy)	14	62
NOx emission reduction (tpy)	90	41
Total Annualized Operating Cost	\$2,547,259	\$52,831
Cost of NOx removal (\$/ton)	\$28,417	\$1,277

#### Table 14: Economic Analysis

\* UDLN plus SCR was not evaluated for cost-effectiveness since DLN with SCR achieves comparable levels of controls, and cost-effectiveness for DLN with SCR exceeds the BACT cost-effectiveness threshold. UDLN plus SCR would have higher costs and would result in a cost-effectiveness in excess of \$28,417 per ton.

\*\* Anticipated level of control. Permit limits may be set higher to accommodate fluctuations in emissions from variable operations. Analyzing cost-effectiveness at the 2 ppmv level results in more conservative results.

## 5.1.5. Step 5: Select BACT

The cost effective analysis of feasible controls shows that UDLN alone constitutes BACT for NOx in this analysis. DLN plus SCR was eliminated at Step 4 as a potential control option.

While UDLN alone constitutes BACT in this analysis, it should be noted that DLN plus SCR is a common BACT emissions control approach for turbine installations, including LNG projects (see Appendix A for other comparable BACT determinations).

# 5.2. CO BACT Analysis

CO is formed during the combustion process as a result of incomplete fuel combustion. Factors contributing to incomplete fuel combustion include, low air temperatures, insufficient combustion zone turbulence and residence times, inadequate amounts of excess air, as well as competing combustion conditions employed to mitigate NOx formation. This BACT analysis evaluates control techniques and technologies used to mitigate CO emissions.

## 5.2.1. Step 1: Identify All Control Technologies

This review focused on natural gas-fired combustion turbines greater than 25 MW from year 2010 to the present. A summary of the data collected by this review is included in Appendix A.

Control technologies identified as potential CO control technologies for combined cycle gas turbines include the following:

- Good Combustion Practices/Clean Fuel
- Catalytic Oxidation
- SCONOx<sup>™</sup>
- NSCR

These control methods may be used alone or in combination to achieve the various degrees of CO emissions control. A description of each of these control technologies is provided in Section 4.2.1of this document.

#### 5.2.2. Step 2: Eliminate Technically Infeasible Options

This section summarizes the potential technical feasibility for CO control of each air pollution control technology; technologies determined to be technically infeasible are summarized in Table 15, below.

Technology Alternative	Basis
SCONOx™	There are no documented installations of this type of control on large combustion turbines.
NSCR	The oxygen concentration of the combustion turbine is approximately 15% O <sub>2</sub> which is much higher than the optimum oxygen concentration range for NSCR.

#### Table 15: Control Technology Options Determined to be Technically Infeasible

#### SCONOx™

SCONOx<sup>™</sup> technology is still in the early stages of market introduction. Issues that may impact application of the technology include relatively high capital cost, a large reactor size, increased system complexity, high utilities cost and demand (steam, natural gas, compressed air and electricity are required), and a gradual decrease in effectiveness over time, requiring a one to two day renewal of catalyst. Commercial experience with this technology is limited, with a majority of the units operating on units of 15 MW or less. No known installations exist in low ambient temperature settings similar to Alaska. At least one installation of has reported challenges in meeting permit limits. While SCONOx<sup>™</sup> may be applicable in theory, it is not considered feasible for the LNG Project because it has limited commercial experience and has not been demonstrated in low ambient temperature settings.

#### Non-Selective Catalytic Reduction (NSCR)

NSCR requires a low excess oxygen concentration in the exhaust gas stream (typically below 1%) to be effective, as the oxygen must be depleted before the reduction chemistry can proceed. As such, NSCR is only effective with rich-burn gas-fired units that operate at all times with an A/F ratio controller at or close to stoichiometric conditions. As gas turbines typically operate with an excess oxygen concentration of approximately 15%, it is outside of the acceptable operating range for NSCR and is not considered technically feasible for this analysis.

## 5.2.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 16, below. These technologies are ranked by control efficiency.

Rank	Control Technology	Control Efficiency (%) or Emissions Target (ppmv)
1	CO Catalyst	10 ppmv (or lower) at 15% $O_2$
2	Good Combustion Practices/ Clean Fuels	15 ppmv or more at 15% O <sub>2</sub>

This analysis assumes a 10 ppmv (or lower) controlled emissions level similar to other LNG turbines of this size.

#### 5.2.4. Step 4: Evaluate Most Effective Controls and Document Results

This section summarizes the energy, environmental, and economic impacts of the control technologies noted above.

#### 5.2.4.1. Energy Impact Analysis

No unusual energy impacts were identified for the technically feasible CO controls evaluated in this BACT analysis.

#### 5.2.4.2. Environmental Impact Analysis

For this analysis, implementation of good combustion practices/clean fuels is not expected to cause an environmental impact. Operation of a CO catalyst would result in the disposal of spent catalyst; however, waste disposal considerations are not expected to preclude use of a CO catalyst as a potential control device for this BACT analysis.

#### 5.2.4.3. Economic Impact Analysis

Economic analysis of costs to install CO control is based on the following key factors:

- Capacity of the turbine
- Baseline emissions levels
- Controlled emissions levels
- Emission control installation and operating costs

The cost-effectiveness of a CO catalyst installation on the power generation turbines is summarized in Table 17, below. As shown in this table, CO catalyst is above the ADEC cost-effectiveness threshold guidance of \$10,000 per ton.

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Table	17:	Economic	Analysis
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Control Technology	CO Catalyst
Control Option	1
Uncontrolled Baseline ppmvd@15%O <sub>2</sub>	15
Uncontrolled emissions (tpy)	62
Controlled emissions ppmvd@15%O2	5
Controlled emissions (tpy)	21
CO emission reduction (tpy)	42
Total Annualized Operating Cost	\$663,165
Cost of CO removal (\$/ton)	\$15,801

While the cost-effectiveness shown in Table 17 is higher than the "rule of thumb" cost-effectiveness range, ADEC may be inclined to discount the cost-effectiveness result in the BACT determination for the following reasons:

- Other recent Alaska permitting actions have required CO catalysts to reduce CO emissions. For example, the Point Thomson BACT determination issued in 2012 sets a reasonable precedent for these CO controls.
- The above cost-effectiveness calculations used an aggressive baseline emission rate (i.e., 15 ppmv CO). If ADEC were to require that a more relaxed baseline emission rate be used in the calculations (e.g., 25 or 50 ppmv CO), the installation of CO catalyst would become cost-effective.

## 5.2.5. Step 5: Select BACT

This BACT analysis concludes, similar to other comparable projects evaluated, that good combustion practices/clean fuels, as well as operation of an oxidation catalyst likely constitutes BACT for a gas turbine of this type and application (see Appendix A for a list of other BACT determinations reviewed).

## 5.3. SO<sub>2</sub>, VOC, and PM BACT Analysis

The SO<sub>2</sub>, VOC, and PM BACT analysis for the power generation turbine is identical to the compressor turbines; see Sections 4.3 and 4.4, above.

## 5.4. GHG BACT Analysis

 $CO_2$ , a GHG, is the main combustion product from gas turbines. Incomplete combustion would cause methane to be emitted, which is also a GHG. This section describes the techniques that would be employed to reduce GHGs from the power generation turbines.

## 5.4.1. Step 1: Identify All Control Technologies

This analysis focused on natural-gas fired combustion turbines greater than 25 MW from year 2010 to the present. A summary of the data collected by this review is included in Appendix A.

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Control technologies identified for GHG control of combined cycle gas turbines include the following:

- Use of Low-Carbon Fuel
- Design and Operational Energy Efficiency
- Alternate Design Use of Grid Power

These control methods may be used alone or in combination to achieve the various degrees of GHG emissions control. Each of the control methods are described below.

Notably, another emission control technique, which is identified in the EPA GHG BACT guidance, is the use of CCS, which is discussed in its own section (see Section 8). As shown in the BACT analysis for CCS, the technology is potentially infeasible and is not cost-effective. CCS will not be discussed further in this section of the analysis.

#### Use of Low-Carbon Fuel

Use of pipeline quality natural gas and BOG (i.e., fuel gas predominately consisting of methane) is the cleanest and lowest-carbon fuel available at the LNG Plant.

#### **Design and Operational Energy Efficiency**

Design and operational energy efficiencies affecting emissions and efficiency include the following:

- Output Efficiency per Heat Input
- Periodic Burner Tuning
- Proper Instrumentation and Controls
- Reliability

Each of these is summarized below.

- Efficiency: Turbine models under consideration should be evaluated for output efficiency compared to the heat input rate. More efficient models require less heat input for the equivalent amount of fuel consumed.
- **Periodic Burner Tuning**: Periodic inspections and tuning should be planned in order to maintain/restore high efficient and low-emissions operation.
- Instrumentation and Controls: Control systems should be of the type to monitor and modulate fuel flow and/or combustion air, and other vital parameters in order to achieve optimal high efficiency low-emission performance for full load and part-load conditions.
- **Reliability**: Turbine models under consideration should be evaluated for reliability of design for the specific operational design and conditions.

#### Alternate Design – Use of Electrical Grid Power

Connection to the electrical grid power system in order to eliminate the need to install power generation turbines at the LNG Plant was considered.

## 5.4.2. Step 2: Eliminate Technically Infeasible Options

The only technology eliminated at Step 2 is the use of electrical grid power as the primary power source. This technology choice is infeasible as the grid does not provide adequate energy to meet the normal operating requirements of the facility. Electrical grid primary power is not an option for the Project.

# 5.4.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 18, below. These technologies are ranked by control efficiency.

Rank	Control Technology	Control Efficiency (%)
1	Combined Cycle Turbine (Base Case)	No change to control efficiency; however, fewer combined cycle turbines would be required to be installed as compared to simple cycle turbines.
2	Operational Efficiencies/ Low Carbon Fuels	Variable

#### **Table 18: Remaining Control Options and Control Effectiveness**

## 5.4.4. Step 4: Evaluate Most Effective Controls and Document Results

The only technology evaluated for control-effectiveness is the use of combined cycle vs simple cycle turbines. The other measures identified in Step 3 would be incorporated into the design and operation of the gas turbines; no analysis of cost is required for these options.

## 5.4.4.1. Energy Impact Analysis

Since GHG controls incorporate energy efficiency elements and do not result in impacts, an energy impact analysis is not required.

## 5.4.4.2. Environmental Impact Analysis

Relative to GHG controls, none of the proposed GHG measures result in adverse environmental impacts.

## 5.4.4.3. Economic Analysis

An economic analysis is not required as the Project proposes to implement all of the above measures listed in Step 3.

## 5.4.5. Step 5: Select BACT

This BACT analysis concludes that use of a combined cycle turbine using low-carbon fuel, and implementing operational energy efficiency measures achieves BACT for the power generation gas turbines. The BACT determination is consistent with other comparable projects (see Appendix A for a full list of BACT determinations reviewed).

## 5.5. Conclusions

The objective of this analysis was to examine the power generation combustion turbine as the driver selection for power generation. The analysis considered the technology, feasibility, cost, and other site-specific factors to control of NOx, CO, PM, SO<sub>2</sub>, VOC, and GHG emissions. The BACT analysis confirmed the following levels of control for the combustion turbine drivers:

- NOx: UDLN achieving 9 ppmv NOx @ 15% O<sub>2</sub>
- CO: CO Catalyst achieving 10 ppmv CO or lower @ 15% O<sub>2</sub>
- SO<sub>2</sub>: Clean Fuels
- PM and VOC: Good Combustion Practices/Clean Fuels
- GHGs: Use of a combined cycle turbine using low-carbon fuel, and implementing operational energy efficiency measures

Notably, the BACT determinations for NOx did not incorporate the most stringent and feasible control option. The most stringent control option, SCR, was eliminated in the analysis based on cost-effectiveness.

The installation of a catalyst bed to control CO emissions achieves the most stringent level of control for this pollutant.

Relative to SO<sub>2</sub>, PM, and VOC, this BACT analysis did not identify any more stringent control technologies that could impact turbine design.

For GHGs, the most stringent controls, which have been achieved in practice, are proposed for the gas turbine generators.

# 6. VENT GAS DISPOSAL (FLARES AND THERMAL OXIDIZER)

Vent gases may be emitted by the facility during periods of blowdown, start-up, shutdown, and malfunction events. Vent gases at the LNG Plant would contain VOC and high concentrations of methane, which has a relatively high GHG GWP. Vapor recovery, flares and thermal oxidizers are used to control these emissions.

The LNG Plant would have three flare gas systems (i.e., wet, dry, and low-pressure), to route relief vapors from separate sections of the plant into their respective flare collection headers. The wet flare gas system would control waste gas streams containing a significant concentration of water (i.e., around the molecular sieve dehydration beds), or contain a significant concentration of heavier compounds, which could freeze out at colder temperatures (i.e., pressure relief and de-pressuring flow from the debutanizer column). The dry flare gas system would be used for safe disposal of dry hydrocarbons streams discharged downstream of the dehydration unit both under emergency condition and during a start-up condition. The low-pressure BOG flare gas system would be used for safe disposal of low-pressure operational releases from the LNG Storage and Loading System and intermittent maintenance purging of inert gas from LNG carriers. A thermal oxidizer would be used to control off-gas emissions from the condensate

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tank. Gases from storage tanks and LNG carrier loading would be captured and reused as fuel gas, where possible.

This analysis provides a review of the possible technologies and emission limits that could be imposed as BACT for vent gas from the wet gas hydrocarbon streams and the dry gas hydrocarbon streams. Technologies considered for the third vent gas disposal system handling the emissions from the condensate storage and loading operations are discussed later in Sections 9 and 10 of this document.

## 6.1. VOC and GHG "Top-Down" BACT Analysis

This BACT analysis evaluates control techniques and technologies used to mitigate waste gas emissions, which can result in VOC and GHG emissions.

## 6.1.1. Step 1: Identify All Control Technologies

Control technologies identified to mitigate emissions include the following:

- Flare Gas Reduction Best Practices
- Flare Gas Recovery
- Flare/Thermal Oxidizer Design

These control methods may be used alone or in combination to achieve the various degrees of emissions control. Each technology is summarized below.

Notably, another emission control technique, which is identified in the EPA GHG BACT guidance, is the use of CCS, which is discussed in its own section (see Section 8). As shown in the BACT analysis for CCS, the technology is potentially infeasible and is not cost-effective. CCS will not be discussed further in this section of the analysis.

## Flare Gas Reduction Best Practices

The most practical way to reduce the amount of emissions generated from combustion in a flare/thermal oxidizer is to minimize the amount of waste gas produced. The LNG Plant would be designed to avoid routine continuous flaring (other than pilot gas used to maintain the presence of a flame and purge gas used to prevent oxygen ingress into the flare systems). Additionally, LNG would maintain and follow an Operations Emissions Management Plan, part of which would be flare gas reduction provisions to reduce the frequency, magnitude and duration of flaring events. The plan would present procedures and process controls that would be used to minimize or prevent emissions from the flares while providing for safe operation of the facility. The plan would address anticipated causes of flaring including emergency, operational upsets and commissioning/start-up/shutdown/maintenance activities.

#### Flare Gas Recovery

Flare gas recovery is a method of capturing streams normally diverted to the flare for re-use in the facility as fuel gas.

#### Flare/Thermal Oxidizer Design

Proper flare design can improve the thermal destruction of waste gases and also the combustion efficiency of the flare. Design considerations include maintaining a pilot flame, ensuring the heating value of the flare gas is adequate and restricting the velocity of low-BTU flare gas for flame stability.

Thermal oxidizers are not subject to 40 CFR 60.18 requirements; however, good combustion practices including proper mixing of fuel and combustion air would minimize combustion emissions.

## 6.1.2. Step 2: Eliminate Technically Infeasible Options

None of the technologies discussed in Section 6.1.1 are infeasible. None are eliminated at this step.

## Flare Gas Reduction Best Practices

Flare gas reduction best practices are a common BACT control for flares/thermal oxidizers and are considered a technically feasible control option for flares/thermal oxidizers for the purposes of this analysis.

## Flare Gas Recovery

Flare gas recovery is a common BACT control for flares/thermal oxidizers and is considered a technically feasible control option for flares/thermal oxidizers for the purposes of this analysis. Flare gas recovery is most applicable for facilities that continuously vent gases with fuel value to the flare.

Flare gas recovery becomes infeasible for gases that contain significant concentrations of inert materials. Inert gases can disrupt the operation of the fuel gas system or freeze in the liquefaction system. Hydrocarbon gases that are contaminated with significant concentrations of inert gases are best disposed at a flare or thermal oxidizer using good combustion practice.

## Flare/Thermal Oxidizer Design

Flare/thermal oxidizer is a common BACT control for waste gas minimization and is considered a technically feasible control option for the purposes of this analysis.

# 6.1.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 19, below. These technologies are ranked by control efficiency.

Rank	Control Technology	Control Efficiency (%) or Emissions Target (ppmv)
1	Flare Gas Reduction Best Practices	Variable
2	Flare Gas Recovery	Variable
3	Flare/Thermal Oxidizer Design	Variable

## Table 19: Remaining Control Options and Control Effectiveness

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## 6.1.4. Step 4: Evaluate Most Effective Controls and Document Results

#### 6.1.4.1. Energy Impact Analysis

No unusual energy impacts were identified for the technically feasible emissions controls evaluated in this BACT analysis.

#### 6.1.4.2. Environmental Impact Analysis

For this analysis, implementation of good combustion practices/clean fuels is not expected to cause an environmental impact.

#### 6.1.4.3. Economic Impact Analysis

As flare gas reduction best practices, flare gas recovery and flare/thermal oxidizer design would be implemented for this Project, economic analysis is not required.

## 6.1.5. Step 5: Select BACT

This BACT analysis concludes that a combination of flare gas reduction best practices, flare gas recovery and flare/thermal oxidizer design meet BACT for waste gas emissions mitigations.

## 6.2. Conclusions

The objective of this analysis was to examine the mitigation of waste gas emissions mitigation for the facility. The analysis considered the technology, feasibility, cost, and other site-specific factors to control waste gas emissions. Flare gas reduction best practices, flare gas recovery, and flare/thermal oxidizer design achieve the most stringent level of controls for this pollutant.

# 7. COMPRESSION IGNITION ENGINES – FIREWATER PUMP/INSTRUMENT AIR COMPRESSOR

This BACT analysis addresses the 627 kW emergency diesel firewater pump (operating less than 100 hours per year, in non-emergency use) and 224 kW emergency diesel instrument air compressor (operating less than 100 hours per year, in non-emergency use) that would be installed at the facility. This analysis provides a review of the possible technologies and emission limits that could be imposed as BACT. Relative to internal combustion engines, only a cursory BACT analysis was performed.

Control technologies identified for NOx, SO<sub>2</sub>, CO, PM, VOC, and GHGs include the following:

- Good Combustion Practices/Clean Fuels (All Pollutants)
- Compliance with 40 CFR NSPS Subpart IIII (NOx, VOC, CO, and PM)
- Diesel Particulate Filters (PM)
- CO Catalyst (CO and VOC)

Selective Catalytic Reduction (NOx)<sup>6</sup>

These control methods may be used alone or in combination to achieve the various degrees of emissions control. Each technology is summarized below.

Notably, another emission control technique, which is identified in the EPA GHG BACT guidance, is the use of CCS, which is discussed in its own section (see Section 8). As shown in the BACT analysis for CCS, the technology is potentially infeasible and is not cost-effective. CCS will not be discussed further in this section of the analysis.

## **Good Combustion Practices/Clean Fuels**

The rate of combustion emissions is dependent upon fuel choice and good combustion practices including proper mixing of fuel and combustion air as well as the proper operation and maintenance of the engines. These engines are designed to combust low-sulfur diesel fuel and optimized to minimize combustion emissions through use of good combustion practices.

## Compliance with 40 CFR NSPS Subpart IIII

These compression ignition engines would be subject to 40 CFR NSPS Subpart IIII emission limits. Based on the horsepower rating and service of these engines, these engines are subject to the following EPA Tier 3 standards: CO - 2.6 grams per brake horsepower-hour (g/bhp-hr); non-methane hydrocarbon + NOx - 3.0 g/bhp-hr; PM - 0.15 g/bhp-hr.

## Diesel Particulate Filter, CO Catalyst, and SCR

Due to the limited use and the urgent nature of emergency situations, emergency type engines are not typically required to install diesel particulate filters, CO or SCR catalysts.

# 7.1. Conclusions

Based on the foregoing, the likely BACT for compression ignition engines would be compliance with NSPS Subpart IIII and the combustion of clean fuels. Compliance with this NSPS would require installation of engines that meet EPA Tier 3 standards.

<sup>&</sup>lt;sup>6</sup> There are other potential catalytic type control technologies that could be analyzed as part of this compression ignition BACT analysis; however, SCR is the most commonly utilized catalytic control technology for BACT applicability and is the focus of this analysis.

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# 8. DIESEL FUEL STORAGE TANKS

This BACT analysis addresses the three diesel fuel storage tanks needed for support equipment at the facility. A summary of the required storage tanks is provided below:

Tank Emission Unit ID	Equipment Description	Product Stored
24	Diesel Storage Tank	ULSD
25	Air Compressor Diesel Day Tank	ULSD
26	Firewater Pump Diesel Day Tank	ULSD

This analysis provides a review of the possible technologies and emission limits that could be imposed as BACT.

## 8.1. VOC and GHG "Top-Down" BACT Analysis

VOC is released to the atmosphere due to working and breathing losses from the tanks. This BACT analysis evaluates control techniques and technologies used to mitigate VOC emissions from the tanks.

## 8.1.1. Step 1: Identify All Control Technologies

Control technologies identified to mitigate emissions include the following:

- Floating Roof (External or Internal)
- Vapor Recovery System
- Flare or Thermal Oxidizer
- Submerged Fill

The following subsections discuss the general operating principles of each technology and their potential technical feasibility for VOC control of the LNG condensate and fuel storage tanks.

## **Floating Roof Tanks**

External floating roof tanks are designed with a roof consisting of a double deck or pontoon single deck which rests or floats on the liquid being contained. An internal floating roof includes a fixed roof over the floating roof, to protect the floating roof from damage and deterioration. In general, the floating roof covers the entire liquid surface except for a small perimeter rim space. Under normal floating conditions, the roof floats essentially flat and is centered within the tank shell. The floating roof must be designed with perimeter seals (primary and secondary seals) which slide against the tank wall as the roof moves up and down. The use of perimeter seals minimizes emissions of VOCs from the tank. Sources of emissions from floating roof tanks include standing storage loss and withdrawal losses. Standing losses occur due to improper fits between tank seal and the tank shell. Withdrawal losses occur when liquid is removed from the tank, lowering the floating roof, revealing a liquid on the tank walls which vaporize.

#### Vapor Recovery System

A vapor recovery system (VRS) can be used to draw vapors out of the storage tank, which are routed through a compressor. Compressed vapors may be used onsite as fuel for combustion units or routed to sales gas compressors for further compression to pipeline specifications. VRSs can recover over 95% of the hydrocarbon emissions that accumulate in the storage tanks.

#### Flare/Thermal Oxidizer Design

Proper flare design can improve the thermal destruction of waste gases recovered from the tanks and also the combustion efficiency of the flare. Design considerations include maintaining a pilot flame, ensuring the heating value of the flare gas is adequate and restricting the velocity of low-BTU flare gas for flame stability. A continuously lit pilot ensures that vent gases are combusted at the flare tip. A properly operated flare can achieve a destruction efficiency of 98 percent or greater.

Thermal oxidizers are not subject to 40 CFR 60.18 requirements; however, good combustion practices including proper mixing of fuel and combustion air would minimize combustion emissions. Thermal oxidizers can achieve control efficiencies greater than 98 percent.

#### Submerged Fill

The use of submerged fill during tank loading operations can reduce vaporization of the liquid on the between 40 - 60% from traditional splash loading operations. Note that the use of submerged fill is a control technique specific to the filling of a tank and does not affect the day-to-day emissions of the tank.

## 8.1.2. Step 2: Eliminate Technically Infeasible Options

#### **Floating Roof Tanks**

An external floating roof tank would not be technically feasible in the harsh environment where the proposed tanks will be operated. Snow and ice on the tank surfaces will potentially damage the roofs and seals – making such a system impractical.

Internal floating roof tanks have the potential to be an effective emission control system for the tanks. However, due to the small size of the diesel fuel storage tanks (less than 20,000 gal), the tanks are expected to be horizontal, square or rectangular in shape, not suitable for internal floating roofs. Should the tanks be installed underground, internal floating roofs would also not be technically feasible.

#### Flare/Thermal Oxidizer Design

Flare/thermal oxidizer is a technically feasible control option for the diesel fuel storage tanks. However, it is not identified as BACT for small (<20,000 gal) diesel fuel storage tanks in the BACT Clearinghouse databases (See Appendix E). Notwithstanding, this technology is carried forward for further analysis in this BACT determination.

#### Vapor Recovery System

Use of a vapor recovery system to control VOC emissions is a common BACT control for storage tanks and is considered technically feasible for this application when operated in conjunction with a flare/thermal oxidizer. If operated alone, the VRS would either need an outlet from the plant for the recovered vapors,

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or the vapors would be used for fuel gas for the external combustion devices. Use of recovered vapors from diesel storage is not desirable for the external combustion equipment as they compromise the quality of the gas burned. The external combustion devices, particularly the gas turbines, must meet exacting emissions specifications for NOx and CO. However, if the vapors are routed to a thermal oxidizer/flare installed specifically to capture and combust the vapors from the diesel tanks, then a VRS is technically feasible.

## Submerged Fill

Submerged fill operation is a common BACT control for the diesel fuel storage tanks and is considered a technically feasible control option for the purposes of this analysis.

## 8.1.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 20, below. These technologies are ranked by control efficiency.

Rank	Control Technology	Control Efficiency (%) or Emissions Target (ppmv)
1	Flare/Thermal Oxidizer Design with Vapor Recovery System	>98%
2	Submerged Fill	40 - 60%

#### **Table 20: Remaining Control Options and Control Effectiveness**

## 8.1.4. Step 4: Evaluate Most Effective Controls and Document Results

## 8.1.4.1. Energy Impact Analysis

No unusual energy impacts were identified for the technically feasible emissions controls evaluated in this BACT analysis.

## 8.1.4.2. Environmental Impact Analysis

For this analysis, implementation of the technologies noted above is not expected to cause an environmental impact.

## 8.1.4.3. Economic Impact Analysis

The most-effective control system remaining that is not already part of the Project includes the installation of a vapor recovery system routed to a thermal oxidizer/flare. The cost of installing a vapor recovery system with vapors routed to a thermal oxidizer for destruction of the emissions from the diesel tanks was considered based on equipment cost equations developed by EPA in the US EPA Air Pollution Control Cost Manual.

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	Thermal Oxidizer with Vapor
	Recovery
Baseline VOC emissions (tpy)	0.0015
Control Efficiency	98%
Controlled emissions (tpy)	0.00003
VOC emission reduction (tpy)	0.00151
Total Annualized Operating Cost	\$81,901
Cost of VOC removal (\$/ton)	\$54,260,681

Based on the calculations summarized in Table 21, the use of a thermal oxidizer would not be costeffective, and the control technologies have been eliminated for further consideration.

#### 8.1.5. Step 5: Select BACT

This BACT analysis concludes that the use of a fixed roof tank and submerged fill operations is BACT for the diesel fuel storage tanks.

## 8.2. Conclusions

Based on the foregoing, the likely BACT for the diesel fuel storage tanks is a fixed roof tank with submerged fill.

## 9. CONDENSATE STORAGE TANKS

This BACT analysis addresses the two condensate storage tanks needed to store residual condensate recovered from the pipeline. A summary of the required storage tanks is provided below:

Tank Emission Unit ID	Equipment Description	Product Stored
21	Condensate Storage Tank	Condensate
22	Offspec Condensate Storage Tank	Condensate

This analysis provides a review of the possible technologies and emission limits that could be imposed as BACT.

## 9.1. VOC and GHG "Top-Down" BACT Analysis

VOC is released to the atmosphere due to working and breathing losses from the tanks. This BACT analysis evaluates control techniques and technologies used to mitigate VOC emissions from the tanks.

## 9.1.1. Step 1: Identify All Control Technologies

Control technologies identified to mitigate emissions include the following:

- Floating Roof (External or Internal)
- Vapor Recovery System

- Flare or Thermal Oxidizer
- Submerged Fill

The following subsections discuss the general operating principles of each technology and their potential technical feasibility for VOC control of the LNG condensate storage tanks.

#### **Floating Roof Tanks**

External floating roof tanks are designed with a roof consisting of a double deck or pontoon single deck which rests or floats on the liquid being contained. An internal floating roof includes a fixed roof over the floating roof, to protect the floating roof from damage and deterioration. In general, the floating roof covers the entire liquid surface except for a small perimeter rim space. Under normal floating conditions, the roof floats essentially flat and is centered within the tank shell. The floating roof must be designed with perimeter seals (primary and secondary seals) which slide against the tank wall as the roof moves up and down. The use of perimeter seals minimizes emissions of VOCs from the tank. Sources of emissions from floating roof tanks include standing storage loss and withdrawal losses. Standing losses occur due to improper fits between tank seal and the tank shell. Withdrawal losses occur when liquid is removed from the tank, lowering the floating roof, revealing a liquid on the tank walls which vaporize.

#### Flare/Thermal Oxidizer Design

Proper flare design can improve the thermal destruction of waste gases recovered from the tanks and also the combustion efficiency of the flare. Design considerations include maintaining a pilot flame, ensuring the heating value of the flare gas is adequate and restricting the velocity of low-BTU flare gas for flame stability. A continuously lit pilot ensures that vent gases are combusted at the flare tip. A properly operated flare can achieve a destruction efficiency of 98 percent or greater.

Thermal oxidizers are not subject to 40 CFR 60.18 requirements; however, good combustion practices including proper mixing of fuel and combustion air would minimize combustion emissions.

#### Vapor Recovery System

A vapor recovery system (VRS) can be used to draw vapors out of the storage tank, which are routed through a compressor. Compressed vapors may be used onsite as fuel for combustion units or routed to sales gas compressors for further compression to pipeline specifications. VRSs can recover over 95% of the hydrocarbon emissions that accumulate in the storage tanks.

#### **Submerged Fill**

The use of submerged fill during tank loading operations can reduce vaporization of the liquid on the between 40 - 60% from traditional splash loading operations. Note that the use of submerged fill is a control technique specific to the filling of a tank and does not affect the day-to-day emissions of the tank.

## 9.1.2. Step 2: Eliminate Technically Infeasible Options

#### Floating Roof Tanks

An external floating roof tank would not be technically feasible in the harsh environment where the proposed tanks will be operated. Snow and ice on the tank surfaces will potentially damage the roofs and seals – making such a system impractical.

Both internal and external floating roof tanks are infeasible in the application because the vapor pressure of condensate can be quite high (i.e., exceed 11 psia) under certain temperature conditions. This highly volatile liquid would compromise the integrity of the seal systems on these tank types.

#### Flare/Thermal Oxidizer Design

Flare/thermal oxidizer is a common BACT control for condensate storage tanks and is considered a technically feasible control option for the purposes of this analysis.

#### Vapor Recovery System

Use of a vapor recovery system to control VOC emissions is a common BACT control for storage tanks and is considered technically feasible for this application when operated in conjunction with a flare/thermal oxidizer. If operated alone, the VRS would either need an outlet from the plant for the recovered vapors, or the vapors would be used for fuel gas for the external combustion devices. Use of recovered vapors from condensate storage is not desirable for the external combustion equipment as they compromise the quality of the gas burned. The external combustion devices, particularly the gas turbines, must meet exacting emissions specifications for NOx and CO. However, if the vapors collected and routed to a thermal oxidizer/flare installed specifically to capture and combust the vapors from the condensate tanks, then a VRS, is technically feasible.

Notably, the design of the proposed vapor recovery system for the project includes a vapor balance feature, which allows vapors from the condensate loading operation (discussed in Section 10) to be commingled with condensate tank vapors and balanced in the system. Vapors from both the loading operation and the condensate tanks themselves are controlled by a thermal oxidizer.

#### Submerged Fill

Submerged fill operation is a common BACT control for the condensate storage tanks is considered a technically feasible control option for the purposes of this analysis.

## 9.1.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 22, below. These technologies are ranked by control efficiency.

Rank	Control Technology	Control Efficiency (%) or Emissions Target (ppmv)
1	Flare/Thermal Oxidizer with vapor balance/recovery system	>98%
2	Submerged Fill	Variable

#### Table 22: Remaining Control Options and Control Effectiveness

## 9.1.4. Step 4: Evaluate Most Effective Controls and Document Results

The use of a vapor recovery system to recover vapors from the condensate tanks and route to a flare/thermal oxidizer is anticipated to provide the most effective control system for the condensate storage tanks.

#### 9.1.4.1. Energy Impact Analysis

No unusual energy impacts were identified for the technically feasible emissions controls evaluated in this BACT analysis.

#### 9.1.4.2. Environmental Impact Analysis

For this analysis, implementation of a vapor balance system routed to a flare/thermal oxidizer is not expected to cause an environmental impact.

#### 9.1.4.3. Economic Impact Analysis

As a vapor balance system routed to a flare/thermal oxidizer would be implemented for this Project, economic analysis is not required because the technology is the highest rank in Step 3.

## 9.1.5. Step 5: Select BACT

This BACT analysis concludes that a vapor balance system routed to a flare/thermal oxidizer to control emissions from condensate storage tanks meets BACT.

## 9.2. Conclusions

Based on the foregoing, the likely BACT for the condensate storage tanks is capture and recovery through a vapor balance system and combustion of vapors in a properly designed flare/thermal oxidizer.

## **10.CONDENSATE TANK LOADING**

This BACT analysis addresses the use of a condensate loading system for transporting the condensate of offsite sales. A review of the possible technologies and emission limits that could be imposed as BACT is described below.

## **10.1. VOC and GHG "Top-Down" BACT Analysis**

VOC is released to the atmosphere due to loading losses that occur as the product is transferred from the tank to the trucks. This BACT analysis evaluates control techniques and technologies used to mitigate VOC emissions from the loading operation as found in EPA's RBLC (See Appendix E).

## 10.1.1. Step 1: Identify All Control Technologies

Control technologies identified to mitigate emissions include the following:

• Vapor Recovery System with Carbon Adsorption

- Flare or Thermal Oxidizer
- Submerged Fill

The following subsections discuss the general operating principles of each technology and their potential technical feasibility for VOC control of the condensate loading operation.

#### Vapor Recovery System with Carbon Adsorption

A vapor recovery system (VRS) combined with carbon adsorption can be used to capture vapors displaced from the truck as condensate is pumped into the truck tank. Condensate vapors are collected from the loading rack and routed to a carbon adsorption vessel which adsorbs the hydrocarbon the vapor stream, releasing clean air via vents in the vessel. The system maintains two carbon vessels – one which is actively collecting the hydrocarbon vapors, the other is regenerating via vacuum and purge air stripping methods. The vacuum pump extracts the hydrocarbon vapor routing it to an absorption column where the concentrated hydrocarbon vapor is liquefied and then returned to the original product storage tank. VRS combined with carbon adsorption can recover on the order of 98% of the hydrocarbon emissions that would otherwise be released during the loading process.

#### Flare/Thermal Oxidizer Design

Proper flare design can improve the thermal destruction of waste gases recovered during loading operation, and can improve the combustion efficiency of the flare. Design considerations include maintaining a pilot flame, ensuring the heating value of the flare gas is adequate and restricting the velocity of low-BTU flare gas for flame stability. A continuously lit pilot ensures that vent gases are combusted at the flare tip. A properly operated flare can achieve a destruction efficiency of 98 percent or greater.

Thermal oxidizers are not subject to 40 CFR 60.18 requirements; however, good combustion practices including proper mixing of fuel and combustion air would minimize combustion emissions.

#### Submerged Fill

The use of submerged fill during tank loading operations can reduce vaporization of the liquid between 40 – 60% from traditional splash loading operations.

#### 10.1.2. Step 2: Eliminate Technically Infeasible Options

#### Vapor Recovery System with Carbon Adsorption

Use of a vapor recovery system to control VOC emissions is a common BACT control for loading operations and is considered technically feasible for this application.

#### Flare/Thermal Oxidizer Design

Flare/thermal oxidizer is a common BACT control for loading operations and is considered a technically feasible control option for the purposes of this analysis.

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#### Submerged Fill

Submerged fill operation is a common BACT control for the condensate loading operation and is considered a technically feasible control option for the purposes of this analysis.

## 10.1.3. Step 3: Rank Remaining Control Technologies by Control Effectiveness

The emission control technologies not eliminated by practical or operational limitations are listed in Table 23, below. These technologies are ranked by control efficiency.

Rank	Control Technology	Control Efficiency (%) or Emissions Target (ppmv)
1	Flare/Thermal Oxidizer with vapor balance/recovery system	>98%
2	Vapor Recovery with Carbon Adsorption	98%
3	Submerged Fill	Variable

#### Table 23: Remaining Control Options and Control Effectiveness

## **10.1.4.** Step 4: Evaluate Most Effective Controls and Document Results

While a vapor recovery system with regenerative carbon adsorption may provide a similar level of emission reduction as the use of a flare/thermal oxidizer, the project proposes to use a thermal oxidizer to control the emissions from the loading operation. Therefore, a vapor recovery system with carbon absorption is eliminated for further consideration in this BACT analysis.

Notably, the design of the proposed system for the project includes a vapor balance feature, which allows for vapors to be commingled with condensate tank vapors and balanced in the system with the tanks. Vapors from the loading operation and the condensate tanks themselves are controlled by a thermal oxidizer. Additionally, the loading operation itself will include submerged fill to help minimize vapors recovered and combusted at the thermal oxidizer.

## 10.1.4.1. Energy Impact Analysis

No unusual energy impacts were identified for the technically feasible emissions controls evaluated in this BACT analysis.

## 10.1.4.2. Environmental Impact Analysis

For this analysis, implementation of submerged filling with a vapor balance/recovery system routed to a flare/thermal oxidizer is not expected to cause an environmental impact.

## 10.1.4.3. Economic Impact Analysis

As submerged filling with a vapor balance/recovery system routed to a flare/thermal oxidizer would be implemented for this Project, economic analysis is not required because the technology is the highest rank in Step 3.

## 10.1.5. Step 5: Select BACT

This BACT analysis concludes that submerged filling with a vapor balance/recovery system routed to a flare/thermal oxidizer to control emissions from condensate storage tanks meets BACT.

## 10.2. Conclusions

Based on the foregoing, the likely BACT for the condensate loading operations is submerged filling with a vapor balance/recovery system routed to a flare/thermal oxidizer.

# **11.CARBON CAPTURE AND SEQUESTRATION (CCS)**

For the purposes of a BACT analysis for GHG, EPA classifies CCS as an add-on pollution control technology that is "available" for facilities emitting CO<sub>2</sub>. Technical feasibility and cost have generally eliminated this GHG reduction technology from further consideration in all BACT analyses reviewed at EPA, state, and local BACT clearinghouses and databases. Below is a description of the technology and its potential application to the LNG Plant.

# 11.1. Overview of CCS

CCS consists of two main operations: (1)  $CO_2$  capture, compression and transport; and (2) sequestration (storage). To capture  $CO_2$ , CCS systems generally involve use of adsorption or absorption processes to remove  $CO_2$  from exhaust gas, with subsequent desorption to produce a concentrated  $CO_2$  stream. Research into technically and economically feasible capture systems is ongoing and is the focus of many large scale grants from the U.S. Department of Energy.

In the CCS process, the concentrated  $CO_2$  would be compressed to "supercritical" temperature and pressure, a state in which  $CO_2$  exists neither as a liquid nor a gas, but instead has physical properties of both liquids and gases. The supercritical  $CO_2$  would then be transported to an appropriate location for underground injection into a suitable geological storage reservoir such as a deep saline aquifer or depleted coal seam, or used in crude oil production for enhanced oil recovery. Transportation of "supercritical" temperature and pressure  $CO_2$  can be accomplished via truck, ship, or pipeline depending on the location of the generation site and the storage site. However, unless the storage site is relatively close to the site of generation, this transportation is costly and increases significantly with distance. The concentration of  $CO_2$  is required because injection of exhaust streams containing high levels of N,  $O_2$ , and dilute  $CO_2$  is not technically feasible. Adequate techniques for compression of  $CO_2$  exist, but such compression systems require large amounts of energy, typically then resulting in the generation of even more  $CO_2$ .

Carbon sequestration is the long-term isolation of  $CO_2$  from the atmosphere through physical, chemical, biological, or engineered processes. In general, carbon sequestration is achieved through storage in geologic formations or in terrestrial ecosystems, or through conversion into commercial products. Without an existing market to use recovered  $CO_2$ , the material would instead require sequestration, or permanent storage. Geologic sequestration refers to the injection and storage of captured  $CO_2$  in an underground location where it will not readily escape into the atmosphere, such as within deep rock formations at pressures and temperatures where  $CO_2$  is in the supercritical phase (typically 0.5 miles or

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more below ground surface). In general, CO<sub>2</sub> storage could be successful in porous, high-permeability rock formations or deep saline aquifer formations that are overlain by a thick, continuous layer of low-permeability rock, such as shale, where CO<sub>2</sub> may remain immobilized beneath the ground surface for extended periods of time. Other geologic formations deemed suitable for geologic sequestration include coal beds that are too thin or deep to be cost effectively mined and depleted oil and gas reservoirs, where in addition to CO<sub>2</sub> storage, economic gains may also be achieved (most notably through the use of enhanced oil recovery to obtain residual oil in mature oil fields).

An understanding of site-specific geologic studies and formation characteristics is critical to determine the ultimate CO<sub>2</sub> storage capacity and, ultimately the feasibility of geologic sequestration, for a particular area. Other factors to consider when determining the feasibility (both technical and economic) of geologic sequestration are:

- The cost, constructability, safety and potential environmental impacts of infrastructure necessary for the transportation of captured CO<sub>2</sub> from the source to the ultimate geologic sequestration site;
- The amount of measurement, monitoring (baseline, operational, etc.); and
- Verification of CO<sub>2</sub> distribution required following injection into the subsurface to ensure the risk of leakage of CO<sub>2</sub> is minimized or eliminated.

Potential uses/long term storage options for CO<sub>2</sub> are described below:

## **Enhanced Oil Recovery**

Enhanced Oil Recovery (EOR) injection systems pump CO<sub>2</sub> into partially depleted oil reservoirs. Injection enhances the recovery of oil from partially depleted reservoirs allowing additional recovery. EOR systems have been used to enhance oil recovery at many oil reservoirs. Optimal EOR operation is dependent upon reservoir temperature, pressure, depth, net pay, permeability, remaining oil and water saturations, porosity, and fluid properties such as API gravity and viscosity.

## Saline Aquifer Injection

Saline aquifer injection systems pump CO<sub>2</sub> into deep saline aquifers. Saline aquifers may be the largest long-term subsurface CCS option. Such aquifers are generally saline and are usually hydraulically separated from the shallower "sweet water" aquifers and surface water supplies accessible by drinking water wells. The injected CO<sub>2</sub> displaces the existing liquid and is trapped as a free phase (pure CO<sub>2</sub>), which is referred to as "hydrodynamic trapping." A fraction of the CO<sub>2</sub> will dissolve into the existing fluid. The ultimate CO<sub>2</sub> sequestration capacity of a given aquifer is the difference between the total capacity for CO<sub>2</sub> at saturation and the total inorganic carbon currently in solution in that aquifer. The solubility of CO<sub>2</sub> depends on the pressure, temperature, and salinity of the formation water. Low salinity, low temperature, and high pressure environment is the most effective for sequestering CO<sub>2</sub> in widespread, deep, saline aquifers. The potential sequestration capacity of deep horizontal reservoirs is many times that of depleted, really restricted, structural or stratigraphic oil and gas reservoirs.

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Sequestration of CO<sub>2</sub> is generally accomplished via available geologic reservoirs that must be either local to the point of capture, or accessible via pipeline to enable the transportation of recovered CO<sub>2</sub> to the permanent storage location. The *United States 2012 Carbon Utilization and Storage Atlas* (Fourth Edition published by the U.S. Department of Energy, Office of Fossil Energy) identifies an extensive saline aquifer directly below Nikiski as being "screened, high sequestration potential." However, this area has not had detailed evaluation for CO<sub>2</sub> sequestration and lies in a fault zone. Thus, this saline aquifer is not deemed to be suitable for CCS at this time by the Project.

## **Oceanic Dispersion**

Ocean dispersion has not yet been deployed or demonstrated and is still in the research phase. This CCS system would inject  $CO_2$  directly into the ocean at depths greater than 3,000 feet. Injection is achieved by transporting  $CO_2$  via pipelines or ships to an ocean storage site where it is injected. The dissolved and dispersed  $CO_2$  would subsequently become part of the global carbon cycle. At this depth, it is theorized that most of the  $CO_2$  would be isolated from the atmosphere for centuries.

## 11.2. CCS Feasibility

CCS has many technical challenges from facility design and operation to transport and ultimate disposal of CO<sub>2</sub> streams. At present, it is unclear if the technology could be employed at the LNG Plant. Detailed design studies would be required to assess CCS feasibility, including the investigation of possible uses and/or disposal of the recovered CO<sub>2</sub> stream. Additional work would be required to address legal liability and permitting concerns. A detailed assessment of the feasibility of CCS is beyond the scope of this analysis.

# 11.3. Economic Analysis

This section presents a summary cost analysis for CCS as potentially applied to the LNG Plant. Costs presented below are based on data from other comparable facility analyses, or data provided by the EPA.

Economic analysis of CCS systems is based on the following key factors:

- CO<sub>2</sub> capture costs
- Constructions and operation costs of CO<sub>2</sub> transfer (pipeline, container, rail, etc.)
- Costs to secure the rights for the geologic reservoir
- Operational costs of the sequestration facility

Costs presented below are based on the information from a comparable U.S. LNG liquefaction plant (see notes 1, 2 and 3 in Table 20, below). Comparable costs were determined based on transport to a disposal site within 25 miles of the LNG Plant. The cost-effectiveness of CCS is summarized in Table 20, below. As shown in this table, CCS is not cost-effective, as it greatly exceeds typical benchmarks for GHG control discussed in Section 3, and the \$12 - \$40 per ton benchmark set by the Project.

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#### Table 24: Economic Analysis

	Control Cost <sup>1,3</sup>	Total Cost
Capture and Compression	\$132.28/ton	\$447,300,000
Transport (20-inch pipe/25 miles)	\$9.18/ton	\$31,000,000
Operating	\$19.23/ton	\$65,000,000
Total Annualized CCS Costs		\$543,300,000
CO <sub>2</sub> Removed Per Year (Tons) <sup>2</sup>	1.2 m	nillion
Cost of CO <sub>2</sub> removal (\$/ton)	\$4	55
<sup>1</sup> Costs were taken on a per ton basis from "Golden Pass Products Prevention of Significant Deterioration (PSD) for Greenhouse Gas E <sup>2</sup> Estimated GHG emission from Emission Calculations 194210-USA USAL-CB-PCCAL-00-000014-002. <sup>3</sup> DOD AREA COST FACTORS (ACF) PAX Newsletter No 3.2.1, dated	LNG Export Project - App Emissions," June 2014. AL-CB-PCCAL-00-000014 25 Mar 2015 TABLE – 4-	Dication for a -000 and 194210- -1, UFC 3-701-01,
Change 7, March 2015		

## 11.4. Conclusions

This analysis concludes that CCS is potentially infeasible and definitely not cost effective for this Project.

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# **12.REFERENCES**

Reference Number	Document Number	Document Title
[1]	USAL-CB-SRZZZ-00-000005-000 Revision 0	APP Preliminary BACT Analysis.
[2]	USAKL-PT-BYRFP-00-0001	Alaska LNG Project – LNG Facility Pre-Feed Scope of Services
[3]	EPA/452/B-02-001	Air Pollution Control Cost Manual, Sixth Edition, January 2002, http://www.epa.gov/ttncatc1/dir1/c_allchs.pdf.
[4]	USAL-CB-PRTEC-00-000009-000	Alaska LNG Study 12.3.4 – Liquefaction Compressor Driver Selection Study Report.
[5]	USAI-PS-BPDCC-00-000002-005	Alaska LNG Minutes of Meeting with ADEC, BACT and Dispersion Modeling Overview, GTP and Liquefaction Facilities, May 18, 2016. Reference included in Appendix D.
[6]	USAI-PE-SRZZZ-00-000001-000	Alaska LNG BACT Survey Report.
[7]	EPA-457/B-11-001	U.S. EPA, PSD and Title V Permitting Guidance for Greenhouse Gases.
[8]	NA	U.S. EPA, Draft New Source Review Workshop Manual, Chapter B. Research Triangle Park, North Carolina, October. 1990.
[9]	NA	U.S. EPA's database "Reasonably Available Control Technology (RACT), BACT, and Lowest Achievable Emission Rate (LAER) Clearinghouse" (RBLC). April 2015.
[10]	DE-FC02-97CHIO877	U.S. Department of Energy / ONSITE SYCOM Energy Corporation, Cost Analysis of NOx Control Alternatives for Stationary Gas Turbines. U.S. Department of Energy Environmental Programs Chicago Operations Office 9800 South Cass Avenue Chicago, IL 60439. 1999.
[11]	NA	EPA Office of Air Quality Planning and Standards, June 17, 2011: Panel Outreach with SERS; Rulemaking for Greenhouse Gas Emissions from Electric Utility Steam Generating Units.

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# **APPENDIX A**

# Summary of BACT Determinations

#### Loading Operations

Project	Location	Process	Date	Product Loaded	Throughput	VOC BACT	VOC BACT Limit	Control Efficiency	Other Requirements
Gasoline Terminals		42.002							
COUNTRYMARK REFINING AND LOGISTICS, LLC COUNTRYMARK REFINING AND LOGISTICS, LLC	MIAMI, IN	Loading Rack	12/3/2015	Gasoline	404.71 MMGAL	Relief Stack, Vapor Knockout box, flare vapor control unit.	35 MG/L		
MARATHON PETROLEUM COMPANY LP MARATHON PETROLEUM COMPANY LP	POSEY, IN	Loading Rack	8/13/2015	Gasoline	741.2 MMGAL	Vapor Recovery Unit (Carbon Adsorption)	0.159 LB/GAL		
COUNTRYMARK REFINING & LOGISTICS, LLC COUNTRYMARK REFINING & LOGISTICS, LLC	GREENE, IN	Loading Rack	6/30/2015		46200 GAL/H	test method - 1	35 MG/LITER		
Volatile Organic Liquid Marke	eting	42.01							
MAGELLAN TERMINALS HOLDINGS, L.P. PASADENA TERMINAL	HARRIS, TX	Tank Truck Loading	7/14/2017	Gasoline	120000 GAL/HR	Submerged fill and vented to a vapor recovery unit. Vapor collection system routed to vapor recovery unit	1 MG/LTR	Vapor collection system 100% capture efficiency	NSPS XX MACT R
MAGELLAN TERMINALS HOLDINGS, L.P. PASADENA TERMINAL	HARRIS, TX	Tank Truck Loading	7/14/2017	Denatured ethanol	120000 GAL/HR	Submerged fill and vented to a vapor recovery unit.	4.48 T/YR	Air eliminator venting will result in emissions to the atmosphere at less than 3 lb/hr for air purging in truck tanks.	NSPS XX MACT R
MAGELLAN TERMINALS HOLDINGS, L.P. PASADENA TERMINAL	HARRIS, TX	Tank Truck Unloading	7/14/2017	Pressurized Butane	0	Specialized connection system of transfer valves that minimize the volume of piping containing residual butane after unloading	33 T/YR		NSPS XX MACT R
PHILLIPS 66 PIPELINE LLC BEAUMONT TERMINAL	JEFFERSON, TX	Truck and railcar loading	6/8/2016	VOLs and refined petroleum products	0	Loading vapors of materials with a TVP of 0.5 psia or greater are controlled by a flare.	28.83 T/YR	Railcar capture efficiency of 100% will be verified annually by Class DOT-111AW or Class DOT-115AW testing, and truck capture efficiency of 100% will be verified annually by DOT testing specified in 49 CFR 180.407.	40 CFR Part 63, Subparts A, R, & EEEE
PHILLIPS 66 PIPELINE LLC BEAUMONT TERMINAL	JEFFERSON, TX	Truck and railcar loading	6/8/2016	VOLs and refined petroleum products	0	Flare	0.376 LB/MMBTU		Good combustion practices

#### Loading Operations

Project	Location	Process	Date	Product Loaded	Throughput	VOC BACT	VOC BACT Limit	Control Efficiency	Other Requirements
PHILLIPS 66 PIPELINE LLC	JEFFERSON, TX	Truck and		VOLs and refined	0	Flare	4885.75 T/YR	Railcar capture efficiency of 100% will be	Good combustion
BEAUMONT TERMINAL		railcar loading		petroleum products				verified annually by Class DOT-111AW or	practices
								Class DOT-115AW testing, and truck	
			6/8/2016					capture efficiency of 100% will be	
								verified annually by DOT testing	
								specified in 49 CFR 180.407.	
Other									
SEMGAS LP ROSE VALLEY PLANT	woods, ok	TRUCK LOADING	3/1/2013	CONDENSATE	9198000 GAL/YR	Enclosed Flare			
GULF CROSSING PIPELINE CO. LLC. STERLINGTON COMPRESSOR STATION	OUACHITA, LA	TRUCK LOADING	6/24/2008	CONDENSATE	5760 BBL/YR	Submerged loading and dedicated service.			

#### **Condensate Storage**

Project	Location	Process	Date	Product Stored	Tank Capacity	VOC BACT	VOC BACT Limit	Control Efficiency	Other Requirements
Petroleum Liquid Storage in Fi	ixed Roof Tanks	42.005							
GULF CROSSING PIPELINE CO. LLC. STERLINGTON COMPRESSOR STATION	OUACHITA, LA	Storage Tank	6/24/2008	Condensate	100 BBL	Submerged fill pipe			
DCP MIDSTREAM, LP LUCERNE GAS PROCESSING PLANT	WELD, CO	Storage Tank	1/13/2014	Condensate	4 X 1,000 BBL	Enclosed combustor		95%	
SEMGAS LP ROSE VALLEY PLANT	WOODS, OK	Storage Tank	3/1/2013	Condensate	4 X 1,000 BBL	Flare.			
MARKWEST BUFFALO CREEK GAS CO LLC BUFFALO CREEK PROCESSING PLANT	ВЕСКНАМ, ОК	Petroleum Storage-Fixed Roof Tanks	9/12/2012	Condensate		Flare.		95%	Closed Vent and Control.
MARKWEST BUFFALO CREEK GAS CO LLC BUFFALO CREEK PROCESSING PLANT	ВЕСКНАМ, ОК	Petroleum Storage-Fixed Roof Tanks	9/12/2012	Condensate		Flare.			Closed Vent and Control.

#### Diesel Storage

Project	Location	Process	Date	Product Stored	Tank Capacity	VOC BACT	VOC BACT Limit	Control Efficiency	Other Requirements
Petroleum Liquid Storage in F	ixed Roof Tanks	42.005							
ST. JOSEPH ENERGY CENTER ST. JOSEPH ENERGY CENTER	ST. JOSEPH, IN	Diesel Storage Tanks	6/22/2017	Diesel	650 GALLONS	Fixed Roof Tank			Good design and operating practices
ST. JOSEPH ENERGY CENTER ST. JOSEPH ENERGY CENTER	ST. JOSEPH, IN	DIESEL STORAGE TANK TK50	6/22/2017	Diesel	5000 GALLONS	Fixed Roof Tank			Good design and operating practices
BASF PEONY CHEMICAL MANUFACTURING FACILITY	BRAZORIA, TX	Diesel Storage Tanks	4/1/2015	Diesel	10708 gallons/yr	low vapor pressure fuel, submerged fill, white tank	0.02 LB/H		The tanks are painted white. Loading is done via submerged piping. The volatile organic compound (VOC) vapor pressure of the diesel and lube oil stored is below 0.0002 pounds per square inch actual (psia), so a fixed roof is reasonable.

#### Simple Cycle Combustion Turbines and Heaters Summary of BACT Determinations (2010 - 2015)

Summary of BAC	Determinations (2	010 - 2015)										-		
Project	Item	Арр	Permit	Status	NOx BACT	NOx BACT Limit	CO BACT	CO BACT Limit	VOC BACT	VOC BACT Limit	PM BACT	PM BACT Limit	GHG BACT	GHG BACT Limit
Natural Gas/Dual I	Fuel Simple Cycle (	Combustion	Furbines ≤ 2	25MW										
Point Thomson Production Facility	8 MW Gas Fired Simple Cycle CTs	7/9/2011	8/20/2012	Final	DLN (SoloNOx) and inlet air heating	15 ppmv @ 15% $O_2$ ; 60 ppmv @ 15% $O_2$ w/o SoloNOx (limited hours)	Catalytic oxidizer	2.5 ppmv @ 15% O <sub>2</sub> ; 1350 ppmv @ 15% O <sub>2</sub> w/o SoloNOx (limited hours)			Good operation and combustion practices	0.0066 lb/MMBti (average rate)	DLN with inlet air heating and good combustion practice	
Point Thomson Production Facility	8 MW Dual Fueled Simple Cycle CTs (Gas)	7/9/2011	8/20/2012	Final	DLN (SoloNOx) and inlet air heating	25 ppmv @ 15% $O_2$ ; 60 ppmv @ 15% $O_2$ w/o SoloNOx (limited hours)	Catalytic oxidizer	5 ppmv @ 15% $O_2$ ; 1350 ppmv @ 15% $O_2$ w/o SoloNOx (limited hours)			Good operation and combustion practices	0.0066 lb/MMBti (average rate)	DLN with inlet air heating, good combustion practice, and waste heat recovery	
Point Thomson Production Facility	8 MW Dual Fueled Simple Cycle CTs (Diesel)	7/9/2011	8/20/2012	Final	DLN (SoloNOx) and inlet air heating	96 ppmv @ 15% O <sub>2</sub> ; 120 ppmv @ 15% O <sub>2</sub> w/o SoloNOx (limited hours)	Catalytic oxidizer	5 ppmv @ 15% O <sub>2</sub> ; 462-981 ppmv @ 15% O <sub>2</sub> w/o SoloNOx (load- dependent, limited hours)			Good operation and combustion practices	0.012 lb/MMBti (average rate)	DLN with inlet air heating, good combustion practice, and waste heat recovery	
Kenai Nitrogen Operations	Five (5) Natural Ga s Fired Combustio n Turbines	11/24/2014	1/6/2015	Final	Selective Catalytic Red uction	7 ppmv at 15% $O_2$		50 ppmv at 15% $O_2$		0.0021 lb/MMBtu		0.0074 lb/MMBtu		59.61 Tons/MMScf
Consumers Energy Company Thetford Generating Station	Two (2) 13 MW natural gas simple cycle turbines - Peaker Units	5/8/2013	7/25/2013	Final	Dry Low-NOx combustors	0.090 lb/MMBtu	Good combustion	0.1100 lb/MMBtu	Efficient combustion, natural gas fuel	0.017 lb/MMBtu	Efficient combustion, natural gas fuel	0.010 lb/MMBtu	Efficient combustion; energy efficiency	20141 Tons/year
Qualcomm Inc.	Solar Turbine, 4.37 MW	5/23/2012	7/9/2012	Final	SoLoNOx Burner (Ultra lean premix)	5 ppmv at 15% O2				7 ppmv at 15% O2				
Cheniere Corpus Christi Pipeline - Sinton Compressor Station	Two Solar Titan 130S Turbines	9/4/2012	12/2/2013	Final	DLN (SoloNOx)	25 ppmv @ 15% O2	DLN (SoloNOx)	50 ppmv @ 15% O2						
Natural Gas Simpl	e Cvcle Combustio	n Turbines >	25MW			L			4		ł		μ	
Guadalupe Generating Station	Two (2) Natural Gas Simple-Cycle peaking combustion turbines	9/24/2012	10/4/2013	Final	DLN Burners, Limited operation	9 ppmv at 15% O <sub>2</sub>	DLN Burners, Limited operation	9 ppmv at 15% O <sub>2</sub>						
Freeport LNG Liquefaction Project - Pre Treatment Facility	87 MW Simple Cycle CT	7/20/2012	7/16/2014	Final	SCR (LAER)	2.0 ppmv @ 15% O <sub>2</sub> (LAER)	Oxidation catalyst	4.0 ppmv @ 15% O <sub>2</sub>	Oxidation catalyst	2.0 ppmv @ 15% O <sub>2</sub>	Natural gas fuel; ammonia slip limited to 10 ppmv @ 15% O <sub>2</sub>		Efficient design, including waste heat recovery; natural gas or BOG fuel; good combustion practices; air intake chiller; and oxidation catalyst	738 lbs CO <sub>2</sub> /MWh (365-day rolling average)
Corpus Christi Liquefaction Project	37 MW Simple Cycle CT	8/1/2012	9/12/2014	Final	Water injection	25 ppmv @ 15% O <sub>2</sub>	Good combustion practices	29 ppmv @ 15% O	Pipeline quality natural gas fuel and maintenance of <sup>2</sup> optimum combustion conditions and practices	0.6 lb/hr	Good combustion practices and natural gas fuel		BOG or natural gas fuel; efficient CTs with waste heat recovery on ethylene units; and good combustion, operating, and maintenance practices	8,041 lb CO <sub>2</sub> e/MMscf of LNG produced (12- month rolling average)
Cameron Liquefaction Project	853.9 MMBtu/hr Simple Cycle CT	8/21/2012	10/1/2013	Final	Dry LNB with good combustion practices	15 ppmv @ 15% O <sub>2</sub>	Good combustion practices and natural gas fuel	0.040 lb/MMBtu	Good combustion practices and natural gas fuel		Good combustion practices and natural gas fuel		Natural gas fired high thermal efficiency turbines with good combustion/operating practices	

#### RBLC BACT SUMMARY

# ALASKA LNG

Project	Item	Арр	Permit	Status	NOx BACT	NOx BACT Limit	CO BACT	CO BACT Limit	VOC BACT	VOC BACT Limit	PM BACT	PM BACT Limit	GHG BACT	GHG BACT Limit
Sabine Pass Liquefaction Expansion Project (M5)	34.3 MW (286 MMBtu/hr) Simple Cycle CTs (Refrigeration and Power Generation)	9/20/2013	6/3/2015	Final	Water injection (refrig.); DLN (power gen)	25 ppmv at 15% O <sub>2</sub> (all CTs)	Good combustion practices	50 ppmv at 15% O2 (refrig) and 58.4 ppmv at 15% O2 (Power Gen)	Good combustion practices	0.66 lb/hr	Good combustion practices and natural gas fuel		Natural gas fuel; good combustion/operating practices (CO <sub>2</sub> ); fuels selection, energy efficient design, adoption of best operational practices (CH <sub>4</sub> )	
Lake Charles Liquefaction Expor Terminal Project	t 467 MMBtu/hr Simple Cycle CTs	12/20/2013	5/1/2015	Final	LNB and SCR	5 ppmv @ 15% $O_2$ (3-hour average)	Catalytic oxidation and CO turndown	10 ppmv @ 15% O <sub>2</sub> (3-hour average)	Good combustion practices and catalytic oxidation		Good combustion practices and clean fuel		Low-carbon fuels, catalytic oxidation, design energy efficiency, and operational energy efficiency	

#### RBLC BACT SUMMARY

# ALASKA LNG

Project	Item	Арр	Permit	Status	NOx BACT	NOx BACT Limit	CO BACT	CO BACT Limit	VOC BACT	VOC BACT Limit	PM BACT	PM BACT Limit	GHG BACT	GHG BACT Limit
Heaters					-		-		-		-		-	
Point Thomson Production Facility	Diesel Fired Heaters	7/9/2011	8/20/2012	Final	LNB	4 lb/1000 gal (vendor guarantee)	Good combustion practices	5 lb/1000 gal			Good operational practices	0.25 lb/1000 gal	Good combustion practices	
Freeport LNG Liquefaction Project - Pre Treatment Facility	130 MMBtu/hr Heating Medium Heaters	7/20/2012	7/16/2014	Final	ULNB (LAER)	5.0 ppmv @ 3% O₂ (LAER)	Natural gas fuel and good combustion practices	25 ppmv @ 3% O <sub>2</sub> (one hour average)	Gaseous fuel		Gaseous fuel		Efficient heater and system design, including insulation and waste heat recovery from the CT; natural gas or BOG fuel; good combustion practices; and limiting hours of use	117 lb CO <sub>2</sub> e/MMBtu for each heater (12- month rolling average)
Galena Park Terminal (KM Liquids)	129 MMBtu/hr Heaters	2/23/2012	6/12/2013	Final	ULNB and SCR	0.01 lb/MMBtu	Good combustion practices	50 ppmv						
Oregon LNG Bidirectional Terminal Project	115 MMBtu/hr Regasification Process Heaters	7/2/2013		Proposed	ULNB		Good combustion practices				Good combustion practices and natural gas fuel		Natural gas fuel; good combustion, operating, and maintenance practices; efficient heater design; and limiting the heaters to 2,880 operating hours (total) per year	155,000 short tons of $CO_2$ per year for all the heaters as a group (12-month rolling average)
Oregon LNG Bidirectional Terminal Project	86/92 MMBtu/hr Process Heaters	7/2/2013		Proposed	ULNB		Good combustion practices				Good combustion practices and natural gas fuel		Natural gas fuel; good combustion, operating, and maintenance practices; and efficient heater design	155,000 short tons of $CO_2$ per year for all the heaters as a group (12-month rolling average)
Lake Charles Liquefaction Expor Terminal Project	t 110 MMBtu/hr Hot Oil Heater	12/20/2013	5/1/2015	Final	LNB and good combustion practices		Good combustion practices		Good combustion practices		Good combustion practices		(none proposed)	
Elba Island LNG Liquefaction Project	122 MMBtu/hr Heating Medium Heaters	1/2/2014		Proposed			Low-carbon fuel selection (natural gas), efficient heater design with heat recovery from the thermal oxidizers, good combustion practices, and good operating and maintenance practices	0.04845 lb/MMBtu					Low-carbon fuel selection (natural gas), efficient heater design and heat recovery wher practical, good combustion practices, and good operating and maintenance practices	95,402 tons of CO <sub>2</sub> e (12-month rolling total)

#### Combined Cycle Combustion Turbines

Summary	of BACT Determinations (2010 - 20	)15)

Project	Item	Code	Арр	Permit	Status	NOx BACT	NOx BACT Limit	CO BACT	CO BACT Limit	VOC BACT	VOC BACT Limit	PM BACT	PM BACT Limit	GHG BACT	GHG BACT Limit
Natural Gas/Dual Fuel Combined Cycle Com	bustion Turbine≰ 25MW		40/00/0044 ACT				00 DDM/ AT 45%	Card analysis		Contracture		Card an abusting			
LIQUEFACTION, LL SABINE PASS TERMINAL CAMERON, LA	Turbines (8) GE LM2500+G4	LA-0257	12/06/2011 ACT			water injection	20 PPMV AT 15% O2	practices and fueled by natural gas	15% O2	practices and fueled by natural gas		practices and fueled by natural gas			
DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	TWO GENERAL ELECTRIC (SE) FRAME 7EA COMBUSTION TURBINES (CTS) WITH A NOMINAL NET 87.2 MEGAWATT (MW) RATED CAPACITY, COUPLED WITH A HEAT RECOVERY STEAM GENERATOR (HRSG), EQUIPPED WITH DRY LOW-NOX COMBUSTORS, SELECTVE CATALYTIC REDUCTION SYSTEM (SCR), AND OXIDATION CATALYST	MD-0044	06/09/2014 ACT			USE OF DRY COMBUSTOR COMBUSTOR TURBINE DESIGN (DLN1), USE OF FACILITY PROCESS FUEL GAS AND PIPELINE NATURAL GAS DURING NORMAL OPERATION ANE SCR SYSTEM	2.5 PPMVD @ 15% 02.3-HOUR BLOCK AVERAGE, EXCLUDING SU/SD	EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS OR PIPELINE QUALITY NATURAL GAS, USE OF AN OXIDATION CATALYST AND EFFICIENT COMBUSTION	1:5 PPM/D @ 15% 02 3-HOUR BLOCK AVERAGE, EXLUDING SU/SD	THE USE OF PROCESS FUEL GAS AND PIPELINE NATURAL GAS, GOOD COMBUSTION PRACTICES, AND USE OF AN OXIDATION CATALYST	0.7 PPMVD @ 15% 02.3-HOUR BLOCK AVERAGE, EXCLUDING SU/SD	EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS OR PIPELINE OUALITY NATURAL GAS AND GOOD COMBUSTION PRACTICES	0.0033 LB/MMBTU 3- HOUR BLOCK AVERAGE	HIGH EFFICIENCY GE TEA CTS WITH HRSGS EQUIPPED WITH DLM1 COMBUSTORS AND EXCLUSIVE USE OF FAOLITY PROCESS FUEL GAS OR PIPELINE QUALITY NATURAL GAS	117 LG/MMBTU 3- HOUR BLOCK AVERAGE
BASIN ELECTRIC POWER COOPERATIVE DEER CREEK STATION BROOKINGS, SD	Combustion turbine/heat recovery steam generator	*SD-0005	06/29/2010 ACT		Draft	Selective catalytic reduction	3 PPMVD AT 15% O2 3-HOUR, EXCLUDES SSM	Catalytic oxidatior	2 PPMVD @ 15% O2 3-HOUR, EXCLUDES SSM PERIODS			Good Combustion	0.01 LB/H 3- HOUR		
BRITISH PETROLEUM EXPLORATION ALASKA (BPXA) ENDICOTT PRODUCTION FACILITY, LIBERTY DEVELOPMENT PROJECT PRUDHOE BAY, AK	EU ID 10A, TURBINE	AK-0066	06/15/2009 ACT		Final	DRY LOW NOX COMBUSTORS (DLN)	25 PPMV AT 15% O2 WHEN AMBIENT TEMPERATURE => 10 DEG-F	CATALYTIC OXIDATION	5 PPMV @ 15% O2 WHEN AMBIENT TEMPERATURE => 10 DEG-F						
CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine w/o duct burner two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtu/hr)and two duct burners (each with a maximum heat input of 500 MMBtu/hr)	NJ-0079	07/25/2012 ACT		Final	DLN combustion system with SCR on each of the two combustion turbines and use of only natural gas as fuel.	2 PPMVD 3-HR ROLLING AVE BASED ON 1-HR BLOCK	Oxidation Catalys good combustion practices and use only natural gas a clean burning fuel	t. ROLLING AVE BASED ON 1-HR BLOCK	Oxidation catalyst and good combustion practices, use of natural gas a clea burning fuel	2.9 LB/H AVERAGE OF THREE TESTS	Use of Natural gas,a clean burning fuel.	12.1 LB/H AVERAGE OF THREE TESTS		
HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	NJ-0080	11/01/2012 ACT		Final	Selective Catalytic Reduction (SCR) System and use o natural gas a clear burning fuel	2 PPMVD 3-HR ROLLING AVE BASED ON 1-HR BLOCK AVE	Oxidation Catalys and Good combustion Practices and use of natural gas a clean burning fuel	t 2 PPMVD 3-HR ROLLING AVE BASED ON 1-HR BLOCK AVE	Oxidation Catalyst and Good combustion Practices and use of natural gas a clean burning fuel	1 PPMVD 3-HR ROLLING AVERAGE BASED ON 1-HR BLOCK	Use of natural gas a clean burning fuel	11 LB/H AVERAGE OF THREE TESTS	Good Combustion Practices	887 LB/MW-H CONSCUTV 12 MONTH PERIOD ROLLING 1 MONTH
PANDA SHERMAN POWER LLC PANDA SHERMAN POWER STATION GRAYSON, TX	2 Siemens SGT6-5000F or 2 GE Frame 7FA. Both capable of combined or simple cycle operation. 468 MMBtu/hr duct burners.	TX-0551	02/03/2010 ACT		Final	Dry low NOx combustors and Selective Catalytic Reduction	9 PPMVD @ 15% O2, RLNG 24-HR AVG, SIMPLE CYCLE 2 PPMVD @ 15% O2, RLNG 24-HR AVG, COMBINED CYCLE	Good combustion practices	4 PPMVD @ 15% O2, RLNG 24-HR AVG, SIMPLE CYCLE 15 PPMVD @ 15% O2, RLNG 24-HR AVG, COMBINED CYCLE	Good combustion practices	1 PPMVD @ 15% O2, 3-HR AVG, SIMPLE CYCLE MODE 4 PPMVD @ 15% O2, 3-HR AVG, COMBINED CYCLE MODE				
STARK POWER GENERATION II HOLDINGS, LLC WOLF HOLLOW POWER PLANT NO. 2 HOOD, TX	Project will be either 2 MHI501G gas turbines plus 230 MMBtu/hr duct burner firing for each turbine or 2 GE 7FA gas turbines plus 570 MMBtu/hr duct burner firing for each turbine.	TX-0552	03/03/2010 ACT		Final	Dry low NOx combustors plus selective catalytic reduction	2 PPMVD @ 15% O2, ROLLING 24- HR AVG, FULL LOAD	Good combustion practices	10 PPMVD @ 15% O2, ROLLING 3-HR AVG, MHI501G	Good combustion practices	4 PPMVD @ 15% O2, 3-HR AVG, MHI501G				
NRG TEXAS POWER LLC WA PARISH ELECTRIC GENERATING STATION - DEMONSTRATION PROJECT FORT BEND, TX	General Electric (GE) Frame 7EA (or a similar sized unit), which is rated at a maximum base- load electric output of approximately 80 megawatts (WW) HRSG duc burner has a maximum heat input capacity of 225 million Britisi thermal units per hour (MMBtuhr) based on the high heating value (HHV) of the fuel fired. The steam will be used for the regeneration of the Demonstration Unit solvent.	TX-0625	12/19/2012 ACT		Final	DLN combusters on the turbine and selective catalytic reduction (SCR)	2 PPMVD 3-HR ROLLING AVG, AT 15% OXYGEN	oxidation catalyst	4 PPMVD 24 HR ROLLING, AT 15% OXYGEN	oxidation catalyst	2 PPMVD INITIAL STACK TEST	good combustion and use of natural gas	16.58 LB/H 1 HR		
M & G RESINS USA LLC UTILITY PLANT NUECES, TX	General Electric LM6000 natural gas-fired combustion turbine equipped with lean pre-mix low-NOx combustors. One heat recovery steam generator (HRSG) with 263 million British therma units per hour (MBRuhr) natural gas-fired duct burner system containing a selective catalytic reduction system (SCR)	ITX-0704	12/02/2014 ACT		Final	Selective Catalytic Reduction	2 PPMVD @15% O2, 24-HR ROLLING AVERAGE	oxidation catalyst	4 PPMVD @15% O2, 24-HR ROLLING AVERAGE	oxidation catalyst	4 PPMVD @15% O2, 24-HR ROLLING AVERAGE				
NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	GE 7EA turbine, 225 million British thermal units per hour duct burner. Steam created in the heat recovery steam generator will be used as process steam.	TX-0737	12/21/2012 ACT		Final	Selective catalytic reduction	2 PPMVD @ 15% O2 3-HR AVERAGE	Oxidation catalyst	4 PPMVD @ 15% 02 24-HR AVERAGE	Oxidation catalyst	2 PPMVD @ 15% O2				
### Combined Cycle Combustion Turbines

WILLIAMS FIELD SERVICES COMPANY ECHO SPRINGS GAS PLANT CARBON, WY	12,555 HP SOLAR MARS100-15000S OR 16,162 HP SOLAR TITAN 130-20502S TURBINE	WY-0067	04/01/2009 ACT		Final	GOOD COMBUSTION PRACTICES	15 PPMV	GOOD COMBUSTION PRACTICES	25 PPMV	GOOD COMBUSTION PRACTICES	25 PPMV				
Natural Gas/Dual Fuel Combined Cycle Com	bustion Turbines > 25MW				-										
Project	Item	Code	Арр	Permit	Status	NOX BACT	NOx BACT Limit	CO BACT	CO BACT Limit	VOC BACT	VOC BACT Limit	PM BACT	PM BACT Limit	GHG BACT	GHG BACT Limit
BASIN ELECTRIC POWER COOPERATIVE DEER CREEK STATION BROOKINGS, SD	Combustion Turbine - 1,713 million Btus per hour (Lower Heating Value) heat input Duct Burner- 615.2 million Btus per hour (Lower Heating Value heat input	*SD-0005	06/29/2010 ACT		Draft	Selective catalytic reduction	3 PPMVD AT 15% O2 3-HOUR, EXCLUDES SSM	Catalytic oxidation	2 PPMVD @ 15% O2 3-HOUR, EXCLUDES SSM PERIODS			Good Combustion	0.01 LB/H 3- HOUR		
CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) each with a maximum rated heat input of 2,307 million British thermal units per hour (MBBtuhr), that will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	NJ-0079	07/25/2012 ACT		Final	DLN combustion system with SCR on each of the two combustion turbines and use of only natural gas as fuel.	2 PPMVD 3-HR ROLLING AVE BASED ON 1-HR BLOCK	Oxidation Catalysi good combustion practices and use only natural gas a clean burning fuel	2 PPMVD 3-HR ROLLING AVE BASED ON 1-HR BLOCK	oxidation Catalyst and Good Combustion Practices and use of Clean fuel (Natural gas)	2 PPMVD 3-HR ROLLING AVERAGE BASED ON 1-HR BLK				
PANDA SHERMAN POWER LLC PANDA SHERMAN POWER STATION GRAYSON, TX	2 Siemens SGT6-5000F or 2 GE Frame 7FA. Both capable of combined or simple cycle operation. 468 MMBtu/hr duct burners.	TX-0551	02/03/2010 ACT		Final	Dry low NOx combustors and Selective Catalytic Reduction	9 PPMVD @ 15% O2, ROLLNG 24- HR AVG, SIMPLE CYCLE		4 PPMVD @ 15% O2, ROLLNG 24- HR AVG, SIMPLE CYCLE	Good combustion practices	1 PPMVD @ 15% O2, 3-HR AVG, SIMPLE CYCLE MODE				
STARK POWER GENERATION II HOLDINGS, LLC WOLF HOLLOW POWER PLANT NO. 2 HOOD, TX	Project will be either 2 MHI501G gas turbines plus 230 MMBtu/hr duct burner firing for each turbine or 2 GE 7FA gas turbines plus 570 MMBtu/hr duct burner firing for each turbine.	TX-0552	03/03/2010 ACT		Final	Dry low NOx combustors plus selective catalytic reduction	2 PPMVD @ 15% O2, ROLLING 24- HR AVG, FULL LOAD	Good combustion practices	10 PPMVD @ 15% O2, ROLLING 3-HR AVG, MHI501G	Good combustion practices	4 PPMVD @ 15% O2, 3-HR AVG, MHI501G				
NRG TEXAS POWER LLC WA PARISH ELECTRIC GENERATING STATION - DEMONSTRATION PROJECT FORT BEND, TX	General Electric (GE) Frame TEA (or a similar sized unit), which is rated at a maximum base- load electric output of approximately 80 megawatts (MW). HRSG duct burner has a maximum heat input capacity of 225 million Britis thermal units per hour (MMBluhr) based on the high heating value (HHV) of the fuel fired. The steam will be used for the regeneration of the Demonstration Unit solvent.	(TX-0625	12/19/2012 ACT		Final	DLN combusters on the turbine and selective catalytic reduction (SCR)	2 PPMVD 3-HR ROLLING AVG, AT 15% OXYGEN	oxidation catalyst	4 PPMVD 24 HR ROLLING, AT 15% OXYGEN	proper design and operation, good solvent maintenance, LDAR program	3.1 PPMV	good combustion and use of natural gas	16.58 LB/H 1 HR		
M & G RESINS USA LLC UTILITY PLANT NUECES, TX	General Electric LM6000 natural gas-fired combustion turbine equipped with lean pre-mix low-NOx combustors. One heat recovery steam generator (HRSG) with 263 million British therma units per hour (MMBt/uh) natural gas-fired duct burner system containing a selective catalytic reduction system (SCR)	TX-0704	12/02/2014 ACT		Final	Selective Catalytic Reduction	2 PPMVD @15% 02, 24-HR ROLLING AVERAGE	oxidation catalyst	4 PPMVD @15% 02, 24-HR ROLLING AVERAGE	oxidation catalyst	4 PPMVD @15% 02, 24-HR ROLLING AVERAGE				
NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	GE 7EA turbine, 225 million British thermal units per hour duct burner. Steam created in the heat recovery steam generator will be used as process steam.	TX-0737	12/21/2012 ACT		Final	Selective catalytic reduction	2 PPMVD @ 15% O2 3-HR AVERAGE	oxidation catalyst	4 PPMVD @ 15% O2 24-HR AVERAGE	oxidation catalyst	2 PPMVD @ 15% O2				

Note: LNG and Alaska BACT determinations are highlighted.

BACT Anal RBLC Seac RBLC Sear	rsis: h Parameters: :h Date:	Large Natural Gas, Combined Cycle Tu 8/26/2016	urbines			_											
			Proce	199	Throughout &	Standard Emission Limi	it Emission Limit	1 Emission Limit 2		Case by	Estimated			Water	DI N or Efficien	Good	d Dunlicate
RBLC ID *PA-0289	Date 06/18/2010 ACT	Facility Name & Location GEISINGER MEDICAL CENTER	Process Typ COMBINED HEAT AND POWER 16.210	e Process Notes Primary Fuel 0.8 ton of total hazardous air pollutant in Natural Gas	Units Pollutant Control Method Description 55.62 MMBTU/H Formalde	& Units	& Units 0.0029	& Units ppmv @ 15% O2	Ib/MMBtu 0.0029	Basis Other F	actors %	Pollutant/ Compliance Notes	Draft? S	CR Injection (	DxCat SoLoNox y	NG Pract	st ?
		GEISINGER MED CTR/DANVILLE MONTOUR, PA	COMBUSTION TURBINE	any 12 consecutive month period; and 0.7 ton of formaldehyde in any 12 consecutive month period.	hyde		LB/MMBTU			CASE-BY- CASE							
*PA-0289	06/18/2010 ACT	GEISINGER MEDICAL CENTER	COMBINED HEAT AND POWER 16.210	0.8 ton of total hazardous air pollutant in Natural Gas	55.62 MMBTU/H Volatile	0	0.6 LB/H IN	11.9 LB/H SUB-		OTHER U			TRUE				1
		MONTOUR, PA		0.7 ton of formaldehyde in any 12 consecutive month period.	Compoun ds (VOC)		MODE	SOLONOX MODE		CASE							
*PA-0289	06/18/2010 ACT	GEISINGER MEDICAL CENTER GEISINGER MED CTR/DANVILLE	COMBINED HEAT AND POWER 16.210 COMBUSTION TURBINE	0.8 ton of total hazardous air pollutant in Natural Gas any 12 consecutive month period; and	55.62 MMBTU/H Nitrogen SoLoNOx combustor Oxides	0	15 PPM @15% 02 IN SOLONO	42 PPM @15% 15 X O2 DURING		OTHER U CASE-BY-			TRUE				1
		MONTOUR, PA		0.7 ton of formaldehyde in any 12 consecutive month period.	(NOx)		MODE	SUB-ZERO AMBIENT,, NON- SOLONOX		CASE							
*PA-0289	06/18/2010 ACT	GEISINGER MEDICAL CENTER	COMBINED HEAT AND POWER 16.210	0.8 ton of total hazardous air pollutant in Natural Gas	55.62 MMBTU/H Carbon	0	25 PPM @ 15%	100 PPM @ 15% 25		OTHER U			TRUE				1
		MONTOUR, PA		0.7 ton of formaldehyde in any 12 consecutive month period.	Wonoxide		MODE	AMBIENT NON- SOLONOX		CASE							
*SD-0005	06/29/2010 ACT	BASIN ELECTRIC POWER COOPERATIVE DEER CREEK	Combustion turbine/heat recovery steam 16.210 generator	Combustion Turbine - 1,713 million Btus Natural Gas per hour (Lower Heating Value) heat	300 Megawatts Particulat Good Combustion e matter,	0.01 LB/H 3- HOUR	23.2 LB/H 3- HOUR / WITH	18.6 LB/H 3- HOUR /		BACT- U PSD			TRUE			TRUE	E 1
		STATION BROOKINGS, SD		input Duct Burner- 615.2 million Btus per hour (Lower Heating Value) heat input	total < 10 Âμ (TPM10)		DUCT FIRING	WITHOUT DUCT FIRING									
*SD-0005	06/29/2010 ACT	BASIN ELECTRIC POWER	Combustion turbine/heat recovery steam 16.210	Combustion Turbine - 1,713 million Btus Natural Gas	300 Megawatts Carbon Catalytic oxidation	2 PPMVD @	10.5 LB/H 3-	840 POUNDS		BACT- U			TRUE				1
		STATION BROOKINGS, SD	<u>Aerielaroi</u>	input Duct Burner- 615.2 million Btus per hour (Lower Heating Value) heat input	WUNDALLE	HOUR, EXCLUDES SS PERIODS	EXCLUDES SSI	M STARTUP AND SHUTDOWN (SS)		-30							
*SD-0005	06/29/2010 ACT	BASIN ELECTRIC POWER	Combustion turbine/heat recovery steam 16.210	Combustion Turbine - 1,713 million Btus Natural Gas	300 Megawatts Nitrogen Selective catalytic reduction	3 PPMVD AT	25.8 LB/H 3-	220 POUNDS		BACT- U			TRUE TR	RUE			1
		COOPERATIVE DEER CREEK STATION BROOKINGS, SD	generator	per hour (Lower Heating Value) heat input Duct Burner- 615.2 million Btus per hour (Lower Heating Value) heat input	Oxides (NOx)	15% O2 3- HOUR, EXCLUDES SS	HOUR, EXCLUDES SSI	PER SS PERIOD M STARTUP OR SHUTDOWN (SS)		PSD							
AL-0282	01/22/2014 ACT	LENZING FIBERS, INC. LENZING	Gas Turbine with HRSG 16.210	Natural Gas	25 MW Particulat Good combustion practices.	0	0.0075	0	0.0075	BACT- U			FALSE			+	1
		FIBERS, INC. MOBILE, AL			e matter, filterable (FPM)		LB/MMBTU			PSD							
AL-0282	01/22/2014 ACT	LENZING FIBERS, INC. LENZING FIBERS, INC, MOBILE, AL	Gas Turbine with HRSG 16.210	Natural Gas	25 MW Volatile CO oxidation catalyst and good Organic combustion practices.	0	1.6 PPM PPM VD @15% O2	0 1.6		BACT- U PSD			FALSE				1
		,,			Compoun ds (VOC)		WITH DUCT BURNERS										
AL-0282	01/22/2014 ACT	LENZING FIBERS, INC. LENZING FIBERS, INC. MOBILE, AL	Gas Turbine with HRSG 16.210	Natural Gas	25 MW Carbon Good combustion practices. Dioxide	0	137908 TPY OF CO2E 12 -	0		BACT- U PSD			FALSE				1
					Equivalen t (CO2e)		MONTH ROLLING										
CA-1216	11/06/2012 ACT	GROSSMONT HOSPITAL	Cogeneration gas turbine 16.210	Manufacturer: Solar Turbines. Model 50- 6400 R 4 6 MW - Natural cas fired with	0 Nitrogen SoLoNOX BURNERS	0	9 PPMVD@15%	9		OTHER U		9 ppmv with duct burner in operation 5 ppmv when duct	FALSE			+	1
		CA		Duct	(NOx)		021110011			CASE		burner is not in operation. SCR is not cost effective (2.5 ppmv). Other pollutants are below BACT					
CO-0068	01/13/2014 ACT	DCP MIDSTREAM, LP LUCERNE GAS	S Combustion Turbines 16.210	Two natural gas fired combustion natural gas turbines equipped with low NOX burners	72.73 MMBTU/H Carbon Waste heat recovery, thermal Dioxide efficiency tune-ups & maintenance	0	42268 TON CO2E PER	40 % THERMAL EFEICIENCY		BACT- U PSD		The turbines shall be equipped with waste beat recovery units	FALSE				1
				site rated at 9,055 horsepower each.	Equivalen t (CO2e)		YEAR (EACH)					(WHRU) to increase the efficient use of waste heat for process					
												heating. The combustion turbines and the WHRUs system shall					
												meet a BACT limit of 40% minimum thermal efficiency on a					
												Tune-ups and maintenance shall					
												the turbines.					
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST	TWO (2) NATURAL GAS FIRED 16.210 COMBUSTION TURBINES	NATURAL GAS FIRED, OPEN-SIMPLE NATURAL GAS CYCLE COMBUSTION TURBINES	283 MMBTU/H, Particulat GOOD COMBUSTION PRACTICES EACH e matter, AND PROPER DESIGN	3 O	0.0019 LB/MMBTU 3-H	0 R	0.0019	BACT- N PSD			FALSE				2
		FERTILIZER CORPORATION POSEY	r,	WITH HEAT RECOVERY	filterable (FPM)		AVERAGE										
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST	TWO (2) NATURAL GAS FIRED 16.210 COMBUSTION TURBINES	NATURAL GAS FIRED, OPEN-SIMPLE NATURAL GAS CYCLE COMBUSTION TURBINES	283 MMBTU/H, Particulat GOOD COMBUSTION PRACTICES EACH e matter, AND PROPER DESIGN	3 0	0.0076 LB/MMBTU 3-HI	0 R	0.0076	BACT- N PSD			FALSE				2
		FERTILIZER CORPORATION POSEY	r ,	WITH HEAT RECOVERY	total < 10 Âμ (TPM10)		AVERAGE										
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER	TWO (2) NATURAL GAS FIRED 16.210	NATURAL GAS FIRED, OPEN-SIMPLE NATURAL GAS	283 MMBTU/H, Particulat GOOD COMBUSTION PRACTICES	3 0	0.0076	0 R	0.0076	BACT- N PSD			FALSE				1
		FERTILIZER CORPORATION POSEY	,	WITH HEAT RECOVERY	total < 2.5 µ (TPM2.5)		AVERAGE										
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER	TWO (2) NATURAL GAS FIRED 16.210	NATURAL GAS FIRED, OPEN-SIMPLE NATURAL GAS	283 MMBTU/H, Carbon GOOD COMBUSTION PRACTICES	5 O	0.03 LB/MMBTU	1 0	0.03	BACT- N			FALSE				2
		FERTILIZER CORPORATION POSEY	COMBUSTION TURBINES	WITH HEAT RECOVERY	EACH MONOXIDE AND PROPER DESIGN		3-HR AVERAGE AT > 50% PEAK LOAD	- C		PSD							
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST	THREE (3) AUXILARY BOILERS 16.210	NATURAL GAS USAGE IN EACH NATURAL GAS BOILER NOT TO EXCEED 1501.91	218.6 Particulat GOOD COMBUSTION PRACTICES MMBTU/H, e matter, AND PROPER DESIGN	3 0	1.9 LB/MMCF 3- HR AVERAGE	- 0		BACT- N PSD			FALSE				2
		FERTILIZER CORPORATION POSEY	, 	MMCF/YR	EACH filterable (FPM)												
IN-0173	06/04/2014 AC I	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	COMBUSTION TURBINES	NATURAL GAS FIRED, OPEN-SIMPLE NATURAL GAS CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	EACH Eioxide AND PROPER DESIGN	5 0	12666 BTU/KW- H, MINIMUM CONTINUOUS	LB/MMBTU 3-HR AVERAGE		BACI- N PSD		CO2 EMISSIONS SHALL NOT EXCEED 144,890 TON/YEAR	FALSE				2
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST	TWO (2) NATURAL GAS FIRED 16.210 COMBUSTION TURBINES	NATURAL GAS FIRED, OPEN-SIMPLE NATURAL GAS CYCLE COMBUSTION TURBINES	283 MMBTU/H, Volatile GOOD COMBUSTION PRACTICES EACH Organic AND PROPER DESIGN	3 0	2.5 PPMVD AT 15% OXYGEN 1	0 2.5		BACT- N PSD			FALSE				2
		FERTILIZER CORPORATION POSEY	r 3	WITH HEAT RECOVERY	Compoun ds (VOC)		HR AVERAGE										
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER	THREE (3) AUXILARY BOILERS 16.210	NATURAL GAS USAGE IN EACH NATURAL GAS	218.6 Nitrogen LOW NOX BURNERS, FLUE GAS	0	20.4 LB/MMCF	3-0		BACT- N PSD			FALSE			+ +	2
		FERTILIZER CORPORATION POSEY	r,	MMCF/YR	EACH (NOx)												
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST	TWO (2) NATURAL GAS FIRED 16.210 COMBUSTION TURBINES	NATURAL GAS FIRED, OPEN-SIMPLE NATURAL GAS CYCLE COMBUSTION TURBINES	283 MMBTU/H, Nitrogen DRY LOW NOX COMBUSTORS EACH Oxides	0	22.65 PPMVD AT 15%	0 22.65		BACT- N PSD			FALSE				2
							AVERAGE AT > 50% PEAK										

BACT A RBLC S RBLC S	nalysis: each Paramete earch Date:	ers:	Large Natural Gas, Combined Cycle T 8/26/2016	urbines																			
RBLC IN-0173	ID Da 06/04/2014	ate 4 ACT	Facility Name & Location MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	Process THREE (3) AUXILARY BOILERS /,	Process Type 16.210	Process Notes NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	Primary Fuel NATURAL GAS	Throughput Units 218.6 MMBTU/H, EACH	E & Pollutan Carbon Monoxide	t Control Method Description & Image Control Method Description & Um GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	lard n Limit Emission Limit & Units 37.22 LB/MMCF 3-HR AVERAGE	1Emission Limit 2 & Units ppmv @ 1 0	15% O2 Ib/MMBtu	Case by Case Basis BACT- PSD	Other Factors	stimated Efficiency %	Pollutant/ Compliance Notes	Draft? SCR FALSE	Water Injection Ox	DLN or Cat SoLoNox	Efficienc Use y NG	Good of Comb E i Pract	Puplicate ? 2
IN-0173	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Volatile Organic Compou	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	5.5 LB/MMCF 3- HR AVERAGE	0		BACT- PSD	N			FALSE					2
IN-0173	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Carbon Dioxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN: AIR INLET CONTROLS, HEAT RECOVERY CONDENSATE AND BLOWDOWN HEAT RECOVERY	59.61 T/MMCF 3 HR AVERAGE	- 80 % THERMAL EFFICIENCY (HHV)		BACT- PSD	N			FALSE					2
IN-0173	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Particula e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	7.6 LB/MMCF 3- HR AVERAGE	0		BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES (,	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H EACH	H, Particula e matter, filterable	t GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.0019 LB/MMBTU 3-HF AVERAGE	0 2	0.0019	BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES /,	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/F EACH	H, Particula e matter, total < 10 µ (TPM10)	t GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.0076 LB/MMBTU 3-H AVERAGE	2	0.0076	BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES (,	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/F EACH	H, Particula e matter, total < 2. µ (TPM2 5	t GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN 5	0.0076 LB/MMBTU 3-H AVERAGE	2	0.0076	BACT- PSD	N			FALSE					1
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES (,	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/F EACH	H, Carbon Monoxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.03 LB/MMBTU 3-HR AVERAGE AT > 50% PEAK LOAD	0	0.03	BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Particula e matter, filterable (FPM)	t GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	1.9 LB/MMCF 3- HR AVERAGE	0		BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES /,	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H EACH	H, Carbon Dioxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	12666 BTU/KW- H, MINIMUM CONTINUOUS	116.89 LB/MMBTU 3-HR AVERAGE		BACT- PSD	N		CO2 EMISSIONS SHALL NOT EXCEED 144,890 TON/YEAR	FALSE					2
IN-0180	06/04/2014	4 ACT	IN MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES (,	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H EACH	H, Volatile Organic Compour ds (VOC	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN n	2.5 PPMVD AT 15% OXYGEN 1 HR AVERAGE	0	2.5	BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Nitrogen Oxides (NOx)	LOW NOX BURNERS, FLUE GAS 0 RECIRCULATION	20.4 LB/MMCF 3 HR AVERAGE	- 0		BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	IN MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES /,	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H EACH	H, Nitrogen Oxides (NOx)	DRY LOW NOX COMBUSTORS 0	22.65 PPMVD AT 15% OXYGEN 3-HR AVERAGE AT > 50% PEAK	0	22.65	BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Carbon Monoxide	GOOD COMBUSTION PRACTICES 0 e AND PROPER DESIGN	37.22 LB/MMCF 3-HR AVERAGE	0		BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Volatile Organic Compour ds (VOC	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	5.5 LB/MMCF 3- HR AVERAGE	0		BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Carbon Dioxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN: AIR INLET CONTROLS, HEAT RECOVERY CONDENSATE AND BLOWDOWN HEAT RECOVERY	59.61 TON/MMCF 3- HR AVERAGE	80 % THERMAL EFFICIENCY (HHV)		BACT- PSD	N			FALSE					2
IN-0180	06/04/2014	4 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Particula e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	7.6 LB/MMCF 3- HR AVERAGE	0		BACT- PSD	N			FALSE					2
NJ-0079	07/25/2012	2 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbin with Duct Burner	ne 16.210	Woodbridge Energy Center (WEC), located at Riverside Drive in Woodbridg Township (Middlesex County), New Jersey, 07095, will be a new 700 MW combined-cycle power generating facilit (GE) combusion turbine generators (GE) combusion turbine generators (GE) each with a maximum rated hee input of 2,307 million Rritish thermal unit per hour (MMBtu/hr), hat will utilize pipeline natural gas only, with 2 HRSGs 2 Duct Burners (each 500 MMbtu/hr).	Natural gas e y y tt ts	40297.6 mmcubic ft/ye	Carbon Dioxide Equivale t (CO2e)	Good combustion practices 0	925 LB/MW-H BASED ON 12 MONTH PERIOD, ROLLING 1 MNTH	0		BACT- PSD	U			FALSE				TRUE	1
NJ-0079	07/25/2012	2 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbin with Duct Burner	ne 16.210	Woodbridge Energy Center (WEC), located at Riverside Drive in Woodbridg Township (Middlesex County), New Jersey, 07095, will be a new 700 MW combined-cycle power generating facilit WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) each with a maximum rated hea input of 2,307 million British thermal uni per hour (MMBtu/hr), that will utilize pipeline natural gas only, with 2 HRSGs 2 Duct Burners (each 500 MMbtu/hr),	Natural gas e y , ,	40297.6 mmcubic ft/ye	Carbon Monoxide	Oxidation Catalyst; Good Combustion0	12.1 LB/H AVERAGE OF THREE 1-HOUF TESTS	2 PPMVD 3-HR ROLLING AVERAGE BASED ON 1-HR BLOCK		BACT- PSD	U 77	.000		FALSE					2
NJ-0079	07/25/2012	2 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbin duct burner	1e w/d16.210	The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtu/hr)and two duct burners (each with a maximum heat input of 500 MMBtu/hr)	natural gas a	40297.6 mmcubic ft/ye	Particula e matter, filterable < 10 ŵ (FPM10)	Use of Natural gas,a clean burning 0 fuel.	12.1 LB/H AVERAGE OF THREE TESTS	0		OTHER CASE-BY- CASE	U			FALSE					2

BACT Analysis: RBLC Seach Parameters: RBLC Search Date:	Large Natural Gas, Combined Cycle Turbines 8/26/2016				-										
	Process	3	Throughput &		Standard Emission Limit Emission Limit	1 Emission Limit 2		Case by Case	Estimate	1		Water	DLN or Efficien	Good C Use of Comb	Duplicate
RBLC ID         Date           NJ-0079         07/25/2012 ACT	Facility Name & Location         Process         Type           CPV SHORE, LLC WOODBRIDGE         Combined Cycle Combustion Turbine w/(16.210         16.210           FNFRGY CENTER MIDDL FSEX XJ         diuct burner         Combined Cycle Combustion Turbine w/(16.210)         16.210	Process Notes The above natural gas use is combined for two GE 7EA CC turbines (each with a	Primary Fuel Units Pollutani natural gas 40297.6 Particulat mmcubic fi/vear e matter	t Control Method Descriptior	& Units & Units 0 12.1 LB/H AVERAGE OF	& Units ppmv (	@ 15% O2 Ib/MMBtu	Basis OTHER CASE-BY-	Other Factors %	Pollutant/ Compliance Notes	Draft? SCR FALSE	Injection OxC	at SoLoNox y	NG Pract	2
		maximum heat input of 2, 307 MMBtu/hr)and two duct burners (each with a maximum heat input of 500 MMBtu/hr)	filterable < 2.5 ŵ (FPM2.5)		THREE TESTS			CASE							
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine 16.210 ENERGY CENTER MIDDLESEX, NJ with Duct Burner	Woodbridge Energy Center (WEC), located at Riverside Drive in Woodbridge Township (Middlesex County), New Jersey, 07095, will be a new 700 MW combined-cycle power generating facility WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) each with a maximum rated heat input of 2,307 million British thermal units per hour (MMBtu/hr), that will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	Natural gas 40297.6 Particulat mmcubic ft/year filterable < 10 ŵ (FPM10)	Good Combustion Practices and use of Natural gas, a clean burning fuel.	0 19.1 LB/H AVERAGE OF THREE TESTS	0		BACT- I PSD	U		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE. LLC WOODBRIDGE Combined Cycle Combustion Turbine 16.210 ENERGY CENTER MIDDLESEX, NJ with Duct Burner 16.210	Woodbridge Energy Center (WEC), located at Riverside Drive in Woodbridge Township (Middlesex County), New Jersey, 0705, will be a new 700 MW combined-cycle power generating facility, WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) each with a maximum rated heat input of 2,307 million British thermal units per hour (MMBtu/hr), that will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	Natural gas 40297.6 Particulat mmcubic ft/year e matter, filterabe < 2.5 Å (FPM2.5)	Good Combustion Practices and use of Natural gas, a clean burning fuel.	0 19.1 LB/H AVERAGE OF THREE TESTS	0		OTHER CASE-BY- CASE	U		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine 16.210 ENERGY CENTER MIDDLESEX, NJ with Duct Burner 16.210	Woodbridge Energy Center (WEC), located at Riverside Drive in Woodbridge Township (Middlesex County), New Jersey, 07055, will be a new 700 MW combined-cycle power generating facility WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) each with a maximum rated heat input of 2,307 million British thermal units per hour (MMBu/hr), that will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	Natural gas 40297.6 Nitrogen Oxides (NOx)	Low NOx burners and Selective Catalytic Reduction System	0 19.8 LB/H AVERAGE OF THREE 1- HOUF TESTS	2 PPMVD 3 HR ROLLING AVE BASED ON 1-HR BLOCK AVE		LAER	Y 77.000		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine w/d 16.210 ENERGY CENTER MIDDLESEX, NJ duct burner	The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtuh/nad two duct burners (each with a maximum heat input of 500	natural gas 40297.6 Nitrogen mmcubic ft/year (NOx) (NOx)	DLN combustion system with SCR on each of the two combustion turbines and use of only natural gas as fuel.	0 2 PPMVD 3-HR ROLLING AVE BASED ON 1-HF BLOCK	16.8 LB/H AVERAGE OF THREE TESTS	2	LAER I	U 77.000		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine w/ 16.210 ENERGY CENTER MIDDLESEX, NJ duct burner	MMBurlin The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtuhr)and two duct burners (each with a maximum heat input of 500 MMBtuhr)	natural gas 40297.6 Carbon mmcubic fl/year Monoxide	Oxidation Catalyst, good combustion practices and use only natural gas a clean burning fuel	0 2 PPMVD 3-HR ROLLING AVE BASED ON 1-HF BLOCK	10.2 LB/H AVERAGE OF THREE TESTS	2	BACT- I PSD	U 77.000		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine 16.210 ENERGY CENTER MIDDLESEX, NJ with Duct Burner	Woodbridge Energy Center (WEC), located at Kiverside Drive in Woodbridge Township (Middlesex County), New Jersey, 0705, will be a new 700 MW combined-cycle power generating facility, WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) seak with a maximum rated heat input of 2.307 million British thermal units per hour (MMBtuhr), that will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	Natural gas 40297.6 Volatie mmcubic ft/year Compour ds (VOC)	oxidation Catalyst and Good Combustion Practices and use of Clean fuel (Natural gas)	0 2 PPMV0 3-HR ROLLING AVERAGE BASED ON 1-HF BLK	6.9 LB/H AVERAGE OF THREE TESTS.	2	LAER	U		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine w/ 16.210 ENERGY CENTER MIDDLESEX, NJ duct burner	The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtu/hr)and two duct burners (each with a maximum heat input of 500	natural gas 40297.6 Volatile mmcubic ft/year Organic Compour ds (VOC)	Oxidation catalyst and good combustion practices, use of natural gas a clean burning fuel	0 2.9 LB/H AVERAGE OF THREE TESTS	0		LAER	U		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine w/ 16.210 ENERGY CENTER MIDDLESEX, NJ duct burner	The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtuhr)and two duct burners (each with a maximum heat input of 500	natural gas 40297.6 Sulfur mmcubic ft/year (SO2)	Use of only natural gas a clean burning fuel	0 4.1 LB/H AVERAGE OF THREE TESTS	0		OTHER CASE-BY- CASE	U		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine w/ 16.210 ENERGY CENTER MIDDLESEX, NJ duct burner	MMBurlin The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtu/hr)and two duct burners (each with a maximum heat input of 500 MMBtu/hr)	natural gas 40297.6 Particulat mmcubic ft/year e matter, filterable (FPM)	use of natural gas only which is a clean burning fuel	0 4.8 LB/H AVERAGE OF THREE TESTS	0		OTHER CASE-BY- CASE	U		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine 16.210 ENERGY CENTER MIDDLESEX, NJ with Duct Burner	Woodbridge Energy Center (WEC), located at Krevrside Drive in Woodbridge Township (Middlesex County), New Jersey, 0705, will be a new 700 MW combined-cycle power generating facility, WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) each with a maximum rated heat input of 2,307 million British thermal units per hour (MMBtu/hr), that will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	Natural gas 40297.6 Suffur mmcubic ft/year (SO2) (SO2)	Good Combustion Practices and use of Natural gas,a clean burning fuel.	0 4.9.EM AVERAGE OF THREE TESTS	0		OTHER I CASE-BY- CASE	U		FALSE				2
NJ-0079 07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE Combined Cycle Combustion Turbine 16.210 ENERGY CENTER MIDDLESEX, NJ with Duct Burner	Woodbridge Energy Center (WEC), located at Riverside Drive in Woodbridge Township (Middlesex County), New Jersey, 07095, will be a new 700 MW combined-cycle power generating facility WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) each with a maximum rated heat input of 2,307 million British thermal units per hour (MMBtu/hr), that will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	Natural gas 40297.6 Particulat mmcubic ft/year e mater, filterable (FPM)	Good Combustion Practices and use of Natural gas, a clean burning fuel.	0 8.2 LB/H AVERAGE OF THREE TESTS.	0		OTHER CASE-BY- CASE	U		FALSE				2

BACT Ar RBLC Se RBLC Se	⊧alysis: ⊭ach Parameters: ∋arch Date:	Large Natural Gas, Combined Cycle T 8/26/2016	Furbines							-														
RBLC	ID Date	Facility Name & Location	Process	Process Type	Process Notes	Primary Fuel	Throughput & Units	Pollutan	t Control Method Descriptior	Standard Emission Limit & Units & Units	1 Emission Limit 2 & Units	2 ppmy @ 15% O2 lb/MMBtu	Case by Case Basis	Other Factors	Estimated Efficiency %	Pollutant/ Compliance Notes	Draft?	Wa SCR Iniec	tion OxCat	DLN or E SoLoNox	Efficienc v	Use of NG	Good Comb Pract	Duplicate ?
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	16.210	* Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	natural gas	39463 mmcubic ft/year*	Carbon Dioxide Equivaler t (CO2e)	Good Combustion Practices	0 887 LB/MW-H CONSCUTV 12 MONTH PERIO ROLLING 1 MONTH	0 D		BACT- PSD	U		O2 Monitored by CO2 CEMs, H4 and Nitrous oxide monitored y calculations	FALSE			UCLINICX	_ <b>,</b>		TRUE	1
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines 2 duct burners and 1 auxiliary boiler CO2e = 2.000.268 tlyr for the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	i, natural gas a	39463 MMCubic ft/yr	C Nitrogen Oxides (NOx)	Selective Catalytic Reduction (SCR) System and use of natural gas a clean burning fuel	0 0.75 LB/H AVERAGE OF THREE TESTS	2 PPMVD 3-HR ROLLING AVE BASED ON 1-HR BLOCK AVE	2	LAER	U	90.000		FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	16.210	* Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	natural gas	39463 mmcubic ft/year*	<ul> <li>Volatile</li> <li>Organic</li> <li>Compour</li> <li>ds (VOC)</li> </ul>	Oxidation catalyst	0 1 PPMVD 3-HR ROLLING AVERAGE BASED ON 1-H BI OCK	5.7 LB/H AVERAGE OF THREE TESTS R	1	LAER	U			FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines 2 duct burnes and 1 auxiliary boiler CO2e = 2,000,268 tyr for the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	, natural gas	39463 MMCubic ft/yr	c Carbon Monoxide	Oxidation Catalyst and Good e combustion Practices and use of natural gas a clean burning fuel	0 10.2 LB/H AVERAGE OF THREE TESTS	2 PPMVD 3-HR ROLLING AVE BASED ON 1-HR BLOCK AVE	t	BACT- PSD	U	90.000		FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines 2 duct burners and 1 auxiliary boiler CO2e = 2,000,268 tlyr for the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	, natural gas	39463 MMCubic ft/yr	c Particulat e matter, filterable < 10 Âμ (FPM10)	t Use of natural gas a clean burning fuel	0 11 LB/H AVERAGE OF THREE TESTS	0		BACT- PSD	U			FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines 2 duct burners and 1 auxiliary boiler CO2e = 2,000,268 t/yr for the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	, natural gas ∋	39463 MMCubic ft/yr	c Particulat e matter, filterable < 2.5 µ (FPM2.5)	t Use of Natural Gas a clean burning fuel )	0 11 LB/H AVERAGE OF THREE TESTS	0		N/A	U			FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	16.210	* Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	natural gas	39463 mmcubic ft/year*	Particulat e matter, filterable < 10 Âμ (FPM10)	t Use of natural gas a clean burning fuel	0 13.2 LB/H AVERAGE OF THREE TESTS	0		BACT- PSD	U			FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	16.210	<ul> <li>Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler</li> </ul>	natural gas	39463 mmcubic ft/year*	<ul> <li>Particulat e matter, filterable</li> <li>2.5 µ</li> <li>(FPM2.5)</li> </ul>	t Use of natural gas a clean burning fuel )	0 13.2 LB/H AVERAGE OF THREE TESTS	0		N/A	U			FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	16.210	Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	natural gas	39463 mmcubic ft/year*	Carbon Monoxide	Oxidation catalyst	0 2 PPMVD 3-HR ROLLING AVERAGE BASED ON 1-H BLOCK	10.2 LB/H AVERAGE OF THREE TESTS R	2	BACT- PSD	U	90.000		FALSE							2
N.L0080	11/01/2012 ACT	LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	r 16 210	Annual throughput is for 2 turbines, 2     duct burners and 1 auxiliary boiler     * Annual throughput is for 2 turbines, 2	natural gas	ft/year*	Oxides (NOx)	system	ROLLING AVERAGE BASED ON 1-H BLOCK	AVERAGE OF THREE TESTS	2	N/A		50.000		FALSE							2
NJ-0080	11/01/2012 ACT	LLC HESS NEWARK ENERGY CENTER ESSEX, NJ HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	duct burners and 1 auxiliary boiler Fuel: Annual throughput is for 2 turbines 2 duct burners and 1 auxiliary boiler CO2e = 2.000,268 byr for the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	i, natural gas	ft/year* 39463 MMCubic ft/yr	Dioxide (SO2) c Sulfur Dioxide (SO2)	fuel Use of natural gas a clean low sulfur fuel	AVERAGE OF THREE TESTS 0 2.8.LB/H AVERAGE OF THREE TESTS	0		N/A	U			FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines 2 duct burners and 1 auxiliary boiler CO2e = 2,000,268 t/yr for the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	, natural gas	39463 MMCubic ft/yr	c Volatile Organic Compour ds (VOC)	Oxidation Catalyst and Good combustion Practices and use of n natural gas a clean burning fuel	0 2.9 LB/H AVERAGE OF THREE TESTS	1 PPMVD 3-HR ROLLING AVERAGE BASED ON 1-HR BLOCK	ł	LAER	U			FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines 2 duct burners and 1 auxiliary boiler CO2e = 2,000,268 t/yr for the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	, natural gas	39463 MMCubic ft/yr	c Particulat e matter, filterable (FPM)	t Good combustion Practices and use of natural gas a clean burning fuel	0 6.6 LB/H AVERAGE OF THREE TESTS	0		N/A	U			FALSE							2
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	16.210	* Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	natural gas	39463 mmcubic ft/year*	e matter, filterable (FPM)	t Use of natural gas a clean burning fuel	0 7.9 LB/H AVERAGE OF THREE TESTS	0		N/A	U			FALSE							2
TX-0551	02/03/2010 ACT	PANDA SHERMAN POWER LLC PANDA SHERMAN POWER STATIO GRAYSON, TX	Natural Gas-fired Turbines N	16.210	2 Siemens SGT6-5000F or 2 GE Frame 7FA. Both capable of combined or simpl cycle operation. 468 MMBtu/hr duct burners.	Natural Gas le	600 MW	Volatile Organic Compour ds (VOC)	Good combustion practices	0 1 PPMVD @ 15% O2, 3-HR AVG, SIMPLE CYCLE MODE	4 PPMVD @ 15% O2, 3-HR AVG, COMBINED CYCLE MODE	1	BACT- PSD	U			FALSE						TRUE	1
TX-0551	02/03/2010 ACT	PANDA SHERMAN POWER LLC PANDA SHERMAN POWER STATIO GRAYSON, TX	Natural Gas-fired Turbines	16.210	2 Siemens SGT6-5000F or 2 GE Frame 7FA. Both capable of combined or simpl- cycle operation. 468 MMBtu/hr duct burners.	Natural Gas ie	600 MW	Carbon Monoxide	Good combustion practices	0 4 PPMVD @ 15% 02, ROLLNG 24-HF AVG, SIMPLE CYCLE	15 PPMVD @ 15% O2, RLNG 24-HR AVG, COMBINED CYCLE	4	BACT- PSD	U			FALSE						TRUE	1
TX-0551	02/03/2010 ACT	PANDA SHERMAN POWER LLC PANDA SHERMAN POWER STATIO GRAYSON, TX	Natural Gas-fired Turbines	16.210	2 Siemens SGT6-5000F or 2 GE Frame 7FA. Both capable of combined or simple cycle operation. 468 MMBtu/hr duct burners.	Natural Gas	600 MW	Nitrogen Oxides (NOx)	Dry low NOx combustors and Selective Catalytic Reduction	0 9 PPMVD @ 15% 02, ROLLNG 24-HF AVG, SIMPLE CYCLE 0 10 BPMVD @	2 PPMVD @ 15% O2, RLNG 24-HR AVG, COMBINED CYCLE	9	BACT- PSD	U	s	imple Cycle mode bypasses SCR	FALSE						TRUE	1
TX-0552	03/03/2010 ACT	HOLDINGS, LLC WOLF HOLLOW POWER PLANT NO. 2 HOOD, TX	Natural gas-fired turbines	16.210	turbines plus 230 MBBtu/hr duct burner firing for each turbine or 2 GE 7FA gas turbines plus 570 MMBtu/hr duct burner firing for each turbine. Project will be either 2 MHI501G gas	natural gas	600 MW	Volatile	Good combustion practices	0 10 PPMVD @ 15% 02, ROLLING 3-HR AVG, MHI501G 0 4 PPMVD @	15% O2, ROLLING 3-HR AVG, GE 7FA	4	PSD BACT-	u			FALSE						TRUE	' 
TX-0552	03/03/2010 ACT	HOLDINGS, LLC WOLF HOLLOW POWER PLANT NO. 2 HOOD, TX STARK POWER GENERATION II	Natural gas-fired turbines	16.210	turbines plus 230 MMBtu/hr duct burner firing for each turbine or 2 GE 7FA gas turbines plus 570 MMBtu/hr duct burner firing for each turbine. Project will be either 2 MHI501G gas	natural gas	600 MW	Organic Compour ds (VOC) Nitrogen	Dry low NOx combustors plus	15% O2, 3-HR AVG, MHI501G 0 2 PPMVD @	15% O2, 3-HR AVG, GE 7FA 9 PPMVD @	2	PSD BACT-	U		Reduced load for GE 7FA is 50%	FALSE							1
		HOLDINGS, LLC WOLF HOLLOW POWER PLANT NO. 2 HOOD, TX			turbines plus 230 MMBtu/hr duct burner firing for each turbine or 2 GE 7FA gas turbines plus 570 MMBtu/hr duct burner firing for each turbine.			Oxides (NOx)	selective catalytic reduction	15% 02, ROLLING 24-HI AVG, FULL LOAD	15% O2, ROLLING 3-HR AVG, REDUCED LOAD		PSD		o fe le	i full load or less Reduced load or MHI501G is 60% of full load or or ss								

BACT Analys RBLC Seach RBLC Search	sis: Parameters: n Date:	Large Natural Gas, Combined Cycle 8/26/2016	Turbines							-									
				Proces			Throughput	+ 8		Standard Emission Limit Emission Limit	1 Emission Limit 2		Case by	y l	Estimated		Water DI N	or Efficienc Lise of	Good Comb Duplicate
RBLC ID TX-0625	Date 12/19/2012 ACT	Facility Name & Location NRG TEXAS POWER LLC WA	Process Cogeneration turbine	16.210	Process Notes General Electric (GE) Frame 7EA (or a	Primary Fuel	Units 80 MW	Pollutant Particulat	t Control Method Description	& Units & Units 0 16.58 LB/H 1 HF	& Units p	opmv @ 15% O2 Ib/MM	Btu Basis BACT-	Other Factors	% Pollutant/ Compliance Notes	Draft? SCR FALSE	Injection OxCat SoLo	Nox y NG	Pract ?
		PARISH ELECTRIC GENERATING STATION JEMONISTRATION PROJECT FORT BEND, TX			similar sized unit), which is rated at a maximum base-load electric output of approximately 80 megawatts (MW). HRSG duct burner has a maximum hea input capacity of 225 million British thermai units per hour (MMBtu/hr) base on the high heating value (HHV) of the fuel fired. The steam will be used for the regeneration of the Demonstration Unit solvent.	d		e matter, total < 10 Âμ (ΤΡΜ10)	gas				PSD						
TX-0625	12/19/2012 ACT	NRG TEXAS POWER LLC WA PARISH ELECTRIC GENERATING STATION DEMONSTRATION PROJECT FORT BEND, TX	Cogeneration turbine	16.210	General Electric (GE) Frame 7EA (or a similar sized unit), which is rated at a maximum base-load electric output of approximately 80 megawatts (MW). HRSG duct burner has a maximum hea input capacity of 225 million British thermal units per hour (MMBtu/hr) base on the high heating value (HVI-) of the fuel fired. The steam will be used for the regeneration of the Demonstration Unit solvent.	natural gas It d	80 MW	Particulat e matter, total < 2.5 ŵ (TPM2.5)	good combustion and use of natural gas	0 16.58 LB/H 1 HF	s 0		BACT- PSD	U		FALSE			1
TX-0625	12/19/2012 ACT	NRG TEXAS POWER LLC WA PARISH LECTRIC GENERATING STATION -DEMONSTRATION PROJECT FORT BEND, TX	Cogeneration turbine	16.210	Ceneral Electric (GE) Frame 7EA (or a similar sized unit), which is retade at a maximum base-load electric output of approximately 80 megawatts (MW). HRSG duct burner has a maximum hea input capacity of 225 million British thermal units per hour (MMBturh) base on the high heating value (HrV) of the fuel fired. The steam will be used for the regeneration of the Demonstration Unit solvent.	natural gas It d	80 MW	Nitrogen Oxides (NOx)	DLN combusters on the turbine and selective catalytic reduction (SCR)	0 2 PPM/D 3-HR ROLLING AVG, AT 15% OXYGEN	0	2	LAER	U		FALSE			1
TX-0625	12/19/2012 ACT	NRG TEXAS POWER LLC WA PARISH ELECTRIC GENERATIN STATION - DEMONSTRATION PROJECT FORT BEND, TX	Cogeneration turbine	16.210	General Electric (GE) Frame 7EA (or a similar sized unit), which is rated at a maximum base-load electric output of approximately 80 megawatts (MW). HRSG duct Dumer has a maximum hea input capacity of 225 million British thermal units per hour (MMBfu/hr) base on the high heating value (HVI-) of the fuel fired. The steam will be used for the regeneration of the Demonstration Unit solvent.	natural gas It d	80 MW	Volatile Organic Compoun ds (VOC)	oxidation catalyst	0 2 PPMVD INITIAL STACK TEST	0	2	LAER	U		FALSE			2
TX-0625	12/19/2012 ACT	NRG TEXAS POWER LLC WA PARISH ELECTRIC GENERATING STATION -DEMONSTRATION PROJECT FORT BEND, TX	CO2 Capture Demonstration Unit	16.210	Up to 590,000 acfm of coal-fired boiler exhaust is treated by an amine treatmer system	none nt	590000 acfm	Volatile Organic Compoun ds (VOC)	proper design and operation, good solvent maintenance, LDAR program	0 3.1 PPMV	0	3.1	LAER	U	These are emissions from a CO2- stripped gas stream after it has passed through an amine absorber unit.	FALSE			2
TX-0625	12/19/2012 ACT	NRG TEXAS POWER LLC WA PARISH LECTRIC GENERATING STATION -DEMONSTRATION PROJECT FORT BEND, TX	Cogeneration turbine	16.210	General Electric (GE) Frame 7EA (or a similar sized unit), which is rated at a maximum base-load electric output of approximately 80 megawatts (MW). HRSG duct burner has a maximum hea input capacity of 226 million British thermal units per hour (MMB/burly base on the high heating value (H+V) of the fuel fired. The steam will be used for the regeneration of the Demonstration Unit solvent.	natural gas tt d	80 MW	Carbon Monoxide	oxidation catalyst	0 4 PPW/D 24 H ROLLING, AT 15% OXYGEN	¢ 0	4	BACT- PSD	U		FALSE			1
TX-0704	12/02/2014 ACT	M & G RESINS USA LLC UTILITY PLANT NUECES, TX	cogeneration turbine	16.210	General Electric LM6000 natural gas- fired combustion turbine equipped with lean pre-mix low-Nox combustors. One heat recovery steam generator (HRSG) with 263 million British thermal units per hour (MMBlu/hr) natural gas-fired duct burrer system containing a selective catalytic reduction system (SCR)	natural gas r	49 MW	Particulat e matter, total < 2.5 ŵ (TPM2.5)	5	0 0	0		BACT- PSD	N	natural gas fuel, includes PM and PM10	FALSE			1
TX-0704	12/02/2014 ACT	M & G RESINS USA LLC UTILITY PLANT NUECES, TX	cogeneration turbine	16.210	General Electric LM6000 natural gas- fired combustion turbine equipped with lean pre-mix low-NOx combustors. One heat recovery steam generator (HRSG) with 263 million British thermal units per hour (MMBfu/hr) natural gas-fired duct burner system containing a selective catalytic reduction system (SCR)	natural gas	49 MW	Nitrogen Oxides (NOx)	Selective Catalytic Reduction	0 2 PPMVD @159 O2, 24-HR ROLLING AVERAGE	6 0	2	BACT- PSD	N		FALSE TRUE			1
TX-0704	12/02/2014 ACT	M & G RESINS USA LLC UTILITY PLANT NUECES, TX	cogeneration turbine	16.210	General Electric LM6000 natural gas- fired combustion turbine equipped with lean pre-mix low-Nox combustors. One heat recovery steam generator (HR5G) with 263 million British thermal units per hour (MMBlu/hr) natural gas-fired duct burner system containing a selective catalytic reduction system (SCR)	natural gas r	49 MW	Carbon Monoxide	oxidation catalyst	0 4 PPMVD @159 O2, 24-HR ROLLING AVERAGE	6 0	4	BACT- PSD	N		FALSE			1
TX-0704	12/02/2014 ACT	M & G RESINS USA LLC UTILITY PLANT NUECES, TX	cogeneration turbine	16.210	General Electric LM6000 natural gas- fired combustion turbine equipped with lean pre-mix low-NOx combustors. One heat recovery steam generator (HR5G) with 263 million British thermal units per hour (MMBlu/hr) natural gas-fired duct burrer system containing a selective catalytic reduction system (SCR)	natural gas r	49 MW	Volatile Organic Compoun ds (VOC)	oxidation catalyst	0 4 PPMVD @159 O2, 24-HR ROLLING AVERAGE	60	4	BACT- PSD	N		FALSE			1
TX-0737	12/21/2012 ACT	NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	Combined cycle combustion turbine	16.210	GE 7EA turbine, 225 million British thermal units per hour duct burner. Steam created in the heat recovery steam generator will be used as process steam.	natural gas s	80 MW	Particulat e matter, total < 2.5 µ (TPM2.5)	5	0 0	0		BACT- PSD	N	Natural gas as fuel and good combustion practices. This includes PM and PM10.	FALSE			1
TX-0737	12/21/2012 ACT	NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	Combined cycle combustion turbine	16.210	GE 7EA turbine, 225 million British thermal units per hour duct burner. Steam created in the heat recovery steam generator will be used as process steam	natural gas s	80 MW	Volatile Organic Compoun ds (VOC)	Oxidation catalyst	0 2 PPMVD @ 15% O2	0	2	LAER	N		FALSE			1
TX-0737	12/21/2012 ACT	NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	Combined cycle combustion turbine	16.210	GE 7EA turbine, 225 million British thermal units per hour duct burner. Steam created in the heat recovery steam generator will be used as process	natural gas s	80 MW	Nitrogen Oxides (NOx)	Selective catalytic reduction	0 2 PPMVD @ 15% O2 3-HR AVERAGE	0	2	LAER	Ν		FALSE TRUE			1
TX-0737	12/21/2012 ACT	NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	Combined cycle combustion turbine	16.210	GE 7EA turbine, 225 million British thermal units per hour duct burner. Steam created in the heat recovery steam generator will be used as process steam.	natural gas	80 MW	Carbon Monoxide	Oxidation catalyst	0 4 PPMVD @ 15% O2 24-HR AVERAGE	0	4	BACT- PSD	N		FALSE			1

				Proces	s		Throughput &			Standard Emission Limi	it Emission Limi	t Emission Limit		Ca	Case by Case	Estimated Efficiency	Water	DLN or	Efficien	c Use of C	ood omb Duplica	cate
RBLC ID *LA-0295	Date 07/12/2016 ACT	Facility Name & Location EQUISTAR CHEMICALS, LP	Process Solar Titan 130 Gas Turbine with Un	Type nfired 16.210	Process Notes Turbine is subject to 40 CFR 60 Subpart	Primary Fuel Natural Gas	Units 159.46 MM	Pollutar Volatile	Control Method Description Good combustion practices, includin	& Units	1 & Units 1.64 LB/HR	2 & Units 0	ppmv @ 15% O2 I	b/MMBtu E	Basis ACT- L	Other Factors % Pollutant/ Compliance Notes U Good combustion practices shall include monitoring of the flue gas	Draft? SCR Injection OxC	at SoLoNo	ху	NG P	ract ?	Emission Limi
		WESTLAKE FACILITY CALCASIEU, LA	HRSG (3-08, EQT 323)		KKKK. Output power at generator: 14.1 MW		BTU/HR	Organic Compou ds (VOC	good equipment design, use of n gaseous fuels for good mixing, and ) proper combustion techniques consistent with the manufacturer's recommendations to maximize fuel efficiency and minimize emissions (see notes below)	15% O2 ANNUAL AVERAGE	HOURLY MAXIMUM			PS	SD	orygen content, combustion air flow, fuel consumption, and flue gas temperature. These parameters shall be maintained within the manufacturerid ™s recommended operating guidelines or within a rang that is otherwise indicative of proper operation of the emissions unit. P permit requires an annual stack test for VOC. If VOC = 75% of the per limit, the frequency of the testing may be reduced to once every 2 years. & If rissuit of any subsequent test exceeds 75% of the permit limit, resume annual testing.	5 D N					1.64 LB/HR
*LA-0295	07/12/2016 ACT	EQUISTAR CHEMICALS, LP WESTLAKE FACILITY CALCASIEU, LA	Solar Titan 130 Gas Turbine with Un HRSG (3-08, EQT 323)	nfired 16.210	Turbine is subject to 40 CFR 60 Subpar KKKK. Output power at generator: 14.1 MW	Natural Gas	159.46 MM BTU/HR	Nitrogen Oxides (NOx)	Dry low NOx combustor (SoLoNOx) and good combustion practices, including good equipment design, us of gaseous fuels for good mixing, an proper combustion techniques (see notes below)	15 PPMVD @ 15% O2 se ANNUAL d AVERAGE	14.25 LB/HR HOURLY MAXIMUM	0		BA PS	ACT- U SD	U Good combustion practices shall include monitoring of the flue gas oxygen content, combustion air flow, fuel consumption, and flue gas temperature. These parameters shall be maintained within the manufacturer& <sup>®</sup> 's recommended operating guidelines or within a rang that is otherwise indicative of proper operation of the emissions unit.	TRUE				1	14.25 LB/HR
*PA-0289	06/18/2010 ACT	GEISINGER MEDICAL CENTER GEISINGER MED CTR/DANVILLE MONTOUR, PA	COMBINED HEAT AND POWER COMBUSTION TURBINE	16.210	0.8 ton of total hazardous air pollutant in any 12 consecutive month period; and 0 ton of formaldehyde in any 12 consecutive month period.	Natural Gas .:	55.62 MMBTU/H	H Formald hyde	e	0	0.0029 LB/MMBTU	0		0.0029 OT CA CA	THER U ASE-BY- ASE	U	TRUE				1	0.0000   D.M.
*PA-0289	06/18/2010 ACT	GEISINGER MEDICAL CENTER GEISINGER MED CTR/DANVILLE MONTOUR, PA	COMBINED HEAT AND POWER COMBUSTION TURBINE	16.210	0.8 ton of total hazardous air pollutant in any 12 consecutive month period; and 0 ton of formaldehyde in any 12 consecutive month period.	Natural Gas	55.62 MMBTU/H	H Volatile Organic Compou ds (VOC	in ;)	0	0.6 LB/H IN SOLONOX MODE	11.9 LB/H SUB- ZERO NON- SOLONOX MODE		OT CA CA	THER U ASE-BY- ASE	υ	TRUE				1	0.0029 LB/M
*PA-0289	06/18/2010 ACT	GEISINGER MEDICAL CENTER GEISINGER MED CTR/DANVILLE MONTOUR, PA	COMBINED HEAT AND POWER COMBUSTION TURBINE	16.210	0.8 ton of total hazardous air pollutant in any 12 consecutive month period; and 0 ton of formaldehyde in any 12 consecutive month period.	Natural Gas	55.62 MMBTU/H	H Nitrogen Oxides (NOx)	SoLoNOx combustor	0	15 PPM @15% O2 IN SOLONOX MODE	42 PPM @15% O2 DURING SUB-ZERO AMBIENT,, NON SOLONOX	15	OT CA CA	THER U ASE-BY- ASE	U	TRUE				1	0.6 LB/H IN
*PA-0289	06/18/2010 ACT	GEISINGER MEDICAL CENTER GEISINGER MED CTR/DANVILLE MONTOUR, PA	COMBINED HEAT AND POWER COMBUSTION TURBINE	16.210	0.8 ton of total hazardous air pollutant in any 12 consecutive month period; and 0 ton of formaldehyde in any 12 consecutive month period.	Natural Gas	55.62 MMBTU/H	H Carbon Monoxid	ie	0	25 PPM @ 15% O2 IN SOLONOX MODE	100 PPM @ 15% O2 SUB-ZERO AMBIENT NON- SOLONOX	25	OT CA CA	THER U ASE-BY- ASE	U	TRUE				1	15 PPM @ 15%
*SD-0005	06/29/2010 ACT	BASIN ELECTRIC POWER COOPERATIVE DEER CREEK STATION BROOKINGS, SD	Combustion turbine/heat recovery st generator	team 16.210	Combustion Turbine - 1,713 million Btus per hour (Lower Heating Value) heat inp Duct Burner- 615.2 million Btus per hour (Lower Heating Value) heat input	Natural Gas u	300 Megawatts	Carbon Monoxid	Catalytic oxidation le	2 PPMVD @ 15% O2 3- HOUR, EXCLUDES SS PERIODS	10.5 LB/H 3- HOUR, EXCLUDES SS M PERIODS	840 POUNDS PER SS PERIOD M STARTUP AND SHUTDOWN (SS)		BA	ACT- U SD	U	TRUE				1	25 PPM @ 15
*SD-0005	06/29/2010 ACT	BASIN ELECTRIC POWER COOPERATIVE DEER CREEK STATION BROOKINGS, SD	Combustion turbine/heat recovery st generator	team 16.210	Combustion Turbine - 1,713 million Btus per hour (Lower Heating Value) heat inp Duct Burner- 615.2 million Btus per hour (Lower Heating Value) heat input	Natural Gas u	300 Megawatts	Particula e matter total < 10 ŵ (TPM10)	t Good Combustion , 0 )	0.01 LB/H 3- HOUR	23.2 LB/H 3- HOUR / WITH DUCT FIRING	18.6 LB/H 3- HOUR / WITHOUT DUCT FIRING		BA	ACT- L SD	υ	TRUE			Т	RUE 1	10.5 LB/H 3
*SD-0005	06/29/2010 ACT	BASIN ELECTRIC POWER COOPERATIVE DEER CREEK STATION BROOKINGS, SD	Combustion turbine/heat recovery st generator	team 16.210	Combustion Turbine - 1,713 million Btus per hour (Lower Heating Value) heat inp Duct Burner- 615.2 million Btus per hour (Lower Heating Value) heat input	Natural Gas u	300 Megawatts	Nitrogen Oxides (NOx)	Selective catalytic reduction	3 PPMVD AT 15% O2 3- HOUR, EXCLUDES SS	25.8 LB/H 3- HOUR, EXCLUDES SS	220 POUNDS PER SS PERIOD M STARTUP OR SHUTDOWN (SS)		BA/ PSI	ACT- U SD	U	TRUE TRUE				1	
AK-0066	06/15/2009 ACT	BRITISH PETROLEUM EXPLORATION ALASKA (BPXA) ENDICOTT PRODUCTION FACILITY LIBERTY DEVELOPMENT PROJECT PRUDHOE BAY, AK	EU ID 10A, TURBINE	16.210		FUEL GAS	7.5 KW	Sulfur Dioxide (SO2)	LIMIT SULFUR IN FUEL	0	0.06 LB/MMBTU BASED ON HEAT INPUT	0		0.06 BA	ACT- U SD	U BASELINE BACT SELECTED THIS WAS ALSO THE LIMIT USED IN MODELLING DEMONSTRATIONS	FALSE				1	25.8 LB/H 3
AK-0066	06/15/2009 ACT	BRITISH PETROLEUM EXPLORATION ALASKA (BPXA) ENDICOTT PRODUCTION FACILITY LIBERTY DEVELOPMENT PROJECT PRUDHOE BAY, AK	EU ID 10A, TURBINE	16.210		FUEL GAS	7.5 KW	Nitrogen Oxides (NOx)	DRY LOW NOX COMBUSTORS (DLN)	0	25 PPMV AT 15% O2 WHEN AMBIENT TEMPERATURI => 10 DEG-F	120 PPMV AT 15% O2 WHEN AMBIENT TEMPERATURE < 10 DEG-F	25	BA	ACT- U SD	U 70.000 BASELINE SELECTED AS BACT	FALSE				1	0.06 LB/MMB
AK-0066	06/15/2009 ACT	BRITISH PETROLEUM EXPLORATION ALASKA (BPXA) ENDICOTT PRODUCTION FACILITY LIBERTY DEVELOPMENT PROJECT PRUDHOE BAY, AK	EU ID 10A, TURBINE	16.210		FUEL GAS	7.5 KW	Carbon Monoxid	CATALYTIC OXIDATION le	0	5 PPMV @ 15% O2 WHEN AMBIENT TEMPERATURI => 10 DEG-F	<ul> <li>15 PPMV @ 15%</li> <li>O2 WHEN</li> <li>AMBIENT</li> <li>TEMPERATURE</li> <li>&lt; 10 DEG-F</li> </ul>	5	BA	ACT- U SD	U 90.000 BPXA ESTIMATED THE COST EFFECTIVENESS AT \$2,900/TON, WHICH THE ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION DETERMINED WAS ALSO REASONABLE FOR BACT.	FALSE				1	25 PPMV AT
AL-0282	01/22/2014 ACT	LENZING FIBERS, INC. LENZING FIBERS, INC. MOBILE, AL	Gas Turbine with HRSG	16.210		Natural Gas	25 MW	Particula e matter filterable (FPM)	t Good combustion practices.	0	0.0075 LB/MMBTU	0		0.0075 BA/ PSI	ACT- U SD	υ	FALSE				1	
AL-0282	01/22/2014 ACT	LENZING FIBERS, INC. LENZING FIBERS, INC. MOBILE, AL	Gas Turbine with HRSG	16.210		Natural Gas	25 MW	Volatile Organic Compou ds (VOC	CO oxidation catalyst and good combustion practices. in	0	1.6 PPM PPM VD @15% O2 WITH DUCT BURNERS	0	1.6	BA PSI	ACT- U SD	U	FALSE				1	0.0075 LB/M
AL-0282	01/22/2014 ACT	LENZING FIBERS, INC. LENZING FIBERS, INC. MOBILE, AL	Gas Turbine with HRSG	16.210		Natural Gas	25 MW	Carbon Dioxide Equivale t (CO2e)	Good combustion practices.	0	137908 TPY OF CO2E 12 - MONTH ROLLING	• 0		BA	ACT- U SD	U	FALSE				1	1.6 PPM PPM
CA-1216	11/06/2012 ACT	GROSSMONT HOSPITAL GROSSMONT HOSPITAL SAN DIEGO, CA	Cogeneration gas turbine	16.210	Manufacturer: Solar Turbines. Model 50 6400 R. 4.6 MW - Natural gas fired with Duct	- natural gas	0	Nitrogen Oxides (NOx)	SoLoNOX BURNERS	0	9 PPMVD@15% O2 1 HOUR	6 0	9	OT CA CA	THER U ASE-BY- ASE	U 9 ppmv with duct burner in operation. 5 ppmv when duct burner is not i operation. SCR is not cost effective (2.5 ppmv). Other pollutants are below BACT thresholds.	FALSE				1	9 PPMVD@15'
CO-0068	01/13/2014 ACT	DCP MIDSTREAM, LP LUCERNE GA PROCESSING PLANT WELD, CO	KS Combustion Turbines	16.210	Two natural gas fired combustion turbines equipped with low NOX burners site rated at 9,055 horsepower each.	natural gas s,	72.73 MMBTU/H	H Carbon Dioxide Equivale t (CO2e)	Waste heat recovery, thermal efficiency, tune-ups & maintenance.	0	42268 TON CO2E PER YEAR (EACH)	40 % THERMAL EFFICIENCY		BA PSI	ACT- L SD	U The turbines shall be equipped with waste heat recovery units (WHRU increase the efficient use of waste heat for process heating. The combusion turbines and the WHRUs system shall meet a BACT limit 40% minimum thermal efficiency on a 12-month rolling average basis. Ture-ups and maintenance shall be required annually for the life of the turbines.	t FALSE				1	42268 TON C
CT-0155	08/27/2008 ACT	WESLEYAN UNIVERSITY WESLEYA UNIVERSITY , CT	AN 2.4 MW NATURAL GAS FIRED COGENERATION FACILITY WITH SCR/OXIDATION CATALYST	16.210		NATURAL GAS	22.3 MMBTU/H	Nitrogen Oxides (NOx)	STEULER ECO2PRO SCR	0	0.18 G/B-HP-H SHORT TERM EMISSION LIMITS	5.82 T/YR ANNUAL EMISSIOM LIMIT		Oth Car Car	ther L ase-by- ase	U 83.600	FALSE				1	0.18 G/B-HP
CT-0155	08/27/2008 ACT	WESLEYAN UNIVERSITY WESLEYA UNIVERSITY , CT CUTRALE CITRUS JUICES USA	AN 2.4 MW NATURAL GAS FIRED COGENERATION FACILITY WITH SCR/OXIDATION CATALYST	16.210	ANNUAL EPA METHOD 20 OR 7E AS	NATURAL GAS	22.3 MMBTU/H	Carbon Monoxid Nitrogen	DRY LOW NOX BURNERS	0	0.48 G/B-HP-H SHORT TERM EMISSION LIMI 25 PPMVD HR	15.51 T/YR ANNUAL IT EMISSIOM LIMIT	25	Ca: Ca: BA	ase-by- ase	U 84.000 U 85.000 ANNUAL EPA METHOD 20 OR 7E AS PER NSPS SUBPART KKKK.	FALSE	TRUE			2	0.48 G/B-HP
FL-0313	06/12/2008 ACT	AUBURNDALE CITRUS FACILITY POLK, FL	W/EXISTING DUCT BURNER #2	16.210	PER NSPS SUBPART KKKK.	NATURAL GAS	62.7 MMBTU/H	Oxides (NOx)	DRY LOW NOX BURNERS	0	AVG/CORRECT ED TO 25% O2 25 PPMVD HR	0	25	PSI	ACT- U	U 85.000 ANNUAL EPA METHOD 20 OR 7E AS PER NSPS SUBPART KKKK.	FALSE	TRUE			2	25 PPMVD HR
FL-0314	06/02/2008 ACT	AUBURNDALE CITRUS FACILITY POLK, FL CUTRALE CITRUS JUICES USA	W/EXISTING DUCT BURNER #1	16.210	MEGAWATTS. NEW COGEN SYSTEM TURBINES #1 W/EXISTING DUCT BURNER #1. SYSTEM GENERATES 4 MW	NATURAL GAS	62.7 MMBTU/H	Oxides (NOx) Nitrogen	DRY LOW NOX BURNER	0	AVG/CORRECT ED TO 25% O2 25 PPMVD HR	0	25	BA	SD ACT- U	U 85.000 ANNUAL EPA METHOD 20 OR 7E AS PER SUBPART KKKK.	FALSE				1	25 PPMVD HR
IN-0173	06/04/2014 ACT	LEESBURG CITRUS FACILITY LAKE FL MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEN	EXISTING STEAM GENERATOR THREE (3) AUXILARY BOILERS Y,	16.210	ELECTRIC NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Oxides (NOx) Particula e matter filterable	t GOOD COMBUSTION PRACTICES	\$ 0	AV/CORRECTE D TO 25% O2 1.9 LB/MMCF 3 HR AVERAGE	- 0		PSI BAI PSI	SD ACT- N SD	N	FALSE				2	25 PPMVD HR
IN-0173	06/04/2014 ACT	IN MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEN	THREE (3) AUXILARY BOILERS Y,	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	(FPM) Nitrogen Oxides (NOx)	LOW NOX BURNERS, FLUE GAS RECIRCULATION	0	20.4 LB/MMCF HR AVERAGE	3-0		BA PSI	ACT- M SD	N	FALSE				2	1.9 LB/MMCF
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									Standard			Case by		Estimated				Good
RBLC ID	Date	Facility Name & Location	Process	Process Type	Process Notes	Primary Fuel	Throughput & Units	Pollutant	t Control Method Description & Units	it Emission Limit Emission Limit 1 & Units 2 & Units	ppmv @ 15% O2	Case Ib/MMBtu Basis	Other Factors	Efficiency %	Pollutant/ Compliance Notes Draft?	SCR	Water         DLN or         Efficienc         Use of           Injection         OxCat         SoLoNox         y         NG	Comb Duplicate Pract ? Emission Limit
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Carbon Monoxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	37.22 LB/MMCF 0 3-HR AVERAGE		BACT- PSD	Ν		FALSE	<u>.</u>		2 37.22 L B/MM
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Volatile Organic Compoun	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	5.5 LB/MMCF 3- 0 HR AVERAGE		BACT- PSD	Ν		FALSE	E		2
IN-0173	06/04/2014 ACT	IN MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	ds (VOC) Carbon Dioxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN: AIR INLET CONTROLS, HEAT RECOVERY CONDENSATE AND BLOWDOWN HEAT RECOVERY	59.61 T/MMCF 3- HR AVERAGE EFFICIENCY (HHV)		BACT- PSD	N		FALSE			2.5.5 LB/MMCF
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Particulat e matter, total < 10 µ	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	7.6 LB/MMCF 3- 0 HR AVERAGE		BACT- PSD	N		FALSE			2 59.61 T/MMC
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particulat e matter, filterable (FPM)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.0019 0 LB/MMBTU 3-HR AVERAGE		0.0019 BACT- PSD	N		FALSE			7.6 LB/MMCF
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particulat e matter, total < 10 ŵ (TPM10)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.0076 LB/MMBTU 3-HR AVERAGE		0.0076 BACT- PSD	N		FALSE			0.0019 LB/M
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particulat e matter, total < 2.5 ŵ (TPM2.5)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.0076 0 LB/MMBTU 3-HR AVERAGE		0.0076 BACT- PSD	N		FALSE			0.0076 LB/M
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Carbon Monoxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.03 LB/MMBTU 0 3-HR AVERAGE AT > 50% PEAK LOAD		0.03 BACT- I PSD	N		FALSE			0.0076 LB/M
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Carbon Dioxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	12666 BTU/KW- H, MINIMUM CONTINUOUS AVERAGE	R.	BACT- PSD	N		CO2 EMISSIONS SHALL NOT EXCEED 144,890 TON/YEAR FALSE	<u>-</u>		2 12666 BTU/K
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Volatile Organic Compoun ds (VOC)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	2.5 PPMVD AT 0 15% OXYGEN 1- HR AVERAGE	2.5	BACT- PSD	N		FALSE			2 2.5 PPMVD A
IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Nitrogen Oxides (NOx)	DRY LOW NOX COMBUSTORS 0	22.65 PPMVD 0 AT 15% OXYGEN 3-HR AVERAGE AT > 50% PEAK LOAD	22.65	BACT- PSD	N		FALSE	•		2 2 22.65 PPMVD
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Particulat e matter, filterable (FPM)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	1.9 LB/MMCF 3- HR AVERAGE		BACT- PSD	N		FALSE	E		2
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Nitrogen Oxides (NOx)	LOW NOX BURNERS, FLUE GAS 0 RECIRCULATION	20.4 LB/MMCF 3- 0 HR AVERAGE		BACT- PSD	N		FALSE			2 1.9 LB/MMCF
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Carbon Monoxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	37.22 LB/MMCF 3-HR AVERAGE		BACT- PSD	Ν		FALSE	E		2 37.22 LB/MM
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Volatile Organic Compoun ds (VOC)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	5.5 LB/MMCF 3- HR AVERAGE		BACT- PSD	Ν		FALSE			2 5.5 L B/MMCE
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Carbon Dioxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN: AIR INLET CONTROLS, HEAT RECOVERY CONDENSATE AND BLOWDOWN HEAT RECOVERY	59.61 80 % THERMAL TON/MMCF 3- EFFICIENCY HR AVERAGE (HHV)		BACT- PSD	N		FALSE	<u>-</u>		2 59.61 TON/M
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H, EACH	Particulat e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	7.6 LB/MMCF 3- 0 HR AVERAGE		BACT- PSD	N		FALSE	E		2 7.6 LB/MMCF
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particulat e matter, filterable (FPM)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.0019 LB/MMBTU 3-HR AVERAGE		0.0019 BACT- PSD	Ν		FALSE	E		2
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particulat e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.0076 0 LB/MMBTU 3-HR AVERAGE		0.0076 BACT- PSD	N		FALSE			2 0.0019 LB/M
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particulat e matter, total < 2.5 µ (TPM2.5)	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.0076 0 LB/MMBTU 3-HR AVERAGE		0.0076 BACT- PSD	N		FALSE	•		1
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Carbon Monoxide	GOOD COMBUSTION PRACTICES 0 AND PROPER DESIGN	0.03 LB/MMBTU 0 3-HR AVERAGE AT > 50% PEAK LOAD		0.03 BACT- PSD	N					2 0.03 LB/MMB
IN-0180	06/04/2014 ACT	INDIVIEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	COMBUSTION TURBINES	16.210	VATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY		EACH	Dioxide	AND PROPER DESIGN	H, MINIMUM CONTINUOUS 2.5 PRMVD AT		PSD	N		CUZ EMISSIONS SHALL NUT EXCEED 144,890 TONYEAK FALSE			12666 BTU/K
114-0160	Juru4/2014 ACT	FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	COMBUSTION TURBINES	10.210	CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	INTURAL GAO	EACH	Organic Compoun ds (VOC)	AND PROPER DESIGN	15% OXYGEN 1- HR AVERAGE	2.5	PSD			FALSE	-		2 2.5 PPMVD A
IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Nitrogen Oxides (NOx)	DRY LOW NOX COMBUSTORS 0	22.65 PPMVD 0 AT 15% OXYGEN 3-HR AVERAGE AT > 50% PEAK LOAD	22.65	BACT- PSD	N		FALSE			2 22 65 PPM/D

				1			1	Standard			Case by	Entimated					Good	
RBLC ID NJ-0079	07/25/2012 ACT	Facility Name & Location CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Process Combined Cycle Combustion Turbine w/ duct burner	Process Type /d16.210	Process Notes Primary The above natural gas use is combined natural gas for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMB'suh/natur dwo duct burners (each	Fuel Throughput & Units Pollutant 40297.6 Particulat mmcubic ft/year e matter, filterable < 10 ŵ	Control Method Description Use of Natural gas,a clean burning fuel.	Emission Limit & Units	t Emission Limit Emission Lin 1 & Units 2 & Units 12.1 LB/H 0 AVERAGE OF THREE TESTS	lit ppmv @ 15% O2 lb/MMBt	Case by Case Basis OTHER CASE-BY- CASE	Other Factors %	Pollutant/ Compliance Notes	Draft? FALSE	Water DLN or SCR Injection OxCat SoLoNox	Efficienc y	Use of Comb Duplicat NG Pract ?	te Emission Lim
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine w/ duct burner	/d16.210	with a maximum heat input of 500           MMB1u/m)           The above natural gas use is combined for two GE 74A CC turbines (each with a maximum heat input of 2, 307 MMB1u/m) and two duct burners (each with a maximum heat input of 500 MMB1u/m)	(FPM10) 40297.6 Particulat mmcubic ft/year e matter, filterable < 2.5 Åμ (FPM2.5)	use of natural gas only which is a clean burning fuel	0	12.1 LB/H 0 AVERAGE OF THREE TESTS		OTHER CASE-BY- CASE	U		FALSE			2	12.1 LB/H A
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine w/ duct burner	/c16.210	The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtu/hrand two duct burners (each with a maximum heat input of 500	40297.6 Nitrogen mmcubic ft/year Oxides (NOx)	DLN combustion system with SCR each of the two combustion turbine and use of only natural gas as fuel.	on 0 Is	2 PPMVD 3-HR 16.8 LB/H ROLLING AVE AVERAGE OF BASED ON 1-HR THREE TESTS BLOCK	2	LAER	U 77.000		FALSE			2	12.1 LB/H A
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine w/ duct burner	/c16.210	MMBUM/r) The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBUm/r)and two duct burners (each with a maximum heat input of 500 MMBUm/r)and	40297.6 Carbon mmcubic ft/year Monoxide	Oxidation Catalyst, good combustic practices and use only natural gas clean burning fuel	on 0 a	2 PPMVD 3-HR 10.2 LB/H ROLLING AVE AVERAGE OF BASED ON 1-HR THREE TESTS BLOCK	2	BACT- PSD	U 77.000		FALSE			2	2 PPMVD 3-H
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine w/ duct burner	/c16.210	The above natural gas use is combined natural gas for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtu/hr)and two duct burners (each with a maximum heat input of 500 MMBtu/hr)	40297.6 Volatile mmcubic ft/year Organic Compour ds (VOC)	Oxidation catalyst and good combustion practices, use of nature gas a clean burning fuel	0 al	2.9 LB/H 0 AVERAGE OF THREE TESTS		LAER	U		FALSE			2	2.9 LB/H AV
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine w/ duct burner	/c16.210	The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtu/hr)and two duct burners (each with a maximum heat input of 500 MMBtu/hr)	40297.6 Sulfur mmcubic ft/year Dioxide (SO2)	Use of only natural gas a clean burning fuel	0	4.1 LB/H 0 AVERAGE OF THREE TESTS		OTHER CASE-BY- CASE	U		FALSE			2	4.1 LB/H AV
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine w/ duct burner	/616.210	The above natural gas use is combined for two GE 7FA CC turbines (each with a maximum heat input of 2, 307 MMBtu/hr)and two duct burners (each with a maximum heat input of 500 MMBtu/hr)	40297.6 Particulat mmcubic ft/year e matter, filterable (FPM)	use of natural gas only which is a clean burning fuel	0	4.8 LB/H 0 AVERAGE OF THREE TESTS		OTHER CASE-BY- CASE	U		FALSE			2	4.8 LB/H AV
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine with Duct Burner	16.210	Woodbridge Energy Center (WEC). Natural gas located at Riverside Drive in Woodbridge Township (Middlesox County), New Jersey, 07065 will be a new 200 MW combined-cycle power generating facility. WEC will consist of two Generate Electric (GE) combustion turbine generators (CTGs) each with a maximum rade heat input of 2.907 million British thermal units per hour (MMBurhy), that will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu'hr).	40297.6 Carbon mmcubic ft/year Monoxide	Oxidation Catalyst; Good Combusti Practices	ior 0	12.1 LBH 2 PEW/D 3-H AVERAGE OF ROLLING THREE 1-HOUR AVERAGE TESTS BASED ON 1-I BLOCK	t IR	BACT- PSD	U 77.000		FALSE			2	12.11.0/H &
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine with Duct Burner	16.210	Woodbridge Energy Center (WEC). Natural gas located at Rivestide Drive in Woodbridge Township (Middlesex County), New Jersey, 07085, will be a new 700 MW combined-cycle power generating facility. WEC will consist of two General Electric (GE) combusion turbine generators (CTGs) each with a maximum rated heat input of 2.307 million British thermal units per hour (MMBtuhh), Inat will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtuhhr).	40297.6 Particular mmcubic ft/year e matter, filterable < 10 Aµ (FPM10)	Cood Combustion Practices and us of Natural gas,a clean burning fuel.	se 0	19.11.B/H 0 AVERAGE OF THREE TESTS		BACT- PSD	U		FALSE			2	
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine with Duct Burner	16.210	Woodbridge Energy Center (WEC), Natural gas located at Riverside Drive in Woodbridge Torwnship (Middlesex County), New Jersey, 07095, will be a new 700 MW combined-cycle power generating facility. WEC will consist of two General Electric (GE) combusion turbine generators (CFICs) each with a maximum rated heat input of 2.307 million British thermal units per hour (MMBtuhr), Inst will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtuhr).	40297.6 Particulat mmcubic ftyear e mater, e mater, filterable < 2.5 Aµ (FPM2.5)	Good Combustion Practices and us of Natural gas, a clean burning fuel.	se 0	19.1 LB/H 0 AVERAGE OF THREE TESTS		OTHER CASE-BY- CASE	U		FALSE			2	19.1 LB/H A
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine with Duct Burner	16.210	Woodbridge Energy Center (WEC), Iocated at Riverside Drive in Woodbridge Torwnship (Mddeex County), New Jersey, 07055, will be a new 700 MW combined-cycle powre generating facility. WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) each with a maximum rated heat input of 2,307 million British thermal units per hour (MMBtu/hr), Ihat will utilize pipeline natura] gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	40297.6 Nitrogen mmcubic ft/year Oxides (NOX)	Low NOx burners and Selective Catalytic Reduction System	0	19.8 LB/H 2 PPM/VD 3 HF AVERAGE OF ROLLING AVE THREE 1- BASED ON 1- HOUR TESTS BLOCK AVE	IR IR	LAER	Y 77.000		FALSE			2	19.1 LD/H A
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine with Duct Burner	16.210	Woodbridge Energy Center (WEC). Natural gas located at Riverside Drive in Woodbridge Torwnship (Middeex County), New Jersey, 07065, will be a new 700 MW combined-cycle power generating facility. WEC will consist of two General Electric (GE) combustion turbine generators (CTGs) each with a maximum rade heat input of 2,307 million British thermal units per hour (MMBurhy), flat will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	40297.6 Volatile mmcubic ft/year ds (VOC)	oxidation Catalyst and Good Combustion Practices and use of Clean fuel (Natural gas)	0	2 PPMVD 3-HR 6.9 LB/H ROLLING AVERAGE OF AVERAGE MURACE OF BASED ON 1-HR BLK	2	LAER	U		FALSE			2	2 PPMVD 3-H
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine with Duct Burner	16.210	Woodbridge Energy Center (WEC). Natural gas located at Riverside Drive in Woodbridge Township (Middlesex County), New Jersey, 07056, will be a new YOO MW combined-cycle power generating facility. WEC will combisit of two Generate Electric (GE) combustion turbine generators (CTGs) each with a maximum rade heat input of 2.307 million British thermal units per hour (MMBurh); that will utilize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtuhr).	40297.6 Suffur mmcubic ft/year (SO2)	Good Combustion Practices and up of Natural gas, a clean burning fuel.	se 0	4.9.EM AVERACE O THREE TESTS		OTHER CASE-BY- CASE			FALSE			2	4.9 LB/H AV

								Standard			Case by	Estimated				Goo	d	
RBLC ID	Date	Facility Name & Location	Process	Process Type	Process Notes Primary Fuel	Throughput & Units Pollutant	t Control Method Description	Emission Limi & Units	t Emission Limit Emission 1 & Units 2 & Un	Limit its ppmv @ 15% O2 lb/MMBt	Case tu Basis	Other Factors %	Pollutant/ Compliance Notes Draft?	SCR	Water         DLN or         Efficienc         Use of the second	of Com 3 Prar	b Duplicate ct ? Emiss	sion Lim
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine with Duct Burner	16.210	Woodhridge Energy Centre (WEC). Natural gas located at Riverside Drive in Woodhridge Township (Middlesex County), New Jersey, 70785, will be a new 700 MW combined-cycle power generating facility. WEC will consist of two General Ellectric (GE) combustion turbine generators (CTGs) each with a maximum rade hat input of 2.307 million British thermal units per hour (MMBhurh), that will uitize pipeline natural gas only, with 2 HRSGs, 2 Duct Burners (each 500 MMbtu/hr).	40297.6 Particular mmcubic ft/year e matter, filterable (FPM)	Good Combustion Practices and us of Natural gas, a clean burning fuel.	9e 0	B.2.LB/H 0 AVERAGE OF THREE TESTS.		OTHER CASE-BY CASE	U	FALSE				2	B/H AV
NJ-0079	07/25/2012 ACT	CPV SHORE, LLC WOODBRIDGE ENERGY CENTER MIDDLESEX, NJ	Combined Cycle Combustion Turbine with Duct Burner	16.210	Woodhridge Energy Centrer (WEC). Natural gas located as Riverside Drive in Woodhridge Township (Middlesex County). New Jersey, 07085 will be a new 100 MW combined-cycle power generating facility. WEC will consist of two General Electric (CE) combuston turbine generators (CE) combuston turbine generators (CTGs) each with a maximum rated heat input of 2.30° (million British themal units per hour (MMBturhr), that will utilize pipeline natural gas orty, with 2 HRGs, 2 Duct Burners (each 500 MMbtu/hr).	40297.6 mmcubic ft/year Equivaler t (CO2e)	Good combustion practices	0	925 LBMW+H 0 BASED ON 12 MONTH + PERIOD, ROLLING 1 MNTH		BACT- PSD	U	FALSE			TRU	IE 1	
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines, inatural gas 2 duct burners and 1 auxiliary boller CC2e = 2.00.268 tryf or the facility (2 turbines, 2 duct burners and 1 auxiliary boller, 1 emergency generator and 1 fire pump)	39463 MMCubic Nitrogen ft/yr Oxides (NOx)	Selective Catalytic Reduction (SCR) System and use of natural gas a clean burning fuel	i) 0	0.75 LB/H 2 PPMVD 3 AVERAGE OF ROLLING 7 THREE TESTS BASED ON BLOCK AV	3-HR AVE I 1-HR E	LAER	U 90.000	FALSE				2 925 L	3/MW-H
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines, inatural gas 2 duct burners and 1 auxiliary boiler CC2ce = 2.000.268 tryfor the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	39463 MMCubic Carbon ft/yr Monoxide	Oxidation Catalyst and Good combustion Practices and use of natural gas a clean burning fuel	0	10.2 LB/H 2 PPMVD 3 AVERAGE OF ROLLING / THREE TESTS BASED ON BLOCK AV	3-HR AVE I 1-HR E	BACT- PSD	U 90.000	FALSE				0.75 L	B/H A
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines, inatural gas 2 duct burners and 1 auxiliary boller CO2e = 2,000,28 bly for the facility (2 turbines, 2 duct burners and 1 auxiliary boller, 1 emergency generator and 1 fire pump)	39463 MMCubic Particulat t/yr e matter, filterable < 10 ŵ (FPM10)	Use of natural gas a clean burning fuel	0	11 LB/H 0 AVERAGE OF THREE TESTS		BACT- PSD	U	FALSE				2 10.2 L	B/H A
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines, Inatural gas 2 duct burners and 1 auxiliary boiler CO2e = 2.00,28 tly for the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	39463 MMCubic Particulat ft/yr filterable < 2.5 ŵ (FPM2.5)	Use of Natural Gas a clean burning fuel	0	11 LB/H 0 AVERAGE OF THREE TESTS		N/A	U	FALSE				2	
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines, Inatural gas 2 duct burners and 1 auxiliary boiler CO2e = 2.00.28 tly for the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	39463 MMCubic Sulfur ft/yr Dioxide (SO2)	Use of natural gas a clean low sulfu fuel	ır 0	2.8 LB/H 0 AVERAGE OF THREE TESTS		N/A	U	FALSE				2	R/H AV
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines, Inatural gas 2 duct burners and 1 auxiliary boiler CO2e = 2.00.28 bit yro the facility (2 turbines, 2 duct burners and 1 auxiliary boiler, 1 emergency generator and 1 fire pump)	39463 MMCubic Volatile ft/yr Organic Compoun ds (VOC)	Oxidation Catalyst and Good combustion Practices and use of natural gas a clean burning fuel	0	2.9 LB/H 1 PPMVD 3 AVERAGE OF THREE TESTS ROLLING BASED ON BLOCK	3-HR I 1-HR	LAER	U	FALSE				2.9 LE	B/H AV
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined Cycle Combustion Turbine	16.210	Fuel: Annual throughput is for 2 turbines, natural gas 2 duct burnes and 1 auxiliary boller CO2e = 2,000,268 tlyr for the facility (2 turbines, 2 duct burners and 1 auxiliary boller, 1 emergency generator and 1 fire pump)	39463 MMCubic Particulat ft/yr e matter, filterable (FPM)	I Good combustion Practices and use of natural gas a clean burning fuel	e 0	6.6.1B/H 0 AVERAGE OF THREE TESTS		N/A	U	FALSE				2	R/H AV
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	r 16.210	* Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	39463 mmcubic Volatile ft/year* Organic Compoun ds (VOC)	Oxidation catalyst	0	1 PPMVD 3-HR 5.7 LB/H ROLLING AVERAGE AVERAGE THREE TE BASED ON 1-HR BLOCK	OF 1 STS	LAER		FALSE				2 1 PPN	иvd з-н
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	r 16.210	" Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	39463 mmcubic Particulat ft/year* e matter, filterable < 10 Åμ (FPM10)	Use of natural gas a clean burning fuel	0	13.2 LB/H 0 AVERAGE OF THREE TESTS		PSD	U	FALSE				2 13.2 L	∟B/H A
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	r 16.210	<sup>1</sup> Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	39463 mmcubic Particulat ft/year* e matter, filterable < 2.5 µ (FPM2.5)	Use of natural gas a clean burning fuel	0	13.2 LB/H 0 AVERAGE OF THREE TESTS		N/A	U	FALSE				2 13.2 L	∟B/H A
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	r 16.210	* Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	39463 mmcubic Carbon ft/year* Monoxide	Oxidation catalyst	0	2 PPMVD 3-HR 10.2 LB/H ROLLING AVERAGE AVERAGE THREE TE BASED ON 1-HR BLOCK	OF STS	BACT- PSD	U 90.000	FALSE				2 2 PPN	VIVD 3-H
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	r 16.210	Annual throughput is for 2 turbines, 2     duct burners and 1 auxiliary boiler	39463 mmcubic Nitrogen ft/year* Oxides (NOx)	SeleIctive catalytic reduction (SCR) system	0	2 PPMVD 3-HR 16.5 LB/H ROLLING AVERAGE AVERAGE THREE TE BASED ON 1-HR BLOCK	OF STS	LAER	U 90.000	FALSE				2 2 PPN	VVD 3-H
NJ-0080 NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	r 16.210 r 16.210	"Annual throughput is for 2 turbines, 2 [natural gas duct burners and 1 auxiliary boiler     "Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	139463 mmcubic Suffur fu/year* Dioxide (SO2) 39463 mmcubic Particulat fu/year* filterable ((FPM)	Use of natural gas, a clean low sulft fuel Use of natural gas a clean burning fuel	ur 0 0	2.5 LB/H 0 AVERAGE OF THREE TESTS 7.9 LB/H 0 AVERAGE OF THREE TESTS		N/A N/A	U	FALSE FALSE			_	2 2.5 LE 2	i/H AV
NJ-0080	11/01/2012 ACT	HESS NEWARK ENERGY CENTER, LLC HESS NEWARK ENERGY CENTER ESSEX, NJ	Combined cylce turbine with duct burner	r 16.210	* Annual throughput is for 2 turbines, 2 duct burners and 1 auxiliary boiler	39463 mmcubic Carbon ft/year* Dioxide Equivaler t (CO2e)	Good Combustion Practices	0	887 LB/MW-H 0 CONSCUTV 12 MONTH PERIOD ROLLING 1 MONTH		BACT- PSD	U CO2 Monil calculation	pred by CO2 CEMs, CH4 and Nitrous oxide monitored by FALSE			TRU	1 7.9 LE	/H AV
NY-0101	03/12/2008 ACT	CORNELL UNIVERSITY CORNELL COMBINED HEAT & POWER PROJECT TOMPKINS, NY	COMBUSTION TURBINES 1	16.210	COMBINED CYCLE WITH DUCT NATURAL GAS BURNERS AT 115 MMBTUHR EACH WITH TWO (2) DUCT BURNERS	155 MMBTU/H Particulat EACH e Matter (PM)	SULFUR IN GAS ASSIGNED MAX 1.2 GR/100 SCF; WORK PRACTICE TO MINIMIZE NHZ SLIP.	0	MONTH 6.5 LB/H ABOV 1 0.022 HOUR AVG LB/MMBTL ABOVE 1 H AVG W/DL FIRING	J HOUR ICT	BACT- PSD	U IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	FALSE				3 867 Li	3/MW-H
N		1	1	1		I	1	1						1			0.0 LB	

							Standard	1			C	ase by	Estima	ad				Good		
DDI G ID	Dette	Facility Manage 8 Lagrandian	P	Proces	S Deserve Notes Delever Field	Throughput &	Emission Lin	mit Emission Lin	mit Emission Limit		II. (MARCA)	Case	Efficier	Cy	Water	DLN or	Efficienc	Use of Comb	Duplicate	j Forda al an Almi
NY-0101	03/12/2008 ACT	CORNELL UNIVERSITY CORNELL	COMBUSTION TURBINES 1	16.210	COMBINED CYCLE WITH DUCT NATURAL GAS	155 MMBTU/H	Particulat SULFUR IN GAS ASSIGNED MAX 0	6.7 LB/H	0.023	ppmv @ 15% O2	ID/MMBtu BA	ACT- U	Other Factors %	Pollutant/ Compliance Notes	FALSE FALSE	SOLONOX	У	NG Pract	3	Emission Limit
		COMBINED HEAT & POWER			BURNERS AT 115 MMBTU/HR EACH WITH TWO (2) DUCT BURNERS	EACH	e matter, filterable PRACTICE TO MINIMIZE NHZ SLIP	ABOVE/BELC	DW LB/MMBTU ABOV/BELOW 1		PS	SD								
		TROJECT TOWN KING, WI					< 2.5 µ	THOURAG	HOUR AVG											
							(FPM2.5)		W/DUCT FIRING	6										
NY-0101	03/12/2008 ACT	CORNELL UNIVERSITY CORNELL	COMBUSTION TURBINES 1	16 210	COMBINED CYCLE WITH DUCT NATURAL GAS	155 MMBTU/H	Particulat SULFUR IN GAS ASSIGNED MAX 0	671B/H	0.023		BA	ACT.			FALSE	'	──┤		- 3	6.7 LB/H AB
141-0101	03/12/2000 ACT	COMBINED HEAT & POWER	COMBOSTION TONDINES T	10.210	BURNERS AT 115 MMBTU/HR EACH	EACH	e matter, 1.2 GR/100 SCF; WORK	ABOVE/BELC	DW LB/MMBTU		PS	SD			TALSE				5	
		PROJECT TOMPKINS, NY			WITH TWO (2) DUCT BURNERS		filterable PRACTICE TO MINIMIZE NHZ SLIP < 10 Åu	1 HOUR AVG	ABOVE/BELOW 1 HOUR AVG											
							(FPM10)		W/DUCT FIRING	6										
NY-0101	03/12/2008 ACT	CORNELL UNIVERSITY CORNELL	COMBUSTION TURBINES 2	16.210	TWO COMBUSTION TURBINES WITH NATURAL GAS	155 MMBTU/H	Sulfuric SULFUR IN GAS ASSUMED MAX 0.005	1.4 LB/H ABO	VE 1.5 LB/H		BA	ACT- U			FALSE		+ +		2	0.7 LB/H AB
		COMBINED HEAT & POWER PROJECT TOMPKINS NY			TWO DUCT BURNERS		Acid 1.2 GR/100 SCF LB/MMBTU (mist WITH DUCT	0F, 1 HOUR AVG	BELOW OF, 1 HOUR AVG		PS	SD								
							vapors, FIRING, 1 HO	UR	noonnoo											
NY-0101	03/12/2008 ACT	CORNELL UNIVERSITY CORNELL	COMBUSTION TURBINES 2	16.210	TWO COMBUSTION TURBINES WITH NATURAL GAS	155 MMBTU/H	etc) AVG Particulat SULFUR IN GAS ASSUMED MAX 10 % OPACIT	Y 3.9 LB/H ABO	VE 0.023		BA	ACT- U			FALSE		<u>├</u> ──┤		3	1.4 LB/H AB
		COMBINED HEAT & POWER			TWO DUCT BURNERS		e matter, 1.2 GR/100 SCF; WORK	O'F, 1 HOUR	LB/MMBTU NO		PS	SD								
							< 2.5 ŵ SLIP.	~~~	HOUR AVG											
							(FPM2.5)													
NV 0101	02/12/2008 ACT	CORNELL LINIVERSITY CORNELL	COMPLICTION TURPINES 2	16 210			Dertioulet SUILEUD IN CAS ASSUMED MAY 40.9/ ODACIT	V 2018/H	0.022		D.A	ACT			EALSE					3.9 LB/H AB
111-0101	03/12/2008 AC1	COMBINED HEAT & POWER	COMBUSTION TORBINES 2	10.210	TWO DUCT BURNERS	155 MIMB10/H	e Matter 1.2 GR/100 SCF; WORK	ABOVE/BELC	DW LB/MMBTU		PS	SD 0			PALSE				3	
		PROJECT TOMPKINS, NY					(PM) PRACTICE TO MINIMIZE NH3 SLIP	0F, 1 HOUR	WITH DUCT	2										
									AVG							'			'	3.9 LB/H AB
NY-0101	03/12/2008 ACT	CORNELL UNIVERSITY CORNELL COMBINED HEAT & POWER	COMBUSTION TURBINES 2	16.210	TWO DUCT BURNERS	155 MMB1U/H	e matter, 1.2 GR/100 SCF;WORK PRACTICE	Y 4.1 LB/H BELOW 0F, 1	LB/MMBTU NO		BA	ACT- U SD			FALSE				3	
		PROJECT TOMPKINS, NY					filterable TO MINIMIZE NH3 SLIP.	HOUR AVG	DUCT FIRING, 1	1										
							(FPM10)		HOURAVG											
NY-0101	03/12/2008 ACT	CORNELL UNIVERSITY CORNELL	COMBUSTION TURBINES 3	16.210	NATURAL GAS	155 MMBTU/H	Sulfuric SULFUR IN GAS ASSUMED MAX 0.001	0.24 LB/H	0.25 LB/H		BA	ACT- U			FALSE		+		2	4.1 LB/H BE
		COMBINED HEAT & POWER					Acid 1.2 GR/100 SCF LB/MMBTU N	O ABOVE 0'F, 1	BELOW 0'F, 1		PS	SD								
		PROJECT TOMPKINS, NY					vapors, DUCT FIRING	5, 1 HOUR AVG	HOUR AVG											
NV-0101	03/12/2008 ACT		COMBUSTION TURBINES 3	16 210	NATURAL GAS	155 MMRTU/H	etc) Particulat I II TRA LOW SULEUP DIESEL AT 20 % OPACIT	× 6318/HABO	VE 651 B/MMBTU		RA	ACT. U			EALSE	'	—		- 3	0.24 LB/H A
141-0101	03/12/2000 ACT	COMBINED HEAT & POWER	COMBOSTION TONDINES 5	10.210	NATURAL DAD	135 101011	e Matter 15 PPM; WORK PRACTICE TO	0'F, 1 HOUR	NO DUCT		PS	SD			TALSE				5	
		PROJECT TOMPKINS, NY					(PM) MINIMIZE NH3 SLIP.	AVG	FIRING, 1 HOUF AVG	2										6.3 LB/H AB
NY-0101	03/12/2008 ACT	CORNELL UNIVERSITY CORNELL	COMBUSTION TURBINES 3	16.210	NATURAL GAS	155 MMBTU/H	Particulat ULTRA LOW SULFUR DIESEL AT 0.04 LB/MMB	TU 6.3 LB/H ABO	VE 6.5 LB/H		BA	ACT- U		20 PERCENT OPACITY	FALSE				3	
		PROJECT TOMPKINS, NY					filterable MINIMIZE NH3 SLIP. FIRING, 1 HO	UF, 1 HOUR	HOUR AVG		PS	SD								
							< 10 µ AVG													
							(FFM10)									'			_	6.3 LB/H AB
NY-0101	03/12/2008 ACT	CORNELL UNIVERSITY CORNELL COMBINED HEAT & POWER	COMBUSTION TURBINES 3	16.210	NATURAL GAS	155 MMBTU/H	Particulat ULTRA LOW SULFUR DIESEL AT 0.04 LB/MMB' e matter. 15 PPM. WORK PRACTICE TO NO DUCT	TU 6.3 LB/H AVO 0'F. 1 HOUR	VE 6.5 LB/H BELWO 0'F. 1		BA	ACT- U SD		20 OPACITY	FALSE				3	
		PROJECT TOMPKINS, NY					filterable MINIMIZE NH3 SLIP. FIRING, 1 HO	UR AVG	HOUR AVG											
							< 2.5 Aµ AVG (FPM2.5)													
							( ,													0.01.00/1.01/
TX-0498	05/08/2006 ACT	SIGNAL HILLS SIGNAL HILLS	TURBINES (3)	16.210	NATURAL GAS	20 MW	Sulfur 0	0.06 LB/H	0.26 T/YR		BA	ACT- U			FALSE		+ +		1	0.3 LB/H AV
		WICHITA FALLS POWER LP WICHITA, TX					Dioxide (SO2)				PS	SD								0.06 LB/H
TX-0498	05/08/2006 ACT	SIGNAL HILLS SIGNAL HILLS	TURBINES (3)	16.210	NATURAL GAS	20 MW	Volatile 0	0.87 LB/H	3.83 T/YR		BA	ACT- U			FALSE				1	1
		WICHITA FALLS POWER LP WICHITA, TX					Compoun				PS	SD								
							ds (VOC)													0.87 I B/H
TX-0498	05/08/2006 ACT	SIGNAL HILLS SIGNAL HILLS	TURBINES (3)	16.210	NATURAL GAS	20 MW	Particulat 0	1.04 LB/H	4.57 T/YR		BA	ACT- U			FALSE				1	0.07 2011
		WICHITA FALLS POWER LP WICHITA, TX					e Matter (PM)				PS	SD								1.04 LB/H
TX-0498	05/08/2006 ACT	SIGNAL HILLS SIGNAL HILLS	TURBINES (3)	16.210	NATURAL GAS	20 MW	Carbon 0	32 LB/H	140 T/YR		BA	ACT- U			FALSE				1	
		WICHITA, TX					WORKAGE				10	00				'			_	32 LB/H
TX-0498	05/08/2006 ACT	SIGNAL HILLS SIGNAL HILLS WICHITA FALLS POWER LP	TURBINES (3)	16.210	NATURAL GAS	20 MW	Nitrogen 0 Oxides	52 LB/H	228 T/YR		BA	ACT- U SD			FALSE				1	
TV OFFA	00/00/0040 407	WICHITA, TX	Network One first Turkings	40.040	0.0iamana 0.0T0 00005 as 0.0E Farma Natural Ora	000 101	(NOx)	4.0004/0.0	1.0014/0.0			ACT II			54105	'		TDUE	'	52 LB/H
17-0001	02/03/20 TU AG I	PANDA SHERMAN POWER STATION	Natural Gas-neu Turbines	10.210	7FA. Both capable of combined or simple	OUU IVIVV	Organic Organic	15% O2, 3-HF	R 15% O2, 3-HR	1	PS	SD U			TALAE		1 1	IRUE		
		GRAYSON, TX			cycle operation. 468 MMBtu/hr duct		Compoun de (VOC)	AVG, SIMPLE	AVG,											
					bunois.		(((((((((((((((((((((((((((((((((((((((	CTOLE MODE	CYCLE MODE							'			_	1 PPMVD @ 1
TX-0551	02/03/2010 ACT	PANDA SHERMAN POWER LLC PANDA SHERMAN POWER STATION	Natural Gas-fired Turbines	16.210	2 Siemens SGT6-5000F or 2 GE Frame Natural Gas 7FA. Both capable of combined or simple	600 MW	Carbon Good combustion practices 0 Monoxide	4 PPMVD @ 15% O2.	15 PPMVD @ 15% 02, RLNG	4	BA	ACT- U SD			FALSE	1		TRUE	1	
		GRAYSON, TX			cycle operation. 468 MMBtu/hr duct			ROLLNG 24-H	HR 24-HR AVG,		10					'	1 1	.		1
					burners.			AVG, SIMPLE CYCLE	CYCLE											4 PPMVD @ 1
TX-0551	02/03/2010 ACT	PANDA SHERMAN POWER LLC	Natural Gas-fired Turbines	16.210	2 Siemens SGT6-5000F or 2 GE Frame Natural Gas	600 MW	Nitrogen Dry low NOx combustors and 0 Oxides Selective Catalytic Reduction	9 PPMVD @ 15% 02	2 PPMVD @ 15% 02 PLNC	9	BA	ACT- U SD		Simple Cycle mode bypasses SCR	FALSE				1	-
		GRAYSON, TX			cycle operation. 468 MMBtu/hr duct		(NOx)	ROLLNG 24-H	HR 24-HR AVG,		Pa					'	1 1	.		1
					burners.			AVG, SIMPLE CYCI F	COMBINED CYCLF							'	1 1	.		9 PPMVD @ 1
TX-0552	03/03/2010 ACT	STARK POWER GENERATION II	Natural gas-fired turbines	16.210	Project will be either 2 MHI501G gas natural gas	600 MW	Carbon Good combustion practices 0	10 PPMVD @	11 PPMVD @	10	BA	ACT- U			FALSE	-		TRUE	1	
		HOLDINGS, LLC WOLF HOLLOW POWER PLANT NO. 2 HOOD, TX			firing for each turbine or 2 GE 7FA gas		Monoxide	15% 02, ROLLING 3-H	IR ROLLING 3-HR		PS	50				1		.		
					turbines plus 570 MMBtu/hr duct burner			AVG, MHI501	G AVG, GE 7FA											
TX-0552	03/03/2010 ACT	STARK POWER GENERATION II	Natural gas-fired turbines	16.210	Project will be either 2 MHI501G gas natural gas	600 MW	Nitrogen Dry low NOx combustors plus 0	2 PPMVD @	9 PPMVD @	2	BA	ACT- U		Reduced load for GE 7FA is 50% of full load or less Reduced load for	FALSE	+'			1	
		HOLDINGS, LLC WOLF HOLLOW POWER PLANT NO 2 HOOD TX			turbines plus 230 MMBtu/hr duct burner firing for each turbine or 2 GE 7FA gas		Oxides selective catalytic reduction (NOx)	15% O2, ROLI ING 24-1	15% O2, HR ROLLING 3-HR		PS	SD		MHI501G is 60% of full load or less			1 1	.	1	
					turbines plus 570 MMBtu/hr duct burner			AVG, FULL	AVG, REDUCED							'	1 1	.		1
					Tiring for each turbine.			LOAD	LOAD							'				2 PPMVD @ 1
TX-0552	03/03/2010 ACT	STARK POWER GENERATION II	Natural gas-fired turbines	16.210	Project will be either 2 MHI501G gas turbines plus 230 MMBtu/hr duct humer	600 MW	Volatile Good combustion practices 0	4 PPMVD @	3 PPMVD @	4	BA	ACT- U SD			FALSE			TRUE	1	-
		POWER PLANT NO. 2 HOOD, TX			firing for each turbine or 2 GE 7FA gas		Compoun	AVG, MHI501	G AVG, GE 7FA		Pa					1	1 1	.		
					turbines plus 570 MMBtu/hr duct burner firing for each turbine		ds (VOC)									1	1 1	.		4 PPMVD @ 1
TX-0625	12/19/2012 ACT	NRG TEXAS POWER LLC WA	CO2 Capture Demonstration Unit	16.210	Up to 590,000 acfm of coal-fired boiler none	590000 acfm	Volatile proper design and operation, good 0	3.1 PPMV	0	3.1	LA	AER U		These are emissions from a CO2-stripped gas stream after it has pass	sed FALSE	+'			2	1
		STATION -DEMONSTRATION			exnaust is treated by an amine treatment system		Organic Isolvent maintenance, LDAR program Compoun							urrougn an amine absorber unit.		'	1 1	.		1
		PROJECT FORT BEND, TX					ds (VOC)										1 1	.		3.1 PPM/
TX-0625	12/19/2012 ACT	NRG TEXAS POWER LLC WA	Cogeneration turbine	16.210	General Electric (GE) Frame 7EA (or a natural gas	80 MW	Particulat good combustion and use of natural 0	16.58 LB/H 1	HR 0	+ +	BA	ACT- U			FALSE	+'	<b>⊢</b> −+		1	0.1111/11/
		PARISH ELECTRIC GENERATING STATION -DEMONSTRATION			similar sized unit), which is rated at a maximum base-load electric output of		e matter, gas total < 10				PS	SD					1 1	.	1	
		PROJECT FORT BEND, TX			approximately 80 megawatts (MW).		µ										1 1	.	1	
					INSG duct burner has a maximum heat input capacity of 225 million British		(TPM10)										1	.	1	
					thermal units per hour (MMBtu/hr) based												1 1	.	1	
					fuel fired. The steam will be used for the												1 1	.	1	
					regeneration of the Demonstration Unit											1	1 1	.		
		1														1	1	. 1		16.58 LB/H

BACT Analysis: RBLC Seach Parameters: RBLC Search Date: Small Natural Gas, Combined Cycle Turbines

1.020 000				1				Standard			Case by		Estimated								Good		
RBLC ID	Date	Facility Name & Location	Process	Proces	s Process Notes Primary Fuel	Throughpu Units	It & Pollutant Control Method Description	Emission Limit & Units 1 & Units	Emission Limit	O2 Ib/MMBtu	Case Basis	Other Factors	Efficiency	Pollutant/ Complianc	e Notes	Draft? SC	Water R Injectio	r on OxCat	DLN or Efficient	anc Use of	Comb I Pract	Duplicate	Emission Limi
TX-0625	12/19/2012 ACT	INEG TEXAS POWER LLC WA PARISH ELECTRIC GENERATING STATION -DEMONSTRATION PROJECT FORT BEND, TX	Cogeneration turbine	16.210	Ceneral Electric (CE) Franze TEA (or a natural gas similar sized unit), which is rated at a maximum base-load electric output of approximately 80 megavatel (KWV), HRSG duct burner has a maximum heat input capacity of 225 million British thermal units per hour (MMBtuhr) based on the high heating value (HHV) of the fuel fired. The steam will be used for the regeneration of the Demonstration Unit solvent.	80 MW	Particular good combustion and use of natural e matter, gas total < 2,5 Au (TPM2.5)	0 16.58 LB/H 1 HR	0		BACT- U PSD		~~~~~	- course company		FALSE						1	16.58 LB/H
TX-0625	12/19/2012 ACT	NRG TEXAS POWER LLC WA PARISH ELCRITIC GENERATING STATION -DEMONSTRATION PROJECT FORT BEND, TX	Cogeneration turbine	16.210	General Electric (GE) Frame 7EA (or a similar sized unit), which is rated at a maximum base-load electric output of approximately 80 megavatels (WM), HRSG duct burner has a maximum heat input capacity of 225 million Birtish thermal units per hour (MMBstuhr) based on the high heating value (HHV) of the fuel find. The steam will be used for the regeneration of the Demonstration Unit solvent.	80 MW	Nitrogen DLN combusters on the turbine and Oxides selective catalytic reduction (SCR) (NOx)	0 2 PPM/D 3-HR ROLLING AVG, AT 15% OXYGEN	0	2	LAER U					FALSE						1	2 PPMVD 3-H
TX-0625	12/19/2012 ACT	INRG TEXAS POWER LLC WA PARISH ELECTRIC GENERATING STATION -DEMONSTRATION PROJECT FORT BEND, TX	Cogeneration turbine	16.210	Ceneral Electric (GE) Frame 7EA (or a initial sized unit), which is rated at a maximum base-load electric output of approximately 80 megavatel (WW), HRSG duct burner has a maximum heat input capacity of 225 million British thermal units per hour (MMBtuhr) based on the high heating value (HHV) of the fuel fired. The steam will be used for the regeneration of the Demonstration Unit solvent.	80 MW	Volatie oxidation catalyst Organic Compoun ds (VOC)	0 2 PPAVD INITIAL STACK TEST	0	2	LAER U					FALSE						2	
TX-0625	12/19/2012 ACT	INEG TEVAS POWER LLC WA PARISH ELECTRIC GENERATING STATION -DEMONSTRATION PROJECT FORT BEND, TX	Cogeneration turbine	16.210	General Electric (GE) Frame 7EA (or a natural gas similar sized unit), which is rated at a maximum base-load electric output of approximately 80 magawatts (NW). HRSG duck burner has a maximum heat input capacity of 22m Rillion British thermal units per hour (MMBturh) based on the high heating value (HHV) of the lue lifed. The same will be used for the regeneration of the Demonstration Unit solvent.	80 MW	Carbon Monoxide	0 4 PPM/ID 24 HB ROLLING, AT 15% OXYGEN	0	4	BACT- U PSD					FALSE						1	
TX-0704	12/02/2014 ACT	M & G RESINS USA LLC UTILITY PLANT NUECES, TX	cogeneration turbine	16.210	General Electric LM6000 natural gas-fired natural gas combustion turbine equipped with lean pre-mix (ow-NOx combustors. One heat recovery steam generator (HRSG) with 263 million British hermal units per hour (MMBu/hr) natural gas-fired duct burner system containing a selective catalytic reduction system (SCR)	49 MW	Particulat e matter, total < 2.5 ŵ (TPM2.5)	0 0	0		BACT- N PSD		natu	ral gas fuel, includes PM and PM10		FALSE						1	0
TX-0704	12/02/2014 ACT	M & G RESINS USA LLC UTILITY PLANT NUECES, TX	cogeneration turbine	16.210	Ceneral Electric LM6000 natural gas-fired natural gas combustion turbine equipped with lean pre-mix low-NOx combustors. One heat recovery steam generator (HRSG) with 263 million British thermal units per hour (MMBuhr) natural gas-fired duct burner system containing a selective catalytic reduction system (SCR)	49 MW	Nitrogen Selective Catalytic Reduction Oxides (NOx)	0 2 PPMVD @15% O2, 24-HR ROLLING AVERAGE	0	2	BACT- N PSD					FALSE TRU	JE					1	2 PPMVD @15
TX-0704	12/02/2014 ACT	M & G RESINS USA LLC UTILITY PLANT NUECES, TX	cogeneration turbine	16.210	Ceneral Electric LM6000 natural gas-fired natural gas combustion turbine equipped with lean pre-mix low-NOx combustors. One heat recovery steam generator (HRSG) with 263 million British thermal units per hour (MMBuhr) natural gas-fired duct burner system containing a selective catalytic reduction system (SCR)	49 MW	Carbon oxidation catalyst Monoxide	0 4 PPMVD @15% O2, 24-HR ROLLING AVERAGE	0	4	BACT- N PSD					FALSE						1	4 PPMVD @15
TX-0704	12/02/2014 ACT	M & G RESINS USA LLC UTILITY PLANT NUECES, TX	oogeneration turbine	16.210	General Electric LM6000 natural gas-fired natural gas combustion turbine equipped with lean pre-mix low-NOX combustors. One heat recovery steam generator (HRSG) with 263 million British thermal units per hour (MMBuhr) natural gas-fired duct burner system containing a selective catalytic reduction system (SCR)	49 MW	Volatile oxidation catalyst Organic Compoun ds (VOC)	0 4 PPM/D @15% O2, 24-HR ROLLING AVERAGE	0	4	BACT- N PSD					FALSE						1	4 PDM//D @15
TX-0737	12/21/2012 ACT	NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	Combined cycle combustion turbine	16.210	GE 74A turbine, 235 million British Inatural gas hermal units per hour duct burner. Stean created in the heat recovery steam generator will be used as process steam.	80 MW	Particulat e matter, total < 2.5 ŵ (TPM2.5)	0 0	0		BACT- N PSD		Natu and	ral gas as fuel and good combustion p PM10.	ractices. This includes PM	FALSE						1	0
TX-0737	12/21/2012 ACT	NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	Combined cycle combustion turbine	16.210	GE 7EA turbine, 225 million British thermal units per hour duc burner. Stean created in the heat recovery steam generator will be used as process steam.	80 MW	Volatile Oxidation catalyst Organic Compoun ds (VOC)	0 2 PPMVD @ 15% O2	0	2	LAER N					FALSE						1	2 PPMVD @ 1
TX-0737	12/21/2012 ACT	NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	Combined cycle combustion turbine	16.210	GE 7EA turbine, 225 million British thermal units per hour duct burner. Stean created in the heat recovery steam generator will be used as process steam.	80 MW	Nitrogen Selective catalytic reduction Oxides (NOx)	0 2 PPMVD @ 15% O2 3-HR AVERAGE	0	2	LAER N					FALSE TRU	JE					1	2 PPMVD @ 1
TX-0737	12/21/2012 ACT	NRG TEXAS POWER LLC W. A. PARISH ELECTRIC GENERATING STATION FORT BEND, TX	Combined cycle combustion turbine	16.210	GE 72A turbine, 225 million British Inatural gas thermal units per hour duck burner. Stean created in the heat recovery steam generator will be used as process steam.	80 MW	Carbon Oxidation catalyst Monoxide	0 4 PPMVD @ 15% O2 24-HR AVERAGE	0	4	BACT- N PSD					FALSE						1	
WY-0067	04/01/2009 ACT	WILLIAMS FIELD SERVICES COMPANY ECHO SPRINGS GAS	TURBINE S37	16.210	12,555 HP SOLAR MARS100-15000S NATURAL GAS OR 16,162 HP SOLAR TITAN 130-	16162 HP	Nitrogen GOOD COMBUSTION PRACTICES Oxides	5 0 15 PPMV	32.1 T/YR 1	15	BACT- N PSD		BAS	ELINE		FALSE				T	TRUE	1	46 00101
WY-0067	04/01/2009 ACT	PLANT CARBON, WY WILLIAMS FIELD SERVICES COMPANY ECHO SPRINGS GAS PLANT CARBON, WY	TURBINE S37	16.210	2002/25 IURBINE 12,555 HP SOLAR MARS100-15000S NATURAL GAS OR 16,162 HP SOLAR TITAN 130- 20502S TURBINE	16162 HP	(NUX) Carbon GOOD COMBUSTION PRACTICES Monoxide	3 0 25 PPMV	32.5 T/YR 2	25	BACT- N PSD		BAS	ELINE		FALSE					TRUE	1	15 PPMV 25 PPMV
WY-0067	04/01/2009 ACT	WILLIAMS FIELD SERVICES COMPANY ECHO SPRINGS GAS PLANT CARBON, WY	TURBINE S37	16.210	12.555 HP SOLAR MARS100-15000S NATURAL GAS OR 16.162 HP SOLAR TITAN 130- 20502S TURBINE	16162 HP	Volatile  GOOD COMBUSTION PRACTICES Organic Compoun ds (VOC)	s  0 25 PPV	3.7 f/YR		BACT- PSD		BAS	ELINE		FALSE					TRUE	1	25 PPV

BACT Analysis: RBLC Seach Parameters: RBLC Search Date:

rameters: LNG Facilities from 1/1/2010 to 12/31/2015

				Process			Throughput &			Standard Emission Limit	Emission Limit	Emission Limit	Case by Case		Estimated Efficiency	
RBLC ID	Date	Facility Name & Location	Process	Туре	Process Notes	Primary Fuel	Units	Pollutan	Control Method Description	& Units	1 & Units	2 & Units	Basis	Other Factors	%	Pollutant/ Compliance Notes
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Particulat e matter, total (TPM)	Good combustion practices and fueled by natural gas	0	2.08 LB/H HOURLY MAXIMUM	0	BACT- L PSD	J		also for PM10 and PM2.5
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Volatile Organic Compour ds (VOC)	Good combustion practices and fueled by natural gas	0	0.66 LB/H HOURLY MAXIMUM	0	BACT- L PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Nitrogen Oxides (NOx)	water injection	20 PPMV AT 15% O2	22.94 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Carbon Monoxide	Good combustion practices and fueled by natural gas	58.4 PPMV AT 15% OXYGEN	43.6 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Carbon Dioxide Equivaler t (CO2e)	Good combustion/operating practices and fueled by natural gas - use GE LM2500+G4 turbines	0	4872107 TONS/YR ANNUAL MAXIMUM FROM THE FACU UTYWIDE	0	BACT- U PSD	J		CO2(e)
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Particulat e matter, total (TPM)	Good combustion practices and fueled by natural gas	0	2.08 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		also for PM10 and PM2.5
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Volatile Organic Compour ds (VOC)	Good combustion practices and fueled by natural gas	0	0.66 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Nitrogen Oxides (NOx)	water injection	25 PPMV AT 15% O2	28.68 LB/H HOURLY MAXIMUM	0	BACT- L PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Carbon Monoxide	Good combustion practices and fueled by natural gas	25 PPMV AT 15% O2	17.46 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Carbon Dioxide Equivaler t (CO2e)	Good combustion/operating practices and fueled by natural gas - use GE LM2500+G4 turbines	0	4872107 TONS/YR ANNUAL MAXIMUM FROM THE FACILITYWIDE	0	BACT- U PSD	J		CO2(e)
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Particulat e matter, total (TPM)	Good combustion practices and fueled by natural gas	0	2.08 LB/H HOURLY MAXIMUM	0	BACT- L PSD	J		also for PM10 and PM2.5
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Volatile Organic Compour ds (VOC)	Good combustion practices and fueled by natural gas	0	0.66 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Nitrogen Oxides (NOx)	water injection	20 PPMV AT 15% O2	22.94 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Carbon Monoxide	Good combustion practices and fueled by natural gas	58.4 PPMV AT 15% O2	43.6 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Carbon Dioxide Equivaler t (CO2e)	Good combustion/operating practices and fueled by natural gas - use GE LM2500+G4 turbines	0	4872107 TONS/YEAR ANNUAL MAXIMUM FROM THE FACILITYWIDE	0	BACT- U PSD	J		co2(e)

BACT Anal RBLC Seac RBLC Sear	/sis: h Parameters: ch Date:	Production Facilities								-					
				Process			Throughput	&		Standard Emission Limit	Emission Limit	Emission Limit	Case by Case		Estimated Efficiency
RBLC ID AK-0081	Date 06/12/2013 ACT	Facility Name & Location EXXONMOBIL CORPORATION POINT THOMSON PRODUCTION FACILITY NORTH SLOPE BOROUGH, AK	Combustion	16.110	Process Notes Solar Turbine with SoLoNOx	Primary Fuel Natural Gas	7520 kW	Pollutan Particula e matter, total < 2. B5 (TPM2.5	t Control Method Description Good combustion and operating practices	0 0	1 & Units 0.0066 LB/MMBTU	2 & Units 0	Basis OTHER CASE-BY- CASE	Other Factors	Kernel Compliance Notes     Emission limit based on AP-42,     Table 3.1-2a
AK-0081	06/12/2013 ACT	EXXONMOBIL CORPORATION POINT THOMSON PRODUCTION FACILITY NORTH SLOPE BOROUGH, AK	Combustion	16.110	Solar Turbine with SoLoNOx	Natural Gas	7520 kW	Carbon Dioxide Equivale	Good Combustio and Operating Practices	0	0	0	OTHER CASE-BY- CASE	U	
AK-0074	07/29/2011 ACT	BP EXPLORATION (ALASKA) ENDICOTT PRODUCTION FACILITY NORTH SLOPE BOROLIGH, AK	Combustion	16.150	Small simple cycle turbines burning fuel gas	Fuel Gas	8717 hp	Sulfur Dioxide	Concentration of hydrogen sulfide in fuel gas shall not excced 1,000 ppmv	0	1000 PPMV AT ANY TIME	0	BACT- PSD	U	
AK-0074	07/29/2011 ACT	BP EXPLORATION (ALASKA) ENDICOTT PRODUCTION FACILITY	Combustion	16.150	Small simple cycle combustion turbines burning fuel gas	Fuel Gas	5400 hp	Sulfur Dioxide	Limit hydrogen sulfide in fuel gas to no more than 1000 ppmv	0	1000 PPMV ANY TIME	0	BACT- PSD	U	
AK-0076	08/20/2012 ACT	EXXON MOBIL CORPORATION POIN THOMSON PRODUCTION FACILITY NORTH SLOPE, AK	Combustion of Fuel Gas	16.150	7.52 MW with Dry Low NOx and SoLoNOx Technology burning natural gas on the North Slope of Alaska, north of the Artic Circle	Fuel Gas	7520 kW	Nitrogen Oxides (NOx)	Dry Low NOx and SoLoNOx. DLN combustors utilize multistage premix combustors utilize multistage premix mixed at a lean fuel to air ratio. The excess air in the lean mixture acts as a heat sink, which lowers peak combustion temperatures and also ensures a more homogeneous mixture, both resulting in greatly reduced NOX formation rates. SoLoNOx is a lean premixed process which improves combustion efficiency and reduce NOx and particulate emissions.	0	15 PPMV 15 PERCENT OXYGEN	0	BACT- PSD	Ŷ	DLN and SoLoNOx are now basic in the industry
AK-0076	08/20/2012 ACT	EXXON MOBIL CORPORATION POIN THOMSON PRODUCTION FACILITY NORTH SLOPE, AK	Combustion of Fuel Gas	16.150	7.52 MW with Dry Low NOx and SoLoNOx Technology burning natural gas on the North Slope of Alaska, north of the Artic Circle	Fuel Gas	7520 kW	Carbon Monoxid	SCR (Selective Catalytic Reduction) is a post-combustion gas treatment technique for reduction of nitric oxide (NO) and nitrogen dioxide (NO2) in the turbine exhaust stream to molecular nitrogen, water, and oxygen. This process is accomplished by using ammonia (NH3) as a reducing agent, and is injected into the flue gas upstream of the catalyst bed. By lowering the activation energy of the NOX decomposition removal efficiency of 80 to 90 percent are achievable.	0	2.5 PPMV 15% OXYGEN	0	BACT- PSD	υ	85.000
AK-0076	08/20/2012 ACT	EXXON MOBIL CORPORATION POIN THOMSON PRODUCTION FACILITY NORTH SLOPE, AK	Combustion of Fuel Gas	16.150	7.52 MW with Dry Low NOx and SoLoNOx Technology burning natural gas on the North Slope of Alaska, north of the Artic Circle	Fuel Gas	7520 kW	Particula e matter, filterable < 2.5 B5		0	0.0066 LB/MMBTU	0	BACT- PSD	U	
AK-0076	08/20/2012 ACT	EXXON MOBIL CORPORATION POIN THOMSON PRODUCTION FACILITY NORTH SLOPE, AK	Combustion of Fuel Gas	16.150	7.52 MW with Dry Low NOx and SoLoNOx Technology burning natural gas on the North Slope of Alaska, north	Fuel Gas	7520 kW	Carbon Dioxide	DLN with inlet heating and good combustion practices	0	0	0	BACT- PSD	U	
AK-0077	06/26/2012 ACT	BP EXPLORATION ALASKA INCORPORATED NORTHSTAR PRODUCTION FACILITY NORTH	Combustion of Fuel Gas by Turbines < 25 MW	16.150	Turbines < 25 MW, no waste recovery	Fuel Gas	24 MW	Sulfur Dioxide (SO2)	H2S content of fuel gas shall not exceed 300 ppmv at any time	0	300 PPMV H2S CONTENT OF FUEL GAS	0	BACT- PSD	U	
AK-0082	01/23/2015 ACT	EXXON MOBIL CORPORATION POIN THOMSON PRODUCTION FACILITY USA, AK	r Turbines	16.150	Four 7.52 MW Solar Turbines with SoLoNOx Technology burning natural gas on the North Slope of Alaska, north of the Artic Circle. Two of the turbines ar dual fired units that can combust ULSD as well as Fuel Gas	Fuel Gas	7520 kW	Nitrogen Oxides (NOx)	Dry Low NOx and SoLoNOx. DLN combustors utilize multistage premix combustors where the air and fuel is mixed at a lean fuel to air ratio. The excess air in the lean mixture acts as a heat sink, which lowers peak combustion temperatures and also ensures a more homogeneous mixture, both resulting in greatly reduced NOX formation rates. SoLoNOx is a lean premixed process which improves combustion efficiency and reduce NOx and particulate emissions.	0	15 PPMV 15% OXYGEN	0	BACT- PSD	Y	
AK-0082	01/23/2015 ACT	EXXON MOBIL CORPORATION POIN THOMSON PRODUCTION FACILITY USA, AK	T Turbines	16.150	Four 7.52 MW Solar Turbines with SoLoNOx Technology burning natural gas on the North Slope of Alaska, north of the Artic Circle. Two of the turbines ar dual fired units that can combust ULSD as well as Fuel Gas	Fuel Gas	7520 kW	Carbon Monoxid	SCR (Selective Catalytic Reduction) is a post-combustion gas treatment technique for reduction of nitric oxide (NO) and nitrogen dioxide (NO2) in the turbine exhaust stream to molecular nitrogen, water, and oxygen. This process is accomplished by using ammonia (NH3) as a reducing agent, and is injected into the flue gas upstream of the catalyst bed. By lowering the activation energy of the NOX decomposition removal efficiency of 80 to 90 percent are achievable.	0	2.5 PPMV 15% OXYGEN	0	BACT- PSD	υ	85.000

# BACT Analysis: RBLC Seach Parameters:

Production Facilities

RBLC Searc	ch Date:									—			
RBI C ID	Date	Facility Name & Location	Proce	Process SS Type	Process Notes	Primary Fuel	Throughput &	Pollutant	Control Method Description	Standard Emission Limit & Units 1 & Units	Emission Limit Case by	Other Factors	Pollutant/ Compliance Notes
AK-0082	01/23/2015 ACT	EXXON MOBIL CORPORATION POINT THOMSON PRODUCTION FACILITY USA, AK	Turbines	16.150	Four 7.52 MW Solar Turbines with SoLoNOx Technology burning natural gas on the North Slope of Alaska, north of the Artic Circle. Two of the turbines an dual fired units that can combust ULSD as well as Fuel Gas	Fuel Gas	7520 kW	Particulat e matter, filterable < 2.5 B5 (FPM2.5)	Control method beschpilon	0 0.066 LB/MMBTU	Jo BACT- PSD	U	
AK-0082	01/23/2015 ACT	EXXON MOBIL CORPORATION POINT THOMSON PRODUCTION FACILITY USA, AK	Turbines	16.150	Four 7.52 MW Solar Turbines with SoLoNOx Technology burning natural gas on the North Slope of Alaska, north of the Artic Circle. Two of the turbines an dual fired units that can combust ULSD as well as Fuel Gas	Fuel Gas	7520 kW	Particulat e matter, filterable < 10 B5 (FPM10)		0 0.0066 LB/MMBTU	0 BACT- PSD	U	
AK-0082	01/23/2015 ACT	EXXON MOBIL CORPORATION POINT THOMSON PRODUCTION FACILITY USA, AK	Turbines	16.150	Four 7.52 MW Solar Turbines with SoLoNOx Technology burning natural gas on the North Slope of Alaska, north of the Artic Circle. Two of the turbines an dual fired units that can combust ULSD as well as Fuel Gas	Fuel Gas	7520 kW	Volatile Organic Compoun ds (VOC)		0 2.5 PPMV	0 BACT- PSD	U	
AK-0082	01/23/2015 ACT	EXXON MOBIL CORPORATION POINT THOMSON PRODUCTION FACILITY USA, AK	Turbines	16.150	Four 7.52 MW Solar Turbines with SoLoNOx Technology burning natural gas on the North Slope of Alaska, north of the Artic Circle. Two of the turbines an dual fired units that can combust ULSD as well as Fuel Gas	Fuel Gas	7520 kW	Carbon Dioxide Equivalen t (CO2e)		0 89336 TONS/YEAR	0 BACT- PSD	U	

GHG RBLC Flare

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	Date	Facility Name & Location	Process	Process	Process Notas	Primary Fuel	Throughput &	Pollutant	Control Method Description	Standard Emission Limit	Emission Limit	Emission Limit	Case by Case Basis	Other Eactors	nated iency // Pollutant/ Compliance Notes
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FRONT END FLARE	19.310	SSM VENTING IS LIMITED TO 336 HOURS PER YEAR. HEAT INPUT OF 4 MMBTU/HR IS FOR PILOT ONLY.	NATURAL GAS	4 MMBTU/H	Carbon Dioxide	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0	116.89 LB/MMBTU 3-HF AVERAGE	511.81 TON/H, SSM VENTING : HR AVERAGE	BACT- B-PSD	N	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	BACK END FLARE	19.310	SSM VENTING SHALL NOT EXCEEDD 336 HOURS PER YEAR. HEAT INPUT IS PILOT ONLY.	NATURAL GAS	4 MMBTU/H	Carbon Dioxide	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0	116.89 LB/MMBTU 3-HF AVERAGE	127.12 LB/H, R SSM VENTING : HR AVERAGE	BACT- 3-PSD	N	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	AMMONIA STORAGE FLARE	19.310	HEAT INPUT IS FOR PILOT ONLY. SSI EMISSIONS HAVE SEPARATE LIMITS. SSM VENTING LIMITED 168 HOURS.	INATURAL GAS	1.5 MMBTU/H	Carbon Dioxide	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0	116.89 LB/MMBTU 3-HF AVERAGE	0 २	BACT- PSD	N	
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FRONT END FLARE	19.310	SSM VENTING IS LIMITED TO 336 HOURS PER YEAR. HEAT INPUT OF 4 MMBTU/HR IS FOR PILOT ONLY.	NATURAL GAS	4 MMBTU/H	Carbon Dioxide	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0	116.89 LB/MMBTU 3-HF AVERAGE	511.81 TON/H, SSM VENTING : HR AVERAGE	BACT- 3-PSD	N	
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	BACK END FLARE	19.310	SSM VENTING SHALL NOT EXCEEDD 336 HOURS PER YEAR. HEAT INPUT IS PILOT ONLY.	NATURAL GAS	4 MMBTU/H	Carbon Dioxide	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0	116.89 LB/MMBTU 3-HF AVERAGE	127.12 LB/H, SSM VENTING 3 HR AVERAGE	BACT- 3-PSD	N	
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	AMMONIA STORAGE FLARE	19.310	HEAT INPUT IS FOR PILOT ONLY. SSI EMISSIONS HAVE SEPARATE LIMITS. SSM VENTING LIMITED 168 HOURS.	NATURAL GAS	1.5 MMBTU/H	Carbon Dioxide	NATURAL GAS PILOT, FLARE MINIMIZATION PRACTICES	0	116.89 LB/MMBTU 3-HF AVERAGE	Q R	BACT- PSD	N	
*TX-0638	10/12/2012 ACT	ENTERPRISE PRODUCTS OPERATING LLC MONT BELVIEU COMPLEX CHAMBERS, TX	Flare	19.390	Flare, EPA: SK25.001		0	Carbon Dioxide		0	62494 T/PY 12- MONTH ROLLING BASIS	0	BACT- PSD	U	Use Good Combustion Practices
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Marine Flare	19.390		natural gas	1590 MMBTU/H	Carbon Dioxide Equivalen t (CO2e)	proper plant operations and maintain the presence of the flame when the gas is routed to the flare	0	2909 TONS/YR ANNUAL MAXIMUM	0	BACT- PSD	U	CO2(e)
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Wet/Dry Gas Flares (4)	19.390		natural gas	0.26 MMBTU/H	Carbon Dioxide Equivalen t (CO2e)	proper plant operations and maintain the presence of the flame when the gas is routed to the flare	0	133 TONS/YR ANNUAL MAXIMUM	0	BACT- PSD	U	CO2(e)

## BACT Analysis: RBLC Seach Parameters: RBLC Search Date:

GHG RBLC Heaters Boilers

				_						Standard		<b></b>	Case by		Estimated	I
	Data	Facility Name & Location	Process	Process	Process Notes	Primary Fuel	Throughput 8	Bollutan	t Control Method Description	Emission Limit	Emission Limit	Emission Limit	Case	Other Factors	Efficiency %	/ Bollutant/ Compliance Notes
*TX-0638	10/12/2012 ACT	ENTERPRISE PRODUCTS OPERATING LLC MONT BELVIEU COMPLEX CHAMBERS, TX	2 Regenerant Heaters	15.110	2 Regenerant Heaters (Combustion Units). Each unit has a maximum design beat input rate of28.5 MMBTU/HR and fired with natural gas, tired with natural gas. HR15.002A and HR15.002B.	Filling Fuel	28.8	Carbon Dioxide		0	14858 T/YR 12- MONTH ROLLING BASIS	0	BACT- PSD	U	70	Minimum Thermal Efficiency of 85%. The emission rate is for each of the two regenerant heaters.
*TX-0638	10/12/2012 ACT	ENTERPRISE PRODUCTS OPERATING LLC MONT BELVIEU COMPLEX CHAMBERS, TX	Hot Oil Heaters	12.310	2 Hot Oil Heaters (Combustion Unit). HRI5.001A and HR1 5.001B Each unit has a maximum design heat input rate of 140 MMBTU/HR, and is fired with natura gas.	Natural Gas f I	140 MMBTU/H	Carbon Dioxide		0	72987 T/YR 12- MONTH ROLLING BASIS	0	BACT- I PSD	υ		Minimum Thermal Efficiency of 85%. Permittee shall calculate, on a monthly basis, the amount of C02 emitted from combustion in tons/yr using equation C-2a in 40 CPR Part 98 Subpart C, converted to short tons. The emission rate is for each of the two heaters.
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	REFORMER FURNACE	11.310		NATURAL GAS, PROCESS GAS	950.64 MMBTU/H	Carbon Dioxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	59.61 T/MMCF 3 HR AVERAGE	- 486675 TON CO2/YR MONTHLY	BACT- I PSD	N		80% THERMAL EFFICIENCY BASED ON HIGHER HEATING VALUE.
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	Carbon Dioxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	59.61 T/MMCF 3 HR AVERAGE	- 0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	IN MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	Carbon Dioxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	59.61 TON/MMCF 3- HR AVERAGE	0	BACT- I PSD	N		
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 AUXILLARY BOILERS	11.390	TWO BOILERS AT 435 MMBTU/HR EACH. BOILERS EQUIPPED WITH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, LOW-NOX BURNERS, CATALYTIC OXIDIZER, AND BURN 100 PERCENT PROCESS GAS DURING NORMAL OPERATIONS	PROCESS GAS	435 MMBTU/H	Carbon Dioxide Equivaler t (CO2e)	EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS DURING NORMAL OPERATION, EFFICIENT BOILER DESIGN AND GOOD COMBUSTION PRACTICES	0	117 LB/MMBTU (AS CO2E) 3- HOUR BLOCK AVERAGE	0	BACT- PSD			
*TX-0638	10/12/2012 ACT	ENTERPRISE PRODUCTS OPERATING LLC MONT BELVIEU COMPLEX CHAMBERS, TX	2 Regenerant Heaters	15.110	2 Regenerant Heaters (Combustion Units). Each unit has a maximum design beat input rate of28.5 MMBTU/HR and fired with natural gas, tired with natural gas. HR15.002A and HR15.002B.		28.8	Carbon Dioxide Equivaler t (CO2e)	1	0	14872 T/PY 12- MONTH ROLLING BASIS	0	BACT- I PSD	U		The emission rate is for each of the two regenerant heaters.
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Auxiliary boiler	13.310		natural gas	39.8 MMBtu/hr	Carbon Dioxide Equivaler	Clean fuels	0	117 LB CO2/MMBTU 3- HR BLOCK AVERAGE	0	BACT- I PSD	U		
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Auxiliary boiler	13.310		natural gas	39.8 MMBtu/hr	Carbon Dioxide Equivaler	Clean fuels	0	117 LB CO2/MMBTU 3- HR BLOCK AVERAGE	0	BACT- I PSD	U		
*TX-0758	08/01/2014 ACT	INVENERGY THERMAL DEVELOPMENT LLC ECTOR COUNTY ENERGY CENTER ECTOR, TX	Dew-Point Heater	13.310		Natural Gas	9 MMBtu/hr	Carbon Dioxide Equivalei t (CO2e)		0	2631 TPY CO2E 12-MONTH ROLLING TOTAI	0	BACT- I PSD	υ		Not to exceed 5000 hrs per year on a 12-month rolling basis. The permittee shall install and maintain the gas-fired dew point heater to ensure a minimum thermal efficiency of 75%. The gas-fired dew point heater will be continuously monitored for exhaust temperature, input fuel temperature, and stack oxygen. Thermal efficiency for the heaters will be calculated monthly from these parameters using equation G-1 from American Petroleum Institute (API) methods 560 (4th ed.) Annex G.
*TX-0638	10/12/2012 ACT	ENTERPRISE PRODUCTS OPERATING LLC MONT BELVIEU COMPLEX CHAMBERS, TX	Hot Oil Heaters	12.310	2 Hot Oil Heaters (Combustion Unit). HRI5.001A and HR1 5.001B Each unit has a maximum design heat input rate of 140 MMBTU/HR, and is fired with natura gas.	Natural Gas	140 MMBTU/H	Carbon Dioxide Equivaler t (CO2e)		0	73058 T/YR 12- MONTH ROLLING BASIS	0	BACT- PSD	U		Permittee shall calculate the CO2e emissions on a 12-month rolling basis, based on the procedures and Global Warming Potentials (GWP) contained in Greenhouse Gas Regulations, 40 CFR Part 98, Subpart A, Table A-1, as published on October 30, 2009 (74 FR 56395). The emission rate is for each of the two heaters.

BACT Analysis:		
RBLC Seach Parameters:	GHG RBLC Heaters Boilers	
RBLC Search Date:		

				Process		Throughput &			Standard Emission Limit Emission Limit	Emission Limit	Case by Case		Estimated Efficiency
RBLC ID	Date	Facility Name & Location	Process	Туре	Process Notes Primary Fuel	Units	Pollutant	<b>Control Method Description</b>	& Units 1 & Units	2 & Units	Basis	Other Factors	% Pollutant/ Compliance Notes
*IN-0218	12/11/2014 ACT	SABIC INNOVATIVE PLASTICS MT. VERNON, LC SABIC INNOVATIVE PLASTICS MT. VERNON, LC POSEY, IN	NATURAL GAS-FIRED AUXILIARY BOILER (AUX 2 BOILER)	12.310	NATURAL GAS	249 MMBTU/H	Carbon Dioxide Equivalen t (CO2e)		0 133521 T/YR	0			THE BOILER SHALL ACHEIVE A MINIMUM 80% THERMAL EFFICIENCY (HHV); THE BOILER SHALL FIRE NATURAL GAS ONLY; BOILER INSULATION; EFFICIENT BURNER DESIGN; IMPROVED COMBUSTION MEASURES:OPTIMIZATION & DIGITAL CONTROL SYSTEM; MINIMIZATION OF AIR INFILTRATION; IMPROVED COMBUSTION MEASURES: COMBUSTION TUNING; OPERATING AND MAINTENANCE (0&M) PRACTICES; STEAM LINE MAINTENANCE.
*IN-0218	12/11/2014 ACT	SABIC INNOVATIVE PLASTICS MT. VERNON, LC SABIC INNOVATIVE PLASTICS MT. VERNON, LC POSEY, IN	NATURAL GAS-FIRED AUXILIARY BOILER (AUX BOILER)	12.310	NATURAL GAS	249 MMBTU/H	Carbon Dioxide Equivalen t (CO2e)		0 133521 T/YR	0			THE BOILER SHALL ACHEIVE A MINIMUM 80% THERMAL EFFICIENCY (HHV); THE BOILER SHALL FIRE NATURAL GAS ONLY; BOILER INSULATION; EFFICIENT BURNER DESIGN; IMPROVED COMBUSTION MEASURES:OPTIMIZATION & DIGITAL CONTROL SYSTEM; MINIMIZATION OF AIR INFILTRATION; IMPROVED COMBUSTION MEASURES: COMBUSTION MEASURES: COMBUSTION TUNING; OPERATING AND MAINTENANCE (O&M) PRACTICES; STEAM LINE MAINTENANCE.
*IN-0218	12/11/2014 ACT	SABIC INNOVATIVE PLASTICS MT. VERNON, LC SABIC INNOVATIVE PLASTICS MT. VERNON, LC POSEY, IN	NATURAL GAS-FIRED BOILER (CG1 BOILER)	12.310	NATURAL GAS	249 MMBTU/H	Carbon Dioxide Equivalen t (CO2e)		0 133521 T/YR	0			THE BOILER SHALL ACHEIVE A MINIMUM 80% THERMAL EFFICIENCY (HHV); THE BOILER SHALL FIRE NATURAL GAS ONLY; BOILER INSULATION; EFFICIENT BURNER DESIGN; IMPROVED COMBUSTION MEASURES:OPTIMIZATION & DIGITAL CONTROL SYSTEM; MINIMIZATION OF AIR INFILTRATION; IMPROVED COMBUSTION MEASURES: COMBUSTION MEASURES: COMBUSTION MEASURES: COMBUSTION TUNING; OPERATING AND MAINTENANCE (O&M) PRACTICES; STEAM LINE MAINTENANCE, IF CG1 BOILER OPERATES AS AN AUXILIARY BOILER, NO ADDITIONA BACT REQUIREMENTS APPLY, BUT IF CG1 BOILER IS A PRIMARY USE BOILER, THE FOLLOWING ITEM WILL BE INCLUDED AS BACT: AIR PREHEATER OR ECONOMIZER

GHG RBLC Heaters Boilers

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	Date	Facility Name & Location	Process	Process	Process Notes	Primary Fuel	Throughput &	Pollutant	Control Method Description	Emission Limit	Emission Limit Emission Limit	Case by Case Basis	Other Eactors	Estimated Efficiency	Pollutant/ Compliance Notes
*TX-0757	05/12/2014 ACT	Facility Name & Location INDECK WHARTON LLC INDECK WHARTON ENERGY CENTER WHARTON, TX	Pipeline Heater	13.310	The proposed project will be equipped with one new natural gas-fired heater (GH). The heater will have a capacity of 3 MMBtu/hr (HHV) and will be operated no more than 3,500 hours per year. This heater will serve to preheat the natural gas feed into the combustion turbines to maximize combustion efficiency. The pipeline heater represents 0.06% of the facility-wide GHG emissions.	Primary Fuel	3 MMBtu/hr (HHV)	Carbon Dioxide Equivalen t (CO2e)		0	CO2E 12- MONTH ROLLING TOTAL	BACT- PSD	U	76	Polutant Compliance Notes The following specific BACT practices are proposed for the heaters: • Use of low carbon fuel (natural gas). Natural gas will be the only fuel fired in the proposed heaters. It is the lowest carbon fuel available for use at the facility. • Good heater design and operation to maximize thermal efficiency and reduce heat loss to the extent practical for heaters of this size in intermittent service. • Use of manual air/fuel controls to maximize combustion efficiency. • Clean and inspect heater burner tips and perform tune-ups as needed and per vendor recommendations. • Limit the operational use of the heaters to no more than 3,500 hours per year per heater on a 12-month rolling basis (2,500 operational hours and 1,000 hours for startup and shutdown). Use of these practices corresponds with a BACT limit of 624.86 tpy CO2e for the heater. Compliance with this limit will be determined by calculating the emissions on a monthly basis and keeping a 12-month rolling total of hours of operation, including
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 AUXILLARY BOILERS	11.390	TWO BOILERS AT 435 MMBTU/HR EACH. BOILERS EQUIPPED WITH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, LOW-NOX BURNERS, CATALYTIC OXIDIZER, AND BURN 100 PERCENT PROCESS GAS DURING NORMAL OPERATIONS	PROCESS GAS	435 MMBTU/H	Carbon Monoxide	EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS DURING NORMAL OPERATION, GOOD COMBUSTION PRACTICES, AND OPERATION OF AN OXIDATION CATALYST	0	0.0088 2618.5 LB/MMBTU 3- LB/EVENT FOR HOUR BLOCK ALL STARTUP AVERAGE, EVENTS EXCLUDING SU/SD	BACT- PSD			during startup and shutdown. 35.9 LB/SHUTDOWN EVENT.
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Auxiliary boiler	13.310		natural gas	39.8 MMBtu/hr	Carbon Monoxide	Utilize Low-NOx burners and FGR.	0	0.04 LB/MMBTU 0 3-HR BLOCK AVERAGE	BACT- PSD	U		
*TX-0691	05/20/2014 ACT	NRG TEXAS POWER LLC PH ROBINSON ELECTRIC GENERATING STATION GALVESTON, TX	fuel gas heater	13.310		natural gas	18 MMBtu/hr	Carbon Monoxide		0	0.054 LB/MMBTU 0	BACT- PSD	U		
*TX-0694	02/02/2015 ACT	INDECK WHARTON, L.L.C. INDECK WHARTON ENERGY CENTER WHARTON TX	heater	13.310		natural gas	3 MMBtu/hr	Carbon Monoxide		0	0.04 LB/MMBTU 0 1 HOUR	BACT- PSD	U		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP06)	13.310		Natural Gas	16.1 MMBTU/H	Carbon Monoxide	good combustion practices	2.7 T/YR	0.08 LB/MMBTU 1.3 LB/H 3- 3-HOUR HOUR AVERAGE AVERAGE	BACT- PSD	Ν		limited to 4,380 hours of operation per calendar year
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP07)	13.310		Natural Gas	16.1 MMBTU/H	Carbon Monoxide	good combustion practices	2.7 T/YR	0.08 LB/MMBTU 1.3 LB/H 3- 3-HOUR HOUR AVERAGE AVERAGE	BACT- PSD	N		limited to 4,380 hours of operation per calendar year
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP08)	13.310		Natural Gas	16.1 MMBTU/H	Carbon Monoxide	good combustion practices	2.7 T/YR	0.08 LB/MMBTU 1.3 LB/H 3- 3-HOUR HOUR AVERAGE AVERAGE	BACT- PSD	Ν		limited to 4,380 hours of operation per calendar year
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP09)	13.310		Natural Gas	16.1 MMBTU/H	Carbon Monoxide	good combustion practices	2.7 T/YR	0.08 LB/MMBTU 1.3 LB/H 3- 3-HOUR HOUR AVERAGE AVERAGE	BACT- PSD	N		limited to 4,380 hours of operation per calendar year
*\\\\\ 0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP10)	13.310		Natural Gas	16.1 MMBTU/H	Carbon Monoxide	good combustion practices	2.7 I/YR	0.08 LB/MMBTU 1.3 LB/H 3- 3-HOUR HOUR AVERAGE AVERAGE	PSD	N		limited to 4,380 hours of operation per calendar year
*NI 0173	06/04/2014 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY		11.210			050.64	Carbon Monoxide		2.7 I/YR	0.08 LB/MMBTU     1.3 LB/H 3-       3-HOUR     HOUR       AVERAGE     AVERAGE       42 45 LB/MMCE     0	PSD	N		per calendar year
IN-0173	00/04/2014 AC1	CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	REFORMER FORMAGE	11.310		NATURAL GAS, PROCESS GAS	MMBTU/H	Monoxide	AND PROPER DESIGN	0	3-HR AVERAGE	PSD	IN		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	Carbon Monoxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	37.23 LB/MMCF 0 3-HR AVERAGE	BACT- PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	Carbon Monoxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	37.23 LB/MMCF 0 3-HR AVERAGE	BACT- PSD	N		
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 AUXILLARY BOILERS	11.390	TWO BOILERS AT 435 MMBTU/HR EACH. BOILERS EQUIPPED WITH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, LOW-NOX BURNERS, CATALYTIC OXIDIZER, AND BURN 100 PERCENT PROCESS GAS DURING NORMAL OPERATIONS	PROCESS GAS	435 MMBTU/H	Nitrogen Oxides (NOx)	EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS DURING NORMAL OPERATION AND USE OF A POST-COMBUSTION SCR SYSTEM AND LOW-NOX BURNERS	0	0.0099 2946.2 LB/MMBTU 3- LB/EVENT FOR HOUR BLOCK ALL STARTUPS AVERAGE, EXCLUDING SU/SD	LAER			38.9 LB/SHUTDOWN EVENT

BACT An RBLC Se RBLC Se	alysis: ach Parameters: arch Date:	GHG RBLC Heaters Boilers								-						
				_						Standard			Case by		Estimated	
<b>RBLC I</b> *OR-0050	D Date 0 03/05/2014 ACT	Facility Name & Location TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC	Process Auxiliary boiler	Process Type 13.310	Process Notes	Primary Fuel natural gas	Throughput & Units 39.8 MMBtu/hr	Pollutan Nitrogen Oxides	t Control Method Description Utilize Low-NOx burners and FGR.	Emission Limit & Units 0	Emission Limit     1 & Units     0.035 LB/MMBT     3-HR BLOCK	t Emission Limi 2 & Units U 0	t Case Basis BACT- PSD	Other Factors U	Efficiency %	Pollutant/ Compliance Notes
*TX-0691	05/20/2014 ACT	NRG TEXAS POWER LLC PH ROBINSON ELECTRIC GENERATING	fuel gas heater	13.310		natural gas	18 MMBtu/hr	Nitrogen Oxides		0	0.1 LB/MMBTU	0	BACT- PSD	U		
*TX-0694	02/02/2015 ACT	INDECK WHARTON, L.L.C. INDECK	heater	13.310		natural gas	3 MMBtu/hr	(NOx) Nitrogen		0	0.1 LB/MMBTU 1	1 0	BACT-	U		
****	00/00/0040 ACT	WHARTON ENERGY CENTER WHARTON, TX		10.040		Natural Car		Oxides (NOx)	Liller Law NO: Dura are	0.4 TMD	HOUR		PSD	NI		
~WY-0070	J 08/28/2012 AC1	CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Iniet Air Heater (EP06)	13.310		Natural Gas	16.1 MIMB10/H	Oxides (NOx)	Ultra Low-NOX Burners	0.4 I/YR	3-HOUR AVERAGE	HOUR AVERAGE	PSD	N		per calendar year
*WY-0070	0 08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP07)	13.310		Natural Gas	16.1 MMBTU/H	Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.4 T/YR	0.012 LB/MMBT 3-HOUR AVERAGE	U 0.2 LB/H 3- HOUR AVERAGE	BACT- PSD	Ν		limited to 4,380 hours of operation per calendar year
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP08)	13.310		Natural Gas	16.1 MMBTU/H	Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.4 T/YR	0.012 LB/MMBT 3-HOUR AVERAGE	U 0.2 LB/H 3- HOUR AVERAGE	BACT- PSD	Ν		limited to 4,380 hours of operation per calendar year
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP09)	13.310		Natural Gas	16.1 MMBTU/H	Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.4 T/YR	0.012 LB/MMBT 3-HOUR AVERAGE	U 0.2 LB/H 3- HOUR AVERAGE	BACT- PSD	N		limited to 4,380 hours of operation per calendar year
*WY-0070	0 08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP10)	13.310		Natural Gas	16.1 MMBTU/H	Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.4 T/YR	0.012 LB/MMBT 3-HOUR AVERAGE	U 0.2 LB/H 3- HOUR AVERAGE	BACT- PSD	Ν		limited to 4,380 hours of operation per calendar year
*WY-0070	0 08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Inlet Air Heater (EP11)	13.310		Natural Gas	16.1 MMBTU/H	Nitrogen Oxides (NOx)	Ultra Low NOx Burners	0.4 T/YR	0.012 LB/MMBT 3-HOUR AVERAGE	U 0.2 LB/H 3- HOUR AVERAGE	BACT- PSD	N		limited to 4,380 hours of operation per calendar year
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	REFORMER FURNACE	11.310		NATURAL GAS, PROCESS GAS	950.64 MMBTU/H	Nitrogen Oxides (NOx)	SELECTIVE CATALYTIC REDUCTION (SCR), LOW NOX BURNERS	0	9 PPMVD @3% OXYGEN THIRTY DAY ROLLING	0	BACT- PSD	Ν		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	183.7 LB/MMCF 3-HR AVERAGE	0	BACT- PSD	N		
*IN-0180	06/04/2014 ACT	IN MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	183.7 LB/MMCF 3-HR AVERAGE	0	BACT- PSD	N		
*MD-0044	4 06/09/2014 ACT	IN DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 AUXILLARY BOILERS	11.390	TWO BOILERS AT 435 MMBTU/HR EACH. BOILERS EQUIPPED WITH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, LOW-NOX BURNERS, CATALYTIC OXIDIZER, AND BURN 100 PERCENT PROCESS GAS DURING NORMAL OPERATIONS	PROCESS GAS	435 MMBTU/H	Particula e matter, filterable (FPM)	t EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS DURING NORMAL OPERATION AND GOOD COMBUSTION PRACTICES	0	0.005 LB/MMBT 3 HOUR BLOCK AVERAGE	U O	BACT- PSD			
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	REFORMER FURNACE	11.310		NATURAL GAS, PROCESS GAS	950.64 MMBTU/H	Particula e matter, filterable	t GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	1.9 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N		
*IN-0180	06/04/2014 ACT	IN MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	REFORMER FURNACE	11.310		NATURAL GAS, PROCESS GAS	950.64 MMBTU/H	Particula e matter, filterable	t GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	1.9 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N		
*IN-0173	06/04/2014 ACT	IN MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	(FPM) Particula e matter, filterable	t GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	1.9 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N		
*IN-0180	06/04/2014 ACT	IN MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	Particula e matter, filterable	t GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	1.9 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N		
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 AUXILLARY BOILERS	11.390	TWO BOILERS AT 435 MMBTU/HR EACH. BOILERS EQUIPPED WITH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, LOW-NOX BURNERS, CATALYTIC OXIDIZER, AND BURN 100 PERCENT PROCESS GAS DURING NORMAL OPERATIONS	PROCESS GAS	435 MMBTU/H	(୮۲M) Particula e matter, total < 10 µ (TPM10)	t EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS DURING NORMAL OPERATION AND GOOD COMBUSTION PRACTICES	0	0.014 LB/MMBT 3 STACK TEST RUN AVERAGE EXCEPT SU/SD	U 296.8 LB/EVEN FOR ALL , STARTUPS	r Bact- PSD			4.9 LB/SHUTDOWN EVENT
*OR-0050	0 03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Auxiliary boiler	13.310		natural gas	39.8 MMBtu/hr	Particula e matter, total < 10 µ (TPM10)	t Good combustion practices; Utilize only natural gas.	0	0	0	BACT- PSD	U		

BACT Ana RBLC Sea RBLC Sea	llysis: ch Parameters: rch Date:	GHG RBLC Heaters Boilers								-					
BBI C ID	Data	Essility Name 9 Location	Brassos	Process	Brosses Notes	Drimony Fuel	Throughput &	& Dolluton	t Control Method Description	Standard Emission Limit	Emission Limit	Emission Limit	Case by Case	Other Festers	Estimated Efficiency
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	REFORMER FURNACE	11.310	Process Notes	NATURAL GAS, PROCESS GAS	950.64 MMBTU/H	Pollutan Particula e matter, total < 10 µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	5.385 LB/MMCF 3-HR AVERAGEE	0	BACT- PSD	N	% Poliutant/ Compliance Notes
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	REFORMER FURNACE	11.310		NATURAL GAS, PROCESS GAS	950.64 MMBTU/H	Particula e matter, total < 10 µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	5.385 LB/MMCF 3-HR AVERAGEE	0	BACT- PSD	N	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	I Particula e matter, total < 10 µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	7.6 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N	
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	I Particula e matter, total < 10 µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE NATURAL GAS	0	7.6 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N	
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 AUXILLARY BOILERS	11.390	TWO BOILERS AT 435 MMBTU/HR EACH. BOILERS EQUIPPED WITH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, LOW-NOX BURNERS, CATALYTIC OXIDIZER, AND BURN 100 PERCENT PROCESS GAS DURING NORMAL OPERATIONS	PROCESS GAS	435 MMBTU/H	Particular e matter, total < 2. µ (TPM2.5)	EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS DURING NORMAL OPERATION AND GOOD COMBUSTION PRACTICES	0	0.014 LB/MMBTU 3 STACK TEST RUN AVERAGE, EXCEPT SU/S	J 296.8 LB/EVENT FOR ALL STARTUPS	BACT- PSD		4.9 LB/SHUTDOWN EVENT
*TX-0691	05/20/2014 ACT	NRG TEXAS POWER LLC PH ROBINSON ELECTRIC GENERATING STATION GALVESTON, TX	fuel gas heater	13.310		natural gas	18 MMBtu/hr	Particula e matter, total < 2. µ (TPM2 5)	5	0	0	0	BACT- PSD	U	natural gas fuel, includes PM and PM10
*TX-0694	02/02/2015 ACT	INDECK WHARTON, L.L.C. INDECK WHARTON ENERGY CENTER WHARTON, TX	heater	13.310		natural gas	3 MMBtu/hr	Particula e matter, total < 2.3 µ	5	0	0	0	BACT- PSD	U	natural gas fuel, includes PM and PM10
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	REFORMER FURNACE	11.310		NATURAL GAS, PROCESS GAS	950.64 MMBTU/H	Particula e matter, total < 2. µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN 5	0	5.385 LB/MMCF 3-HR AVERAGE	0	BACT- PSD	Ν	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	<ul> <li>Particula</li> <li>e matter,</li> <li>total &lt; 2.3</li> <li>µ</li> <li>(TPM2.5)</li> </ul>	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE 5 NATURAL GAS	0	7.6 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N	
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	Particular e matter, total < 2.3 µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN, USE 5 NATURAL GAS	0	7.6 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	Ν	
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Auxiliary boiler	13.310		natural gas	39.8 MMBtu/hr	Sulfuric Acid (mist, vapors,	Good combustion practices; Utilize only natural gas.	0	0	0	BACT- PSD	U	
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 AUXILLARY BOILERS	11.390	TWO BOILERS AT 435 MMBTU/HR EACH. BOILERS EQUIPPED WITH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM, LOW-NOX BURNERS, CATALYTIC OXIDIZER, AND BURN 100 PERCENT PROCESS GAS DURING NORMAL OPERATIONS	PROCESS GAS	435 MMBTU/H	Volatile Organic Compour ds (VOC	THE EXCLUSIVE USE OF PROCESS FUEL GAS DURING NORMAL OPERATION, OXIDATION CATALYST, AND GOOD COMBUSTION PRACTICES	0	0.001 LB/MMBTU 3-HOUR BLOCK AVERAGE, EXCLUDING SU/SD	J 130.6 LB/EVENT FOR ALL STARTUPS	LAER		1.8 LB/SHUTDOWN EVENT
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Auxiliary boiler	13.310		natural gas	39.8 MMBtu/hr	Volatile Organic Compour ds (VOC	Utilize Low-NOx burners and FGR.	0	0.005 LB/MMBTU 3-HR BLOCK AVERAGE	0	BACT- PSD	U	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	REFORMER FURNACE	11.310		NATURAL GAS, PROCESS GAS	950.64 MMBTU/H	Volatile Organic Compour ds (VOC	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	5.5 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	I Volatile Organic Compour ds (VOC	PROPER DESIGN AND GOOD COMBUSTION PRACTICES	0	5.5 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N	
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	STARTUP HEATER	15.110	NATURAL GAS USAGE SHALL NOT EXCEED 18.14 MMCF/YEAR.	NATURAL GAS	92.5 MMBTU/H	Volatile Organic Compour	PROPER DESIGN AND GOOD COMBUSTION PRACTICES	0	5.5 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	N	

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				Process			Throughput &			Standard Emission Limit	Emission Limit	Emission Limit	Case by Case		Estimated Efficiency	
*MD 0042	Date	Facility Name & Location		Type		Primary Fuel	Units	Pollutan	t Control Method Description	& Units		2 & Units	Basis	Other Factors	%	Pollutant/ Compliance Notes
WD-0043	0//01/2014 ACT	GENERATION, INC. PERRYMAN GENERATING STATION HARFORD, MD	EMERGENCI GENERATOR	17.110	COMBUSTION PRACTICES	ULINA LOW SULLON DIESEL	1300 11	e matter, total < 10 µ	LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	0	CONDENSIBLE + FILTERABLE	FILTERABLE	PSD			NGF3 40 CFR 00 30BFART III
	07/0//00///			17.110			1000.115	(TPM10)								
*MD-0043	07/01/2014 ACT	CONSTELLATION POWER SOURCE GENERATION, INC. PERRYMAN GENERATING STATION HARFORD,	EMERGENCY GENERATOR	17.110	40 CFR 60 SUBPART IIII, GOOD COMBUSTION PRACTICES	ULTRA LOW SULFUR DIESEL	1300 HP	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	0	4.8 G/HP-H	6.4 G/KW-H	LAER			NSPS 40 CFR 60 SUBPART IIII
*MD-0044	06/09/2014 ACT	MD DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT MD	EMERGENCY GENERATOR	17.110	40 CFR 60, SUBPART IIII, ULTRA LOW- SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES	ULTRA LOW SULFUR DIESEL	1550 HP	Particulat e matter, filterable	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES	0	0.15 G/HP-H	0.2 G/KW-H	BACT- PSD			
*MD-0044	06/09/2014 ACT		EMERGENCY GENERATOR	17 110	40 CER 60 SUBPART IIII UI TRA LOW-	UI TRA LOW SULFUR DIESEL	1550 HP	(FPM) Particulat	EMISSION LIMITS	0	0 17 G/HP-H	0 23 G/KW-H	BACT-			
	00,00,2011,101	COVE POINT LNG TERMINAL CALVERT, MD			SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES			e matter, total < 10 µ	GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMITS	Ĵ		0.20 0,	PSD			
*MD 0044	06/00/2014 ACT		EMERCENCY CENERATOR	17 110			1550 HP	(TPM10)		0		0.23 G/K/M H	BACT			
WD-0044	00/09/2014 ACT	COVE POINT LNG TERMINAL CALVERT, MD		17.110	SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES	DETINALOW SOLF ON DIESEL	1350 11	e matter, total < 2.8 µ	GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMITS	U	0.17 G/HF-H	0.23 G/WV-11	PSD			
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP	EMERGENCY GENERATOR	17.110	40 CFR 60, SUBPART IIII, ULTRA LOW-	ULTRA LOW SULFUR DIESEL	1550 HP	Nitrogen	GOOD COMBUSTION PRACTICES	0	4.8 G/HP-H	6.4 G/KW-H	LAER			NSPS 40 CFR 60 SUBPART IIII
		COVE POINT LNG TERMINAL CALVERT, MD			SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES			Oxides (NOx)	AND DESIGNED TO ACHIEVE EMISSION LIMIT		COMBINED NOX + NMHC	COMBINED NOX + NMHC	(			
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL	EMERGENCY GENERATOR	17.110	40 CFR 60, SUBPART IIII, ULTRA LOW- SULFUR DIESEL FUEL, GOOD	ULTRA LOW SULFUR DIESEL	1550 HP	Carbon Monoxide	GOOD COMBUSTION PRACTICES AND DESIGNED TO MEET	0	2.6 G/HP-H	3.49 G/KW-H	BACT- PSD			
*140.0044	00/00/2044 ACT	CALVERT, MD		17.110	COMBUSTION PRACTICES		4550 UD	Valatila	EMISSION LIMIT	0		C 4 C///////				
*MD-0044	06/09/2014 ACT	COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	EMERGENCY GENERATOR	17.110	40 CFR 60, SUBPART IIII, ULTRA LOW- SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES	ULIKALOW SULFUR DIESEL	1550 HP	Organic Compour ds (VOC)	COMBUSTION PRACTICES, AND DESIGNED TO ACHIEVE EMISSION LIMIT	U	4.8 G/HP-H COMBINED NOX + NMHC	COMBINED NOX NMHC	LAER			NSPS 40 CFR 60 SUBPART IIII
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER	DIESEL FIRED EMERGENCY	17.110	ANNUAL OPERATING HOURS SHALL	NO. 2, DIESEL	3600 BHP	Particulat	GOOD COMBUSTION PRACTICES	0	0.15 G/BHP-H 3-	0	BACT-	Ν		
		FERTILIZER CORPORATION POSEY,	GENERATOR		NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT			e matter, filterable			HR AVERAGE		PSD			
*IN-0173	06/04/2014 ACT	IN MIDWEST FERTILIZER	DIESEL FIRED EMERGENCY	17.110	BE TESTED. ANNUAL OPERATING HOURS SHALL	NO. 2. DIESEL	3600 BHP	(FPM) Particulat	GOOD COMBUSTION PRACTICES	0	0.15 G/BHP-H 3-	0	BACT-	N		
		CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	GENERATOR		NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT BE TESTED.			e matter, total < 10 µ			HR AVERAGE		PSD			
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	DIESEL FIRED EMERGENCY GENERATOR	17.110	ANNUAL OPERATING HOURS SHALL NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT BE TESTED.	NO. 2, DIESEL	3600 BHP	Particulat e matter, total < 2.8 µ	GOOD COMBUSTION PRACTICES	0	0.15 G/BHP-H 3- HR AVERAGE	0	BACT- PSD	N		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY	DIESEL FIRED EMERGENCY GENERATOR	17.110	ANNUAL OPERATING HOURS SHALL NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT	NO. 2, DIESEL	3600 BHP	(TPM2.5) Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	0	4.46 G/BHP-H 3- HR AVERAGE	0	BACT- PSD	N		
****	00/04/0044 AOT			17.110	BE TESTED.			(		0		2	DAGT	N		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	DIESEL FIRED EMERGENCY GENERATOR	17.110	ANNUAL OPERATING HOURS SHALL NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT BE TESTED	NO. 2, DIESEL	3600 BHP	Carbon Monoxide	GOOD COMBUSTION PRACTICES	U	2.61 G/BHP-H 3- HR AVERAGE	0	PSD	N		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	DIESEL FIRED EMERGENCY GENERATOR	17.110	ANNUAL OPERATING HOURS SHALL NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT	NO. 2, DIESEL	3600 BHP	Volatile Organic Compour	GOOD COMBUSTION PRACTICES	0	0.31 G/BHP-H 3- HR AVERAGE	0	BACT- PSD	N		
*IN-0173	06/04/2014 ACT	IN MIDWEST FERTILIZER		17 110	BE TESTED.	NO 2 DIESEI	3600 BHP	ds (VOC) Carbon	GOOD COMBUSTION PRACTICES	0	526 39 G/BHP-H	0	BACT-	N		
		CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	GENERATOR		NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT BE TESTED.		0000 2.1.1	Dioxide		Ĵ	3-HR AVERAGE		PSD			
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	DIESEL FIRED EMERGENCY GENERATOR	17.110	ANNUAL OPERATING HOURS SHALL NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT	NO. 2, DIESEL	3600 BHP	Particulat e matter, filterable	GOOD COMBUSTION PRACTICES	0	0.15 G/B-HP-H 3 HR AVERAGE	- 0	BACT- PSD	N		
*IN-0180	06/04/2014 ACT	IN MIDWEST FERTILIZER	DIESEL FIRED EMERGENCY	17.110	ANNUAL OPERATING HOURS SHALL	NO. 2, DIESEL	3600 BHP	(FPM) Particulat	GOOD COMBUSTION PRACTICES	0	0.15 G/B-HP-H 3	- 0	BACT-	N		
		CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	GENERATOR		NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT BE TESTED.			e matter, total < 10 µ (TRM10)			HR AVERAGE		PSD			
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER	DIESEL FIRED EMERGENCY	17.110	ANNUAL OPERATING HOURS SHALL	NO. 2, DIESEL	3600 BHP	Particulat	GOOD COMBUSTION PRACTICES	0	0.15 G/B-HP-H 3	- 0	BACT-	N		
		CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	GENERATOR		NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT BE TESTED.			e matter, total < 2.5 µ	5		HR AVERAGE		PSD			
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER	DIESEL FIRED EMERGENCY	17.110	ANNUAL OPERATING HOURS SHALL	NO. 2, DIESEL	3600 BHP	Nitrogen	GOOD COMBUSTION PRACTICES	0	4.46 G/B-HP-H 3	0	BACT-	N		
		CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	GENERATOR		NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT BE TESTED.			Oxides (NOx)			HR AVERAGE		PSD			
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	DIESEL FIRED EMERGENCY GENERATOR	17.110	ANNUAL OPERATING HOURS SHALL NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT	NO. 2, DIESEL	3600 BHP	Carbon Monoxide	GOOD COMBUSTION PRACTICES	0	2.61 G/B-HP-H 3 HR AVERAGE	- 0	BACT- PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	DIESEL FIRED EMERGENCY GENERATOR	17.110	DE LESTED. ANNUAL OPERATING HOURS SHALL NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT BE TESTED.	NO. 2, DIESEL	3600 BHP	Volatile Organic Compour	GOOD COMBUSTION PRACTICES	0	0.31 G/B-HP-H 3 HR AVERAGE	0	BACT- PSD	N		

RBLC Sear	ch Date:									-			
RBLC ID	Date	Facility Name & Location	Process	Process Type	Process Notes	Primary Fuel	Throughput & Units	& Pollutan	Control Method Description	Standard Emission Limit & Units 1 & Units	Emission Limit Case 2 & Units Base	by Estimated se Efficiency sis Other Factors %	Pollutant/ Compliance Notes
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	DIESEL FIRED EMERGENCY GENERATOR	17.110	ANNUAL OPERATING HOURS SHALL NOT EXCEED 500 HOURS. INSIGNIFICANT ACTIVITY WILL NOT BE TESTED.	NO. 2, DIESEL	3600 BHP	Carbon Dioxide	GOOD COMBUSTION PRACTICES	0 526.39 G/B-HP-H 3-HR AVERAGE	I 0 BACT PSD	- N	
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT LAUDERDALE PLANT BROWARD, FL	Four 3100 kW black start emergency generators	17.110	Fired with ULSD	ULSD	2.32 MMBtu/hr (HHV) per	Carbon Monoxide	Good combustion practice	0 3.5 GRAMS PER KW-HR	0 BACT PSD	- U	BACT = NSPS IIII; Certified IIII engine meets BACT (or tests
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT LAUDERDALE PLANT BROWARD, FL	Four 3100 kW black start emergency generators	17.110	Fired with ULSD	ULSD	2.32 MMBtu/hr (HHV) per engine	Particulat e matter, total	Good combustion practice	0 0.2 GRAMS PER KW-HR	0 BACT PSD	- U	BACT = NSPS IIII; Certified IIII engine meets BACT.
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT LAUDERDALE PLANT BROWARD, FL	Four 3100 kW black start emergency generators	17.110	Fired with ULSD	ULSD	2.32 MMBtu/hr (HHV) per engine	Sulfur Dioxide (SO2)	ULSD required	0 15 PPM SULFUR IN FUEL	0 BACT PSD	- U	BACT = NSPS IIII; Certified IIII engine meets BACT. ULSD required in NSPS
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING	Diesel Emergency Generator (EP15)	17.110		Ultra Low Sulfur Diesel	839 hp	Nitrogen Oxides	EPA Tier 2 rated	0 0	0 BACT PSD	- N	limited to 500 hours of non- emergency operation per calendar
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Diesel Emergency Generator (EP15)	17.110		Ultra Low Sulfur Diesel	839 hp	(NOX) Sulfur Dioxide (SO2)	Ultra Low Sulfur Diesel	0 0	0 OTHE CASE CASE	R N -BY-	year limited to 500 hours of non- emergency operation per calendar year
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING	Diesel Emergency Generator (EP15)	17.110		Ultra Low Sulfur Diesel	839 hp	Carbon Monoxide	EPA Tier 2 rated	0 0	0 BACT PSD	- N	limited to 500 hours of non- emergency operation per calendar
*TX-0753	12/02/2014 ACT	GUADALUPE POWER PARTNERS, L.P. GUADALUPE GENERATING STATION GUADALUPE, TX	Fire Water Pump Engine	17.210	Shall not exceed 100 hours of non- emergency operation on a 12-month rolling basis and shall be operated and maintained in accordance with the	ULSD	1.92 MMBtu/hr (HHV)	Carbon Dioxide Equivaler t (CO2e)		0 15.71 TPY CO2E	0 BACT PSD	- U	Not to exceed 100 hours of non- emergency operation on a 12- month rolling basis. Use of good combustion practices.
*TX-0758	08/01/2014 ACT	INVENERGY THERMAL DEVELOPMENT LLC ECTOR COUNTY ENERGY CENTER ECTOR, TX	Firewater Pump Engine	17.210	manulacturer's recommendations.	Diesel	0	Carbon Dioxide Equivaler t (CO2e)		0 5 TPY CO2E 12- MONTH ROLLING TOTAL	0 BACT PSD	- U	Not to exceed 100 hours of non- emergency operation on a 12- month rolling basis. Use of good combustion practices
*MD-0043	07/01/2014 ACT	CONSTELLATION POWER SOURCE GENERATION, INC. PERRYMAN GENERATING STATION HARFORD, MD	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.210	40 CFR 60, SUBPART IIII, GOOD COMBUSTION PRACTICES	ULTRAL LOW SULFUR DIESEL	350 HP	Particulat e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	0 0.17 G/HP-H FILTERABLE + CONDENSIBLE	0.15 G/HP-H BART FILTERABLE		NSPS 40 CFR 60 SUBPART IIII
*MD-0043	07/01/2014 ACT	CONSTELLATION POWER SOURCE GENERATION, INC. PERRYMAN GENERATING STATION HARFORD, MD	EMERGENCY DIESEL ENGINE FOR FIRE WATER PUMP	17.210	40 CFR 60, SUBPART IIII, GOOD COMBUSTION PRACTICES	ULTRAL LOW SULFUR DIESEL	350 HP	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES, LIMITED HOURS OF OPERATION, AND EXCLUSIVE USE OF ULSD	0 3 G/HP-H	4 G/KW-H LAER		NSPS 40 CFR 60 SUBPART IIII
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	5 EMERGENCY FIRE WATER PUMP ENGINES	17.210	40 CFR 60, SUBPART IIII, ULTRA LOW- SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES	ULTRA LOW SULFUR DIESEL	350 HP	Particulat e matter, filterable (FPM)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMITS	0 0.15 G/BHP-H	0.2 G/KW-H BACT PSD	-	
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	5 EMERGENCY FIRE WATER PUMP ENGINES	17.210	40 CFR 60, SUBPART IIII, ULTRA LOW- SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES	ULTRA LOW SULFUR DIESEL	350 HP	Particulat e matter, total < 10 µ (TPM10)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMITS	0 0.17 G/ВНР-Н	0.23 G/KW-H BACT PSD	-	
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	5 EMERGENCY FIRE WATER PUMP ENGINES	17.210	40 CFR 60, SUBPART IIII, ULTRA LOW- SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES	ULTRA LOW SULFUR DIESEL	350 HP	Particulat e matter, total < 2.5 µ (TPM2.5)	EXCLUSIVE USE OF ULSD FUEL, GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMITS	0 0.17 G/ВНР-Н	0.23 G/KW-H BACT PSD	-	
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT MD	5 EMERGENCY FIRE WATER PUMP ENGINES	17.210	40 CFR 60, SUBPART IIII, ULTRA LOW- SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES	ULTRA LOW SULFUR DIESEL	350 HP	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES AND DESIGNED TO ACHIEVE EMISSION LIMIT	0 3 G/HP-H NOX + NMHC	4 G/KW-H NOX + LAER NMHC		NSPS 40 CFR 60 SUBPART IIII
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT MD	5 EMERGENCY FIRE WATER PUMP ENGINES	17.210	40 CFR 60, SUBPART IIII, ULTRA LOW- SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES	ULTRA LOW SULFUR DIESEL	350 HP	Carbon Monoxide	GOOD COMBUSTION PRACTICES AND DESIGNED TO MEET EMISSION LIMIT	0 3 G/HP-H	4 G/KW-H BACT PSD	-	
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	5 EMERGENCY FIRE WATER PUMP ENGINES	17.210	40 CFR 60, SUBPART IIII, ULTRA LOW- SULFUR DIESEL FUEL, GOOD COMBUSTION PRACTICES	ULTRA LOW SULFUR DIESEL	350 HP	Volatile Organic Compour ds (VOC)	USE ONLY ULSD, GOOD COMBUSTION PRACTICES, AND DESIGNED TO ACHIEVE EMISSION LIMIT	0 3 G/HP-H NOX + NMHC	4 G/KW-H NOX + LAER NMHC		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Particulat e matter, filterable (FPM)	GOOD COMBUSTION PRACTICES	0 0.15 G/BHP-H 3- HR AVERAGE	0 BACT PSD	- N	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Particulat e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES	0 0.15 G/BHP-H 3- HR AVERAGE	0 BACT PSD	- N	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Particulat e matter, total < 2.5 µ (TPM2 5)	GOOD COMBUSTION PRACTICES	0 0.15 G/BHP-H 3- HR AVERAGE	0 BACT PSD	- N	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	0 2.83 G/BHP-H 3- HR AVERAGE	0 BACT PSD	- N	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Carbon Monoxide	GOOD COMBUSTION PRACTICES	0 2.6 G/BHP-H 3- HR AVERAGE	0 BACT PSD	- N	

INDEO Geal	ch Date.															
RBI C ID	Date	Facility Name & Location	Process	Process	Process Notes	Primary Fuel	Throughput &	Pollutant	Control Method Description	Standard Emission Limit & Units	Emission Limit	Emission Limit	Case by Case Basis	Other Factors	Estimated Efficiency %	Pollutant/ Compliance Notes
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Volatile Organic Compoun	GOOD COMBUSTION PRACTICES 0	)	0.141 G/BHP-H 3- HR AVERAGE	0	BACT- I PSD	N	,,,	
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Carbon Dioxide	GOOD COMBUSTION PRACTICES	)	527.4 G/BHP-H 3- HR AVERAGE	0	BACT- I PSD	Ν		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Particulat e matter, filterable (FPM)	GOOD COMBUSTION PRACTICES 0	)	0.15 G/BHP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Particulat e matter, total < 10 µ	GOOD COMBUSTION PRACTICES 0	)	0.15 G/BHP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	(TPM10) Particulat e matter, total < 2.5 µ (TPM2 5)	GOOD COMBUSTION PRACTICES	)	0.15 G/BHP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES 0	)	2.83 G/BHP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Carbon Monoxide	GOOD COMBUSTION PRACTICES 0	)	2.6 G/BHP-H 3- HR AVERAGE	0	BACT- I PSD	Ν		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Volatile Organic Compoun ds (VOC)	GOOD COMBUSTION PRACTICES 0	)	0.141 G/BHP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Carbon Dioxide	GOOD COMBUSTION PRACTICES 0	)	527.4 G/BHP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Particulat e matter, filterable (FPM)	GOOD COMBUSTION PRACTICES 0	)	0.15 G/B-HP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Particulat e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES	)	0.15 G/B-HP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Particulat e matter, total < 2.5 µ	GOOD COMBUSTION PRACTICES 0	)	0.15 G/B-HP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES 0	)	2.83 G/B-HP-H 3- HR AVERAGE	0	BACT- I PSD	Ν		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Carbon Monoxide	GOOD COMBUSTION PRACTICES 0	)	2.6 G/B-HP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Volatile Organic Compoun ds (VOC)	GOOD COMBUSTION PRACTICES 0	)	0.141 G/B-HP-H 3-HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	FIRE PUMP	17.210	OPERATION LIMITED TO 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.		500 HP	Carbon Dioxide	GOOD COMBUSTION PRACTICES 0	)	527.4 G/B-HP-H 3-HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Particulat e matter, filterable (FPM)	GOOD COMBUSTION PRACTICES 0	)	0.15 G/B-HP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Particulat e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES	)	0.15 G/B-HP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Particulat e matter, total < 2.5 µ	GOOD COMBUSTION PRACTICES 0	)	0.15 G/B-HP-H 3- HR AVERAGE	0	BACT- I PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Nitrogen Oxides (NOx)	GOOD COMBUSTION PRACTICES	)	2.83 G/B-HP-H 3- HR AVERAGE	0	BACT- I PSD	N		

1				1					Standard			Case by		Estimated	
				Process			Throughput	&	Emission Limit	Emission Limit	Emission Limit	Case		Efficiency	
RBLC ID	Date	Facility Name & Location	Process	Туре	Process Notes	Primary Fuel	Units	Pollutant Control Method Description	& Units	1 & Units	2 & Units	Basis	Other Factors	%	Pollutant/ Compliance Notes
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Carbon GOOD COMBUSTION PRACTICES	0	2.6 G/B-HP-H 3- HR AVERAGE	0	BACT- N PSD			
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Volatile GOOD COMBUSTION PRACTICES Organic Compoun ds (VOC)	0	0.141 G/B-HP-H 3-HR AVERAGE	0	BACT- N PSD			
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	RAW WATER PUMP	17.210	OPERATION NOT TO EXCEED 500 HOURS PER YEAR. INSIGNIFICANT ACTIVITY, WILL NOT BE TESTED.	DIESEL, NO. 2	500 HP	Carbon GOOD COMBUSTION PRACTICES Dioxide	0	527.4 G/B-HP-H 3-HR AVERAGE	0	BACT- N PSD			
*TX-0757	05/12/2014 ACT	INDECK WHARTON, LLC INDECK WHARTON ENERGY CENTER WHARTON, TX	Firewater Pump Engine	17.210	Indeck will be equipped with one nominally rated 175-hp diesel-fired pum engine to provide water in the event of a fire. The fire water pump will operate a maximum of 52 hours of non-emergency operation on a 12-month rolling basis fo testing and maintenance. The fire water pump engine emissions represent 0.003% of the total facility-wide GHG emissions.	ULSD P	175 hp	Carbon Dioxide Equivalen t (CO2e)	0	5.34 TPY CO2E 12-MONTH ROLLING TOTAL	0	BACT- U PSD			BACT for the fire water pump engine will be to limit operation to no more than 52 hours of non- emergency operation per year for the purpose of maintenance, testing, and inspection. Indeck will also monitor hours of operation for the purpose of maintenance, testing, and inspection for each engine on a monthly basis. Compliance will be based on runtime hour meter readings on a 12-month rolling basis.
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT LAUDERDALE PLANT BROWARD, FL	Emergency fire pump engine (300 HP)	17.210	Emergency engine. BACT = NSPS IIII.	USLD	29 MMBtu/hr	Carbon Good combustion practice. Monoxide	0	3.5 GRAM PER KW-HR	0	BACT- U PSD			BACT = NSPS IIII; Certified IIII engine meets BACT.
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT LAUDERDALE PLANT BROWARD, FL	Emergency fire pump engine (300 HP)	17.210	Emergency engine. BACT = NSPS IIII.	USLD	29 MMBtu/hr	Particulat Good combustion practice e matter, total (TPM)	0	0.2 GRAM PER HP-HR	0	BACT- U PSD			BACT = NSPS IIII; Certified IIII engine meets BACT.
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT LAUDERDALE PLANT BROWARD, FL	Emergency fire pump engine (300 HP)	17.210	Emergency engine. BACT = NSPS IIII.	USLD	29 MMBtu/hr	Sulfur Good combustion practice and ULSD Dioxide (SO2)	0	15 PPM SULFUR IN FUEL	8 0	BACT- U PSD			BACT = NSPS IIII; Certified IIII engine meets BACT. ULSD specified in NSPS.
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Diesel Fire Pump Engine (EP16)	17.210		Ultra Low Sulfur Diesel	327 hp	Carbon EPA Tier 3 rated Monoxide	0	0	0	BACT- N PSD			limited to 250 hours of non- emergency operation per calendar year
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Diesel Fire Pump Engine (EP16)	17.210		Ultra Low Sulfur Diesel	327 hp	Nitrogen EPA Tier 3 rated Oxides (NOx)	0	0	0	BACT- N PSD			limited to 250 hours of non- emergency operation per calendar year
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Diesel Fire Pump Engine (EP16)	17.210		Ultra Low Sulfur Diesel	327 hp	Sulfur Ultra Low Sulfur Diesel Dioxide (SO2)	0	0	0	BACT- N PSD			limited to 250 hours of non- emergency operation per calendar vear

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			_	Process			Throughput &			Standard Emission Lim	it Emission Limi	t Emission Limit Case	by	Estimated Efficiency
RBLC ID *TX-0762	Date 09/15/2015 ACT	Facility Name & Location NRG TEXAS POWER CEDAR BAYOU ELECTRIC GENERATING STATION CHAMBERS, TX	Process Simple cycle turbines greater than 25 megawatts (MW)	Туре 15.110	Process Notes 4 turbine options General Electric 7HA å€" 359 MW GE 7FA å€" 215 MW Siemens SF5 (SF5) å€" 225 MW Mitsubishi 501G (MHI510G) å€" 263 MW	Primary Fuel natural gas	Units 359 MW	Pollutan Carbon Dioxide	t Control Method Description	0 Units	1 & Units 1232 LB CO2/MWH	2 & Units Basis 0 BACT- PSD	s Other Factors	%         Pollutant/ Compliance Notes           40 Code of Federal Regulations ,         Part 60 (40 CFR Part 60), Subpart           TTTT         TTTT
*SC-0161	02/19/2014 ACT	DUKE ENERGY CAROLINAS LLC, W.S. LEE STEAM STATION , SC	COMBINED CYCLE COMBUSTION TURBINES (SIEMENS)	15.110	THE FACILITY PLANS TO INSTALL EITHER TWO GE 7FA.05 OR TWO SIEMENS SGT-5000F(5) NATURAL GAS FIRED COMBUSTION TURBINE GENERATORS, EACH EQUIPPED WITH A DUCT-FIRED HEAT RECOVERY STEAM GENERATOR.		0	Carbon Dioxide	ENERGY EFFICIENT PROCESSES PRACTICES, AND DESIGN	i, 1000 LB/MWH CO2 12- OPERATING MONTH ROLLING AVERAGE	1000 LB/MWH CO2 12- OPERATING MONTH ROLLING AVERAGE	0 BACT- PSD		CO2 EQUIVALENT PSD LIMIT IS 1,000 POUNDS OF CO2 PER GROSS MEGAWATT-HOUR (LB CO2/MWH) ON A 12- OPERATING MONTH ROLLING AVERAGE FOR THE GROSS ELECTRIC OUTPUT FROM ONE COMBUSTION TURBINE PLUS THE COMMON STEAM TURBINE
*SC-0161	02/19/2014 ACT	DUKE ENERGY CAROLINAS LLC, W.S. LEE STEAM STATION , SC	COMBINED CYCLE COMBUSTION TURBINES (GE)	15.110	THE FACILITY PLANS TO INSTALL EITHER TWO GE 7FA.05 OR TWO SIEMENS SGT-5000F(5) NATURAL GAS FIRED COMBUSTION TURBINE GENERATORS, EACH EQUIPPED WITH A DUCT-FIRED HEAT RECOVERY STEAM GENERATOR.		0	Carbon Dioxide	ENERGY EFFICIENT PROCESSES PRACTICES, AND DESIGN	i, 1000 LB/MWH CO2 12- OPERATING MONTH ROLLING AVERAGE	1000 LB/MWH CO2 12- OPERATING MONTH ROLLING AVERAGE	0 BACT- PSD		GENERATOR. CO2 EQUIVALENT PSD LIMIT IS 1,000 POUNDS OF CO2 PER GROSS MEGAWATT-HOUR (LB CO2/MWH) ON A 12- OPERATING MONTH ROLLING AVERAGE FOR THE GROSS ELECTRIC OUTPUT FROM ONE COMBUSTION TURBINE PLUS THE COMMON STEAM TURBINE CENERATOR
*TX-0762	09/15/2015 ACT	NRG TEXAS POWER CEDAR BAYOU ELECTRIC GENERATING STATION CHAMBERS, TX	Combined cycle and cogeneration turbines greater than 25 MW	15.210	4 turbines options GE 7HA å€* 359 MW +a 301 million British thermal units per hour (MMBtu/hr) duct burner (DB) GE7FA å€* 215 MW +a 523 MMBtu/hr DB SF5 å€* 225 MW + 688 MMBtu/hr DB MHI510G å€* 263 MW + 686 MMBtu/hr DB	natural gas	301 MMBtu/hr	Carbon Dioxide		0	825 LB CO2/MWH	0 BACT- PSD	N	40 CFR Part 60, Subpart TTTT
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Carbon Dioxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	12666 BTU/KW H, MINIMUM CONTINUOUS	116.89 BACT- LB/MMBTU 3-HR AVERAGE	N	CO2 EMISSIONS SHALL NOT EXCEED 144,890 TON/YEAR
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H EACH	I, Carbon Dioxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN: AIR INLET CONTROLS, HEAT RECOVERY CONDENSATE AND BLOWDOWN HEAT RECOVERY	0	59.61 T/MMCF : HR AVERAGE	80 % THERMAL BACT- EFFICIENCY PSD (HHV)	N	
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Carbon Dioxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	12666 BTU/KW H, MINIMUM CONTINUOUS	116.89 BACT- LB/MMBTU 3-HR AVERAGE	N	CO2 EMISSIONS SHALL NOT EXCEED 144,890 TON/YEAR
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H EACH	I, Carbon Dioxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN: AIR INLET CONTROLS, HEAT RECOVERY CONDENSATE AND BLOWDOWN HEAT RECOVERY	0	59.61 TON/MMCF 3- HR AVERAGE	80 % THERMAL BACT- EFFICIENCY PSD (HHV)	N	
*TX-0778	12/16/2015 ACT	NAVASOTA SOUTH PEAKERS OPERATING COMPANY II, LLC. UNION VALLEY ENERGY CENTER NIXON, TX	Simple Cycle Turbine	15.110	The CTGs will be three General Electric 7FA.04 (~183 MW each for a total of 550 MW), operating as peaking units in simple cycle mode. Each turbine will be limited to 2,500 hours of operation per year. The new CTGs will use dry low- NOx (DLN) burners and may employ evaporative cooling for power enhancement.	natural gas	183 MW	Carbon Dioxide Equivale t (CO2e)	n	0	1461 LB/MW H	0 BACT- PSD	N	NSPS TTTT, SIMPLE CYCLE PEAKING TURBINE
*TX-0775	11/13/2015 ACT	NAVASOTA SOUTH PEAKERS OPERATING COMPANY II, LLC. CLEAR SPRINGS ENERGY CENTER (CSEC) GUADALUPE, TX	Simple Cycle Turbine	15.110	The CTGs will be three General Electric 7FA.04 (~183 MW each for a total of 550 MW), operating as peaking units in simple cycle mode. Each turbine will be limited to 2,500 hours of operation per year. The new CTGs will use dry low- NOx (DLN) burners and may employ evaporative cooling for power enhancement.	natural gas	183 MW	Carbon Dioxide Equivale t (CO2e)	Low carbon fuel, good combustion, efficient combined cycle design n	0	1461 LB/MW H	0 BACT- PSD	N	NSPS TTTT, CTGs will operate at 2500 hours of operation per year at baseload.
*TX-0771	11/10/2015 ACT	SHAWNEE ENERGY CENTER, LLC SHAWNEE ENERGY CENTER HILL, TX	Simple cycle turbines greater than 25 megawatts (MW)	15.110	Siemens Model SGT6-5000 F5ee – 230 MW or Second turbine option: General Electric Model 7FA.05TP – 227 MW	natural gas	230 MW	Carbon Dioxide Equivale t (CO2e)	n	0	1398 LB/MWH	0 BACT- PSD	N	Operation of the turbine is limited to 2,920 hours on a 12-month rolling average.
*TX-0735	05/19/2015 EST	GOLDEN SPREAD ELECTRIC COOPERATIVE, INC. ANTELOPE ELK ENERGY CENTER HALE, TX	Simple Cycle Turbine & Generator	15.110	3 additional GE 7F 5-Series Combustion Turbine Generators	natural gas	202 MW	Carbon Dioxide Equivale	Energy efficiency, good design & combustion practices	0	1304 LB CO2/MWHR	0 BACT- PSD	N	Operation of each turbine is limited to 4,572 hours per year

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				Process		Throughput	&		Standard Emission Limit	Emission Limit	Emission Limit	Case by Case		Estimated Efficiency
RBLC ID *TX-0679	Date 02/27/2015 ACT	Facility Name & Location CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, T2	Process Refrigeration Compressor Turbines X	<u>Type</u> 15.110	Process Notes         Primary Fuel           There are three LNG trains with a total of (12) GE LM2500+ DLE turbines that drive the propane and methane refrigeration compressors.         natural gas	Units 40000 hp	Pollutan Carbon Dioxide Equivaler t (CO2e)	t Control Method Description install efficient turbines, follow the turbine manufacturer候s emission- related written instructions for maintenance activities including prescribed maintenance intervals to assure good combustion and efficient operation. Compressors shall be inspected and maintained according to a written maintenance plan to maintain efficiency.	& Units	1 & Units 146754 TPY ROLLING 12- MONTH BASIS	2 & Units 0	Basis BACT- L PSD	Other Factors	% Pollutant/ Compliance Notes The limit is for each turbine.
*IN-0218	12/11/2014 ACT	SABIC INNOVATIVE PLASTICS MT. VERNON, LC SABIC INNOVATIVE PLASTICS MT. VERNON, LC POSEY, IN	COMBUSTION TURBINE:COGEN	15.110	NATURAL GAS	1812 MMBTU/	H Carbon Dioxide Equivaler t (CO2e)	n	0	937379 T/YR	0			COGEN SHALL USE NATURAL GAS ONLY; COGEN SHALL ACHEIVE A MINIMUM NET PLANT EFFICIENCY OF 85% (1 HV)
*TX-0753	12/02/2014 ACT	GUADALUPE POWER PARTNERS, L.P. GUADALUPE GENERATING STATION GUADALUPE, TX	Simple Cycle Combustion Turbine Generator	15.110	Natural gas-fired simple cycle combustion turbine generators (CTG) will be General Electric 7FA.05 (GE 7FA.05), each with a maximum base-load electric power output of 227 megawatts (MW, nominal). Combined gross heat rate limit of 10,279,456 MMBtu/yr.	10673 Btu/kWt	n Carbon Dioxide Equivaler t (CO2e)	n	0	1293.3 LB CO2/MWHR (GROSS) 12- MONTH ROLLING AVERAGE (NORMAL OPER)	20.8 TONS CO2/HR 12- MONTH ROLLING AVERAGE BASIS (MSS OPER	BACT- U PSD	J	BACT limits above are for each CT. The two new turbines have a combined limit of 5,000 hours of operation (including MSS) on a 12- month rolling total basis. Both CT are limited to 300 combined hours of shutdown on a 12-month rolling total basis. Stack Testing Requirements: initial compliance with the CO2 emission limits. Shall be conducted in accordance with 40 CFR 60.8 and Method 3a or 3b. Emission testing for the CT shall be performed every 5 years, plus or minus 6 months to verify continued performance at permitted emission limits.
*TX-0753	12/02/2014 ACT	GUADALUPE POWER PARTNERS, L.P. GUADALUPE GENERATING STATION GUADALUPE, TX	Simple Cycle Combustion Turbine Generator	15.110	Natural gas-fired simple cycle combustion turbine generators (CTG) will be General Electric 7FA.05 (GE 7FA.05), each with a maximum base-load electric power output of 227 megawatts (MW, nominal). Combined gross heat rate limit of 10,279,456 MMBtu/yr.	10673 Btu/kWł	n Carbon Dioxide Equivaler t (CO2e)	n	0	1293.3 LB CO2/MWHR (GROSS) 12- MONTH ROLLING AVERAGE (NORMAL OPER)	20.8 TONS CO2/HR 12- MONTH ROLLING AVERAGE BASIS (MSS OPER	BACT- U PSD	J	BACT limits above are for each CT. The two new turbines have a combined limit of 5,000 hours of operation (including MSS) on a 12- month rolling total basis. Both CT are limited to 300 combined hours of shutdown on a 12-month rolling total basis. Stack Testing Requirements: initial compliance with the CO2 emission limits. Shall be conducted in accordance with 40 CFR 60.8 and Method 3a or 3b. Emission testing for the CT shall be performed every 5 years, plus or minus 6 months to verify continued performance at permitted emission limits.
*TX-0758	08/01/2014 ACT	INVENERGY THERMAL DEVELOPMENT LLC ECTOR COUNTY ENERGY CENTER ECTOR, TX	Simple Cycle Combustion Turbine, GE	. 15.110	Natural Gas	11707 Btu/kWf (HHV)	n Carbon Dioxide Equivaler t (CO2e)		0	1393 LB CO2/MWHR (GROSS) 2500 OPERATIONAL HR ROLLING DAILY/CT	239649 TPY CO2E 12- MONTH ROLLING TOTAI	BACT- U PSD	J	an emission limit of 1,393 lb CO2/MWhr gross output for the GE7FA.03 combustion turbine to be utilized for this project. Each combustion turbine is limited to 2,500 operational hours on a rolling basis, plus 500 startup and shutdown events on a 12&Fmonth rolling average. Until the 2,500 operational hour basis has been established, Invenergy should utilize the performance testing data to establish a plan whereby Invenergy may operate the emission unit in a manner that will not exceed the permitted CO2e emissions limits. To account for the additional hours of operation associated with the startup and shutdowns, each turbine is limited by fuel use associated with the 2,500 hours of operation per year. Limiting the fuel use achieves the same objective as limiting the number of hours of operation of each turbine to 2,500 hours. The fuel use limit for each combustion turbine that corresponds to the 2,500 hours of operation per 385 day basis is 4,028,700 MMBtu (HHV) on a 12-month rolling basis for the GE7FA.03 combustion

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			_	Process		Throughput &			Standard Emission Limit	Emission Limit Emission	Case Limit Case	by a	Estimated Efficiency	
<b>RBLC ID</b> *TX-0758	Date 08/01/2014 ACT	Facility Name & Location INVENERGY THERMAL DEVELOPMENT LLC ECTOR COUNT ENERGY CENTER ECTOR, TX	Y Simple Cycle Combustion Turbine-MSS Y	Type Process Notes	Primary Fuel Natural Gas	0	Pollutan Carbon Dioxide Equivaler t (CO2e)	t Control Method Description	8 Units	1 & Units     2 & Ur       21 TON     0       CO2E/EVENT     EACH MSS       EVENT     EVENT	its Basi BACT- PSD	s Other Factors	%	Pollutant/ Compliance Notes BACT applies during all periods of turbine operation, including startup and shutdown. MSS emissions are limited to 10,502 CO2e per year and each start up and shut down event is limited to 21 tons of CO2e. The number of startups and shutdowns is based on the number of operational hours per year (2,500 service hours per year per turbine). All startups and shutdowns are limited to 60 minutes in duration per event. A startup of each turbine is defined as the period that begins when there is measureable fuel flow to the turbine and ends when the turbine load reaches 60 percent. A shutdown of each turbine is defined as the time period that begins when the combustion turbine drops out of the normal operating low-NOx combustion mode (which equates to approximately 60% combustion
														instruction to shut down, and ends when flame is no longer detected in the combustion turbine combustors. The proposed ECEC project is proposing 500 startups/shutdowns in addition to
*MD-0043	07/01/2014 ACT	CONSTELLATION POWER SOURCE GENERATION, INC. PERRYMAN GENERATING STATION HARFORD, MD	(2) 60-MW SIMPLE CYCLE COMBUSTION TURBINES, FIRING NATURAL GAS	15.110 (2) 60-MEGAWATT PRATT & V GAS TURBINE GENERATOR PACKAGE	HITNEY NATURAL GAS	120 MW	Carbon Dioxide Equivaler t (CO2e)	USE OF NATURAL GAS. ENERGY EFFICIENCY DESIGN - USE OF INLET FOGGING/WET COMPRESSION, INSULATION BLANKETS TO REDUCE HEAT LOSS, AND FUEL GAS PREHEATING	0	1394 LB 0 CO2E/MWH 12- MONTH ROLLING, EXCLUDING SU/SD	BACT- PSD			
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 COMBUSTION TURBINES	15.110 TWO GENERAL ELECTRIC (G FRAME 7EA COMBUSTION TU (CTS) WITH A NOMINAL NET 8 MEGAWATT (MW) RATED CAI COUPLED WITH A HEAT REC STEAM GENERATOR (HRSG), EQUIPPED WITH DRY LOW-N COMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYS (SCR), AND QXIDATION CATA	E) NATURAL GAS IRBINES ACITY, OVERY DX ILYST	130 MW	Carbon Dioxide Equivaler t (CO2e)	HIGH EFFICIENCY GE 7EA CTS WITH HRSGS EQUIPPED WITH DLN1 COMBUSTORS AND EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS OR PIPELINE QUALITY NATURAL GAS	0	117 LB/MMBTU 3 0 HOUR BLOCK AVERAGE	BACT- PSD			117 LB/MMBTU EMISSION LIMIT IS PER TURBINE
*CO-0075	05/30/2014 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPOR GENERATING STATION PUEBLO, CC	Turbine - simple cycle gas	15.110 One (1) General Electric, simple gas turbine electric generator, U (CT08), model: LM6000, SN: N/	cycle, natural gas nit 6 A, rated	375 mmbtu/hr	Carbon Dioxide Equivaler	Good Combustion Control	0	1600 LB/MW H 193555 TO GROSS PER YEAR ROLLING 365- ROLLING	NS BACT- R PSD 365-	U		
*TX-0757	05/12/2014 ACT	INDECK WHARTON, LLC INDECK WHARTON ENERGY CENTER WHARTON, TX	Simple Cycle Combustion Turbine, GE 7FA.05	at 375 MMBtu per hour.         15.110       Indeck proposes to construct the identical natural gas-fired F-clas cycle combustion turbines with associated support equipment. I proposes that the three new cor turbine generators (CTGs) will b General Electric (GE) 7FA.05 or SGT6-5000F(5). The GE 7FA.05 or SGT6-5000F(5) the GE 7FA.05 or SGT6-5000F(5) has a base-load electric power output approximately 213 megawatts (I nominal), and the Siemens SGT 5000F(5) has a base-load electric output of approximately 225 MV nominal).	ee Pipeline Natural Gas s simple ndeck hbustion e either Siemens 5 has a of WW, net 6- ic power / (net	0	<u>It (CO2e)</u> Carbon Dioxide Equivaler t (CO2e)		0	IDAY AVE DAY AVE 1276 LB 321028 TE CO2/MWHR CO2E 12- (GROSS) 2,500 MONTH OPERATIONAL ROLLING DAILY/CT	Y BACT- PSD BASIS	U		GHG BACT for Indeck is the use of modern natural gas-fired, thermally efficient simple cycle combustion turbines combined with evaporative cooling and good combustion and maintenance practices to maintain optimum efficiency. The GE FA7.05 or Siemens SGT6-5000F(5) turbines are consistent with the BACT requirement and the specific goal of this project. EPA is proposing an emission limit of 1,276 lb CO2/MWhr gross output on a 2,500 operational hour rolling basis for the GE 7FA.05 combustion turbine. Each combustion turbine is limited to 2,500 hours of operation, plus 300 startup and shutdowns, each turbine is limited by fuel use associated with the startup and shutdowns, each turbine is limited by fuel use associated with the startup and shutdowns, each turbine is limited by fuel use associated with the startup and shutdowns, each turbine is limited by fuel use associated with the startup and shutdowns, each turbine is limited to fuel use atheres the same objective as limiting the number of hours of operation of each turbine to 2,500 hours. The fuel use limit for and startup and shutdowns, each

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			_	Process			Throughput 8			Standard Emission Limit	Emission Limit	Emission Limit	Case by Case		Estimated Efficiency	
RBLC IC	Date 05/12/2014 ACT	Facility Name & Location INDECK WHARTON, LLC INDECK WHARTON ENERGY CENTER WHARTON, TX	Process Simple Cycle Combustion Turbine, SGT 5000F(5)	- 15.110	Process Notes Indeck proposes to construct three identical natural gas-fired F-class simple cycle combustion turbines with associated support equipment. Indeck proposes that the three new combustion turbine generators (CTGs) will be either General Electric (GE) 7FA.05 or Siemens SGT6-5000F(5). The GE 7FA.05 has a base-load electric power output of approximately 213 megawatts (MW, net nominal), and the Siemens SGT6- 5000F(5) has a base-load electric power output of approximately 225 MW (net nominal).	Primary Fuel Pipeline Natural Gas	Units	Pollutant C Carbon Dioxide Equivalen t (CO2e)	Control Method Description	& Units 0	1 & Units 1337 LB CO2/MWHR (GROSS) 2500 OPERATIONAL HR ROLLING DAILY/CT	2 & Units 358529 TPY CO2E 12- MONTH ROLLING	Basis BACT- PSD	Uther Factors	<u>%</u>	Pollutant/ Compliance Notes GHG BACT for Indeck is the use of modern natural gas-fired, thermally efficient simple cycle combustion turbines combined with evaporative cooling and good combustion and maintenance practices to maintain optimum efficiency. The GE FA7.05 or Siemens SGT6-5000F(5) turbines are consistent with the BACT requirement and the specific goal of this project. EPA is proposing an emission limit of 1,337 lb CO2/MWhr gross output for the Siemens SGT6-5000F(5) combustion turbine on a 2,500 operational hour rolling basis. Each combustion turbine is limited to 2,500 hours of operation, plus 300 startup and shutdowns, each turbine is limited by fuel use associated with the startup and shutdowns, each turbine is limited by fuel use associated with the startup and shutdowns, each turbine is limited by fuel use associated with the startup and shutdowns, each turbine is limiting the number of hours of operation pervear. Limiting the fuel use achieves the same objective as limiting the number of hours of operation of each turbine to 2,500 hours. The fuel use limit
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	GE LMS-100 combustion turbines, simple cycle with water injection	15.110		natural gas	1690 MMBtu/hr	Carbon Ther Dioxide Equivalen t (CO2e)	mal efficiency Clean fuels	0	1707 LB OF CO2 /GROSS MWH 365-DAY ROLLING	2 0	BACT- I PSD	U		for each combustion turbine that
*ND-0030	09/16/2013 ACT	BASIN ELECTRIC POWER COOP. LONESOME CREEK GENERATING STATION MCKENZIE, ND	Natural Gas Fired Simple Cycle Turbine	s 15.110	The heat input is for a single unit.	Natural gas	412 MMBtu/hr	Carbon High Dioxide Equivalen	efficiency turbines	0	220122 TONS 12 MONTH ROLLING TOTAL	2 0	BACT- I PSD	N		The limit is for each unit.
*ND-0029	05/14/2013 ACT	BASIN ELECTRIC POWER COOPERATIVE PIONEER GENERATING STATION WILLIAMS, ND	Natural gas-fired turbines	15.110	Rating is for each turbine.	Natural gas	451 MMBtu/hr	t (CO2e) Carbon Dioxide Equivalen t (CO2e)		0	243147 TONS 12 MONTH ROLLING TOTAL/EACH	2 0	BACT- I PSD	U		Turbines are GE LM6000 PC SPRINT units that burn natural gas with a HHV of 1200 Btu/scf.
*ND-0028	02/22/2013 ACT	MONTANA-DAKOTA UTILITIES CO. R.M. HESKETT STATION MORTON, ND	Combustion Turbine	15.110	Turbine is a GE Model PG 7121 (7EA) used as a peaking unit.	Natural gas	986 MMBTU/H	Carbon Dioxide Equivalen t (CO2e)		0	413198 TONS/12 MONTH 12 MONTH ROLLING TOTAI	2 0	BACT- I PSD	U		
CA-1223	11/19/2012 ACT	PIO PICO ENERGY CENTER, LLC PIO PICO ENERGY CENTER OTAY MESA, CA	COMBUSTION TURBINES (NORMAL , OPERATION)	15.110	Three simple cycle combustion turbine generators (CTG). Each CTG rated at 100 MW (nominal net).	NATURAL GAS	300 MW	Carbon Dioxide Equivalen		0	1328 LB/MW-H GROSS OUTPUT	720 H ROLLING OPERATING HOUR AVG	BACT- I PSD	U		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Carbon Good Dioxide and Equivalen LM2 t (CO2e)	d combustion/operating practice fueled by natural gas - use GE 500+G4 turbines	s 0	4872107 TONS/YR ANNUAL MAXIMUM FROM THE FACILITYWIDE	0	BACT- I PSD	U		CO2(e)
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Carbon Good Dioxide and Equivalen LM2 t (CO2e)	d combustion/operating practice fueled by natural gas - use GE 500+G4 turbines	s 0	4872107 TONS/YR ANNUAL MAXIMUM FROM THE FACILITYWIDE	0	BACT- I PSD	U		CO2(e)
*TX-0679	02/27/2015 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, TX	Refrigeration Compressor Turbine X	15.210	There are three LNG trains. In total there are (6) GE LM2500+ DLE turbines driving the compressors in the ethylene refrigeration sections.	natural gas	40000 hp	Carbon Dioxide Equivalen t (CO2e) relat mair pres assu oper insp to a mair	Il efficient turbines, follow the ne manufacturer候s emission ed written instructions for ttenance activities including cribed maintenance intervals to re good combustion and efficier ation. Compressors shall be ected and maintained according written maintenance plan to ttain efficiency.	0 - nt	146754 TPY 12- MONTH ROLLING BASIS	0	BACT- I PSD	U		The limit is for each turbine.
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Mitsubishi M501-GAC combustion turbine, combined cycle configuration with duct burner.	15.210	or ULSD; Duct burner 499 MMBtu/hr, natural gas	natural gs	2988 MMBtu/hr	Carbon Ther Dioxide Equivalen t (CO2e)	mal efficiency Clean fuels	0	1000 PER GROSS MWH 365-DAY ROLLING AVERAGE	0	BACT- I PSD	U		

BACT Analys RBLC Seach RBLC Searcl	sis: I Parameters: h Date:	2010 - 2015, Process 15.110 12/1/2015									- - -						
				_				_			Standard			Case by		Estimated	
				Process				Throughput &			Emission Limit	Emission Limit	Emission Limit	Case		Efficiency	
RBLC ID	Date	Facility Name & Location	Process	Type	Process Notes		Primary Fuel	Units	Pollutant	Control Method Description	& Units	1 & Units	2 & Units	Basis	Other Factors	%	Pollutant/ Compliance Notes
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE	Combined Cycle Refrigeration	15.210	GE LM2500+G4	natural gas	•	286 MMBTU/H	Carbon	Good combustion/operating practices	0	4872107	0	BACT- U			co2(e)
		PASS LIQUEFACTION, LL SABINE	Compressor Turbines (8)			_			Dioxide	and fueled by natural gas - use GE		TONS/YEAR		PSD			
		PASS LNG TERMINAL CAMERON, LA							Equivalen	LM2500+G4 turbines		ANNUAL					
									t (CO2e)			MAXIMUM					
									` ´			FROM THE					
												FACILITYWIDE					

BACT Analysis: RBLC Seach Parameters:

**RBLC Search Date:** Standard Process Emission Limi Emission Limit Emission Lim Throughput & RBLC ID Facility Name & Location Process Notes Primary Fuel **Control Method Description** & Units 1 & Units 2 & Units Date **Type** 5.110 Units Process Pollutant 0/27/2015 ACT AVASOTA NORTH COUNT mple Cycle Turbin The CTGs will be three General Electric atural ga 183 MV Carbon DLN burners and good co PPMVD @ PEAKERS OPERATING COMPANY I 7FA 04 (~183 MW each for a total of 550 onoxide oractices 15% O2 VAN ALSTYNE ENERGY CENTER MW), operating as peaking units in (VAEC) GRAYSON, TX imple cycle mode. Each turbine will be imited to 2 500 hours of operation per year. The new CTGs will use dry low-NOx (DLN) burners and may employ evaporative cooling for power enhancement. One Siemens F5 simple cycle \*TX-0764 10/14/2015 ACT NACOGDOCHES POWER, LLC Natural Gas Simple Cycle Turbine (>25 15.110 natural gas 232 MW Carbon dry low NOx burners, good PPMVD @ NACOGDOCHES POWER ELECTRIC M/W) ombustion turbine generato onoxide ombustion practices, limited 15% O2 GENERATING PLANT peration NACOGDOCHES, TX SHAWNEE ENERGY CENTER, LLC Simple cycle turbines greater than 25 SHAWNEE ENERGY CENTER HILL, TX megawatts (MW) Siemens Model SGT6-5000 F5ee â€ \*TX-0768 10/09/2015 ACT 15.110 atural gas 230 MW dry low NOx burners and Imiited 9 PPMVD @ Carbon 15% O2 230 MW or Second turbine option: peration, clean fuel onoxide eneral Electric Model 7FA.05TP – 27 MW \*TX-0733 05/12/2015 ACT GOLDEN SPREAD ELECTRIC 3 additional GE 7F 5-Series Combustion 202 MW 9 PPMVD @ 15% O2 3-HR Simple Cycle Turbine & Generator 5.110 natural gas Carbon Good combustion practices; limited COOPERATIVE, INC. ANTELOPE ELK urbine Generators perating hours ENERGY CENTER HALE, TX AVERAGE \*TX-0734 05/08/2015 ACT 83 MW DLN burners and good combustion NAVASOTA SOUTH PEAKERS Simple Cycle Turbine 5.110 The CTGs will be three General Electric natural gas Carbon 9 PPMVD @ OPERATING COMPANY II, LLC. 7FA.04 (~183 MW each for a total of 550 15% O2 ALL ractices MW), operating as peaking units in simple cycle mode. Each turbine will be CLEAR SPRINGS ENERGY CENTER LOADS (CSEC) GUADALUPE, TX imited to 2,500 hours of operation per year. The new CTGs will use dry low-NOx (DLN) burners and may employ vaporative cooling for power hancement. INDECK WHARTON LLC INDECK The CTGs will either be the General \*TX-0694 02/02/2015 ACT 15.110 220 MW 4 PPMVD @15% 9 PPMVD @15 (3) combustion turbines natural gas Carbon DLN combustors WHARTON ENERGY CENTER Electric 7FA (~214 MW each) or the 02, 3-HR 02, 3-HR WHARTON, TX emens SGT6-5000F (~227 MW each), ROLLING AVG - ROLLING AVG perating as peaking units in simple cyc SIEMENS GE 7FA 'TX-0688 12/19/2014 ACT NRG TEXAS POWER SR BERTRON latural Gas 225 MW Good Combustion Practices 9 PPM 1HR Simple cycle natural gas turbines 5.110 Carbon ELECTRIC GENERATION STATION ROLLING AVG. ARRIS. TX Catalytic Oxidation \*CO-0076 12/11/2014 ACT BLACK HILLS ELECTRIC GE LMS100PA, natural gas fired, simple 799.7 mmbtu/hr 55 LB/H 1-HR urbines - two simple cycle gas 5.110 natural gas Carbon GENERATION LLC PUEBLO AIRPORT cle. combustion turbine AVE / STARTUP GENERATING STATION PUEBLO, CO AND SHUTDOWN \*TX-0696 09/22/2014 ACT 9 PPMVD @15% TENASKA ROAN'S PRAIRIE The three possible CT models are: (1) 600 MW (2) simple cycle turbines 5 110 natural gas Carbon DLN combustors PARTNERS (TRPP), LLC ROAN'S General Electric 7FA.04; (2) General 02, 3-HR PRAIRIE GENERATING STATION Electric 7FA.05; or (3) Siemens SGT6-ROLLING GRIMES. TX 5000F. will operate 2,920 hours per yea AVERAGE at full load for each CT \*TX-0672 09/12/2014 ACT CORPUS CHRISTI LIQUEFACTION Refrigeration compressor turbines 3 liquefied natural gas trains consisting o a total of (12) GE LM2500+ DLE turbines 40000 hp dry low emission combustors 29 PPMVD .110 atural gas Carboi @15% O2. 4 LC CORPUS CHRISTI novi LIQUEFACTION PLANT GREGORY, 1 HOUR ROLLING drive the propane and methane section AVERAGE ompressors. \*TX-0695 08/01/2014 ACT INVENERGY THERMAL (2) combustion turbines (2) GE 7FA.03, 2500 hours of operation natural gas 80 MW DLN combustors 9 PPMVD @159 5.110 Carbon DEVELOPMENT LLC ECTOR COUNTY er year each 02, 3-HR ENERGY CENTER ECTOR. TX ROLLING AVG 1.5 PPMVD @ 562.4 LB/EVEN 15% O2 3-HOUR FOR ALL BLOCK STARTUPS \*MD-0044 06/09/2014 ACT DOMINION COVE POINT LNG, LP 2 COMBUSTION TURBINES 5.110 TWO GENERAL ELECTRIC (GE) NATURAL GAS 30 MW EXCLUSIVE USE OF FACILITY Carbon COVE POINT LNG TERMINAL FRAME 7EA COMBUSTION TURBINES PROCESS FUEL GAS OR PIPELINE novi (CTS) WITH A NOMINAL NET 87.2 CALVERT. MD QUALITY NATURAL GAS. USE OF MEGAWATT (MW) RATED CAPACITY, AN OXIDATION CATALYST AND AVERAGE, COUPLED WITH A HEAT RECOVERY EFFICIENT COMBUSTION EXLUDING STEAM GENERATOR (HRSG), SU/SD EQUIPPED WITH DRY LOW-NOX COMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYSTEM SCR), AND OXIDATION CATALYST General Electric Frame 7E turbines have NRG TEXAS POWER LLC PH ROBINSON ELECTRIC GENERATING 65 MW DLN combustors 25 PPMVD \*TX-0691 05/20/2014 ACT (6) simple cycle turbines 5.110 atural gas Carbon an ISO rating of 65 MW and a nominal @15% O2, 3-HR novi STATION GALVESTON, TX naximum generating capacity of 80 MW ROLLING The turbines were originally constructed AVERAGE as Frame 7B units that were remanufactured in 1999 and upgraded to 7E machines Each of the turbines will no exceed 20 percent annual capacity (equivalent to 1,752 full load hours) in any single year or 10 percent annual capacity factor (equivalent to 876 full loa hours) averaged over any three year period, which qualifies each of the CTGs as Acid Rain Peaking Units under 40 CFR 72.2

	Case by		Estimated	
nit	Case		Efficiency	
	Basis	Other Factors	%	Pollutant/ Compliance Notes
	BACT-	N		CTGs will operate at 2500 hours of
	PSD			operation per year at baseload.
				NSPS KKKK
	DACT	NI .		On another of the tracking is limited
	BACI-	IN		to 2 500 hours on a 12 month
	100			rolling average
				rolling average.
	BACT-	N		
	PSD			
	BACT-	N		Operation of each turbine is limited
	PSD			to 4,572 hours per year
	BACT-	N		NSPS KKKK CTGs will operate at
	PSD	1.		2500 hours of operation per year
	1 00			at baseload
	B. 1. 05			
0%	BACI-	U		
	r9D			
- י				
	BACT-	N		
	PSD			
	BACT-	U		The CO limit was converted to an
	PSD			equivalent hourly based limit (the
				original permit included an event
				based limit) for periods of startup
	BACT-	N		will operate 2 920 hours per year
	PSD	1.4		at full load for each CT
	BACT-	U		
	r9D			
	BACT-	U		2500 hrs/yr operation
	PSD			
JΤ	BACT			
11	PSD			
	1 30			FRAME 7 CTS PER STARTUP
				OR SHUTDOWN EVENT
	BACT	N		limited use
	PSD	14		
		1		1

RBLC Sea	ch Date:										_						
	Data	Facility Name & Location	Brocoss	Process	Brosses Notes		Primary Eucl	Throughput &	Pollutari	Control Method Description	Standard Emission Limit	Emission Limit	Emission Limit	Case by Case Rasis	Other Easters	Estimated Efficiency	Bollutant/ Compliance Notes
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT LAUDERDALE PLANT BROWARD, FL	Five 200-MW combustion turbines	15.110	Throughput could vary slightly (+/- 120 MMBtu/hr) depending on final selection of turbine model and firing of natural gas or oil. Primary fuel is expected to be gas Each turbine limited to 3300 hrs per rolling 12-month period. Of these 3300 hrs, no more than 500 may use ULSD fuel oil	Natural gas	Filling Fuel	2000 MMBtu/hr (approx)	Carbon Monoxide	Good combustion practices	0	4 PPMVD @ 15% O2	21 LB/H	BACT- PSD	U	70	Natural gas: 4.0 ppmvd@ 15% O2, and 21.0 lb/hr. ULSD: 9.0 ppmvd@15%O2, and 49.0 lb/hr. lb/hr limits are per turbine.
*TX-0686	04/22/2014 ACT	GOLDEN SPREAD ELECTRIC COOPERATIVE, INC. ANTELOPE ELK ENERGY CENTER HALE, TX	Combustion Turbine-Generator(CTG)	15.110	Simple Cycle	Natural Gas		202 MW	Carbon Monoxide	Good combustion practices; limited hours	0	9 PPMVD 15% O2, 3HR AVG.	0	BACT- PSD	N		
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	GE LMS-100 combustion turbines, simple cycle with water injection	15.110		natural gas		1690 MMBtu/hr	Carbon Monoxide	Oxidation catalyst; Limit the time in startup or shutdown.	0	6 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON	6 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON	BACT- PSD	U		
*SC-0161	02/19/2014 ACT	DUKE ENERGY CAROLINAS LLC, W.S. LEE STEAM STATION , SC	COMBINED CYCLE COMBUSTION TURBINES (SIEMENS)	15.110	THE FACILITY PLANS TO INSTALL EITHER TWO GE 7FA.05 OR TWO SIEMENS SGT-5000F(5) NATURAL GAS FIRED COMBUSTION TURBINE GENERATORS, EACH EQUIPPED WITH A DUCT-FIRED HEAT RECOVERY STEAM GENERATOR.			0	Carbon Monoxide	OXIDATION CATALYST	0.9 PPMVD @ 15% O2 CONT. OPERATION WITHOUT DUCT BURNERS	4.7 LB/H CONT. OPERATION WITHOUT DUCT BURNERS	1804 LB/H AVG. PER STARTUP AND SHUTDOWN EVENT	BACT- PSD			THERE ARE ALSO CO EMISSON LIMITS ASSOCIATED WITH DUCT BURNERS (CONTINUOUS OPERATION) WHICH ARE 1.7 PPMVD @15% O2 AND 11.4 LB/HR.
*ND-0030	09/16/2013 ACT	BASIN ELECTRIC POWER COOP. LONESOME CREEK GENERATING STATION MCKENZIE, ND	Natural Gas Fired Simple Cycle Turbines	\$ 15.110	The heat input is for a single unit.	Natural gas		412 MMBtu/hr	Carbon Monoxide	Oxidation Catalyst	0	6 PPMVD 8- HOUR ROLLING AVERAGE EXCEPT STARTUP	31.5 LB 30 MINUTE TOTAL FOR STARTUP	BACT- PSD	N	90.000	The startup limit is for each unit. The three units are limited to a total combined emission rate of 54.2 pounds per hour (1-hour average) at all times
*ND-0029	05/14/2013 ACT	BASIN ELECTRIC POWER COOPERATIVE PIONEER GENERATING STATION WILLIAMS, ND	Natural gas-fired turbines	15.110	Rating is for each turbine.	Natural gas		451 MMBtu/hr	Carbon Monoxide	Catalytic oxidation system	0	6 PPMVD 8 HR. ROLLING AVERAGE/EXCE PT STARTUP	57.2 LB 1 HR/DURING STARTUP	BACT- PSD	U	95.200	average) at all unles.
*TX-0701	05/13/2013 ACT	INVENERGY THERMAL DEVELOPMENT LLC ECTOR COUNTY ENERGY CENTER ECTOR, TX	Simple Cycle Combustion Turbines	15.110		natural gas		180 MW	Carbon Monoxide	Good combustion practices	0	9 PPMVD 15%O2, 3HR AVERAGE	0	BACT- PSD	Ν		
*ND-0028	02/22/2013 ACT	MONTANA-DAKOTA UTILITIES CO. R.M. HESKETT STATION MORTON, ND	Combustion Turbine	15.110	Turbine is a GE Model PG 7121 (7EA) used as a peaking unit.	Natural gas		986 MMBTU/H	Carbon Monoxide	Good Combustion	0	25 PPMVD @ 15% OXYGEN 4 H.R.A./WHEN > 50 MWE	27 TONS/30 DA 30 DAY ROLLING TOTA / WHEN < 50	Y BACT- PSD L	Y		
*TX-0690	09/12/2012 ACT	NRG TEXAS POWER CEDAR BAYOU ELECTRIC GERNERATION STATION CHAMBERS, TX	Simple Cycle Combustion Turbines	15.110	The gas turbines will be one of three options: (1) Two Siemens Model F5 (SF5) CTGs each rated at nominal capability of 225 megawatts (MW). (2) Two General Electric Model 7FA (GE7FA) CTGs each rated at nominal capability of 215 MW. (3) Two Mitsubish Heavy Industry G Frame (MHI501G) CTGs each rated at a nominal electric output of 28 MW	Natural Gas		225 MW	Carbon Monoxide	Good Combustion Practices	0	9 PPM 1HR ROLLING AVG.	0	BACT- PSD	N		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Simple Cycle Turbine (EP03)	15.110		Natural Gas		40 MW	Carbon Monoxide	Oxidiation Catalyst	32.9 T/YR	6 PPMV AT 15% O2 1-HOUR	5.6 LB/H 30-DAY ROLLING AVERAGE	PSD	N		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Simple Cycle Trubine (EP04)	15.110		Natural Gas		40 MW	Carbon Monoxide	Oxidation Catalyst	32.9 T/YR	6 PPMV AT 15% O2 1-HOUR	5.6 LB/H 30-DAY ROLLING AVERAGE	PSD	N		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Simple Cycle Turbine (EP05)	15.110		Natural Gas		40 MW	Carbon Monoxide	Oxidation Catalyst	32.9 T/YR	6 PPMV AT 15% O2 1-HOUR AVERAGE	5.6 LB/H 30-DAY ROLLING AVERAGE	PSD	Ν		
LA-0258	12/21/2011 ACT	ENTERGY GULF STATES LA LLC CALCASIEU PLANT CALCASIEU, LA	TURBINE EXHAUST STACK NO. 1 & NO. 2	15.110		NATURAL C	GAS	1900 MM BTU/H EACH	Carbon Monoxide	DRY LOW NOX COMBUSTORS	15 PPMVD @ 15% O2	781 LB/H HOURLY MAXIMUM	5745.6 LB/H HOURLY MAXIMUM / STARTUP & SHUTDOWN ONLY	BACT- PSD	U		LIMITS ARE PER TURBINE EXHAUST STACK. AGGREGATE CO EMISSIONS FROM BOTH TURBINE EXHAUST STACKS ARE LIMITED TO 1344.53 TONS PER YEAR. STARTUP & SHUTDOWN OPERATIONS ARE LIMITED TO 520 HOURS PER YEAR.
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas		286 MMBTU/H	Carbon Monoxide	Good combustion practices and fueled by natural gas	58.4 PPMV AT 15% OXYGEN	43.6 LB/H HOURLY MAXIMUM	0	BACT- PSD	U		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas		286 MMBTU/H	Carbon Monoxide	Good combustion practices and fueled by natural gas	25 PPMV AT 15% O2	17.46 LB/H HOURLY MAXIMUM	0	BACT- PSD	U		
NM-0051	05/02/2011 ACT	SOUTHWESTERN PUBLIC SERVICE CO. CUNNINGHAM POWER PLANT LEA, NM	Normal Mode (without Power Augmentation)	15.110		natural gas		0	Carbon Monoxide	Good Combustion Practices as defined in the permit.	0	77.2 LB/H HOURLY	0	BACT- PSD	Ν		CO BACT established in PSD-NM- 622-M2 issued 2-10-97.
NM-0051	05/02/2011 ACT	SOUTHWESTERN PUBLIC SERVICE CO. CUNNINGHAM POWER PLANT LEA, NM	Power Augmentation	15.110	Increase power output by lowering the outlet air temperatur through water inejctinos into the compressor.	natural gas		0	Carbon Monoxide	Good combustion practices as defined in the permit.	0	138.9 LB/H HOURLY	0	BACT- PSD	U		CO BACT established in PSD-NM- 622-M2 issued 2-10-97.

NDEO Ocar	in Date.									-						
RBLC ID	Date	Facility Name & Location	Process	Process Type	Process Notes	Primary Fuel	Throughput & Units	Pollutant	Control Method Description	Standard Emission Limit & Units	Emission Limit 1 & Units	Emission Limit 2 & Units	Case by Case Basis	Other Factors	Estimated Efficiency %	Pollutant/ Compliance Notes
NJ-0076	10/27/2010 ACT	PSEG FOSSIL LLC PSEG FOSSIL LLC KEARNY GENERATING STATION HUDSON, NJ	SIMPLE CYCLE TURBINE	15.110	Throughput <= 8.94xE6 MMBtu/year (HHV) combined for all six gas turbines. The 6 turbines are identical LM6000 simple cycle combustion turbines.	Natural Gas	8940000 MMBtu/year (HHV)	Carbon Monoxide	Oxidation Catalyst, Good combustion practices	0	5 PPMVD@15% O2 3-HR ROLLING AVERAGE BASED ON 1-HR BLOCK	5.35 LB/H AVERAGE OF THREE TESTS	OTHER CASE-BY- CASE	N -	90.000	
NJ-0077	09/16/2010 ACT	VINELAND MUNICIPAL ELECTRIC UTILITY (VMEU) HOWARD DOWN STATION CUMBERLAND, NJ	SIMPLE CYCLE (NO WASTE HEAT RECOVERY)(>25 MW)	15.110	THE PROCESS CONSISTS OF ONE NEW TRENT 60 SIMPLE CYCLE COMBUSTION TURBINE. THE TURBINE WILL GENERATE 64 MW OF ELECTRICITY USING NATURAL GAS AS A PRIMARY FUEL (UP TO 8760 HOURS PER YEAR), WITH A BACKUP FUEL OF ULTRA LOW SULFUR DIESEL FUEL (ULSD) WHICH CAN ONLY BE COMBUSTED FOR A MAXIMUM OF 500 HOURS PER YEAR AND ONLY DURING NATURAL GAS CURTAILMENT. THE MAXIMUM HEAT INPUT RATE WHILE COMBUSTING NATURAL GAS IS 590 MMBTU/HR AND THE MAXIMUM HEAT INPUT RATE WHILE COMBUSTING ULSD IS 568 MMBTU/HR. THE TURBINE WILL UTILZE WATER INJECTION AND SELECTIVE CATALYTIC REDUCTION TO CONTROL NOX EMISSION AND A CATALYTIC OXIDIZER TO CONTROL CO AND VOC EMISSION.	NATURAL GAS	5000 MMFT3/YF	Carbon Monoxide	THE TURBINE WILL UTILIZE A CATALYTIC OXIDIZER TO CONTROL CO EMISSION, IN ADDITION TO USING CLEAN BURNING FUELS, NATURAL GAS AND ULTRA LOW SULFUR DISTILLATE OIL WITH 15 PPM SULFUR BY WEIGHT	0	5 PPMVD@15%02 3HR ROLLING AVERAGE BASED ON 1-HR BLOCK	6.4 LB/H 3HR 2 ROLLING AVERAGE BASED ON 1-HR BLOCK	OTHER CASE-BY- CASE		90.000	
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPORT GENERATING STATION PUEBLO, CO	Three simple cycle combustion turbines	15.110	Three GE, LMS100PA, natural gas-fired, simple cycle CTG rated at 799.7 MMBtu per hour each,based on HHV.	natural gas	799.7 mmbtu/hr	Carbon Monoxide	Good Combustion Control and Catalytic Oxidation (CatOx)	0	10 PPMVD AT 15% O2 1-HR AVE	19.8 LB/H 30- DAY ROLLING AVE	BACT- PSD	U		Startup limit: 28.0 lb per event Shutdown limit: 36.0 lb per event compliance with BACT limits monitored via continuous
GA-0139	05/14/2010 ACT	SOUTHERN POWER COMPANY DAHLBERG COMBUSDTION TURBINE ELECTRIC GENERATING FACILITY (P JACKSON, GA	SIMPLE CYCLE COMBUSTION TURBINE - ELECTRIC GENERATING PLANT	15.110	THE PROCESS USES FUEL OIL FOR BACKUP AT THE RATE OF 2129 MMBUT/H	NATURAL GASE	1530 MW	Carbon Monoxide	GOOD COMBUSTION PRACTICES	0	9 PPM@15%02 3-HOUR AVERAGE/CON DITION 3.3.24	30 PPM@15%02 3-HOUR AVERAGE/CON DITION 3.3.28	BACT- PSD	U		emissions monitors.
*CO-0076	12/11/2014 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPORT GENERATING STATION PUEBLO, CO	Four combined cycle combution turbines	15.210	GE, LM6000 PF, natural gas fired, combined cycle combustion turbines, with HRSG and no duct burners.	natural gas	373 mmbtu/hr each	Carbon Monoxide	Catalytic Oxidation.	0	38 LB/H 4-HR ROLLING AVE / STARTUP AND SHUTDOWN	0	BACT- PSD	U		The CO limit was converted to an equivalent hourly based limit (the original permit included an event based limit) for periods of startup and shutdown
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, TX	Refrigeration compressor turbines	15.210	3 liquefied natural gas trains consisting o a total of (6) GE LM2500+ DLE turbines that drive the ethylene section compressors with waste heat recovery for amine solution regeneration.	natural gas	40000 hp	Carbon Monoxide	dry low emission combustors	0	29 PPMVD @15% O2, 4 HOUR ROLLING AVERAGE	0	BACT- PSD	U		
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Mitsubishi M501-GAC combustion turbine, combined cycle configuration with duct burner.	15.210	or ULSD; Duct burner 499 MMBtu/hr, natural gas	natural gs	2988 MMBtu/hr	Carbon Monoxide	Oxidation catalyst; Limit the time in startup or shutdown.	0	3.3 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON	9 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON	BACT- PSD	U		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE. WY	Combined Cycle Turbine (EP01)	15.210		Natural Gas	40 MW	Carbon Monoxide	Oxidation Catalyst	32 T/YR	4 PPMV AT 15% 02 1-HOUR	3.7 LB/H 30-DAY ROLLING AVERAGE	BACT- PSD	U		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Combined Cycle Turbine (EP02)	15.210		Natural Gas	40 MW	Carbon Monoxide	Oxidation Catalyst	32 T/YR	4 PPMV AT 15% O2 1-HOUR	3.7 LB/H 30-DAY ROLLING AVERAGE	' BACT- PSD	Ν		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Carbon Monoxide	Good combustion practices and fueled by natural gas	58.4 PPMV AT 15% O2	43.6 LB/H HOURLY MAXIMUM	0	BACT- PSD	U		
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPORT GENERATING STATION PUEBLO, CO	Four combined cycle combution turbines	15.210	Three GE, LMS6000 PF, natural gas- fired, combined cycle CTG, rated at 373 MMBtu per hour each, based on HHV and one (1) HRSG each with no Duct Burners	natural gas	373 mmbtu/hr	Carbon Monoxide	Good combustion control and catalytic oxidation	0	4 PPMVD AT 15% O2 1-HR AVE	3.3 LB/H 30-DAY ROLLING AVE	BACT- PSD	U		startup limit: 140.0 lb per event shutdown limit: 15.0 lb per event compliance is monitored with continuous emissions monitors
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Carbon Monoxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	0.03 LB/MMBTU 3-HR AVERAGE AT > 50% PEAK LOAD	0	BACT- PSD	Ν		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H EACH	l, Carbon Monoxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	37.22 LB/MMCF 3-HR AVERAGE	0	BACT- PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Carbon Monoxide	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	0.03 LB/MMBTU 3-HR AVERAGE AT > 50% PEAK LOAD	0	BACT- PSD	Ν		

BACT Analysis: RBLC Seach Parameters:

**RBLC Search Date:** Standard Process Emission Limi Emission Limit Emission Lim Throughput 8 JC Type 16.210 RBLC ID Facility Name & Location & Units 1 & Units 2 & Units Date **Process Notes** Primary Fuel Control Method Description GOOD COMBUSTION PRACTICES Process HREE (3) AUXILARY BOILERS Units Pollutant NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 06/04/2014 ACT MIDWEST FERTILIZER ATURAL GAS 218.6 MMBTU/H Carbon 37.22 LB/MMCF CORPORATION MIDWEST FACH onoxide AND PROPER DESIGN 3-HR AVERAGE ERTILIZER CORPORATION POSEY MMCF/YR \*TX-0701 05/13/2013 ACT INVENERGY THERMAI Simple Cycle Combustion Turbines 180 MW Hydrogen Firing pipeline quality natural gas and Sulfide good combustion practices. 15 110 natural gas DEVELOPMENT LLC ECTOR COUNTY ENERGY CENTER ECTOR. TX NM-0051 05/02/2011 ACT SOUTHWESTERN PUBLIC SERVICE Normal Mode (without Power 15.110 Dry Low NOx Burners Type K & 21 PPMVD atural gas Nitroaen CO. CUNNINGHAM POWER PLANT ugmentation) oxide Good Combustion Practice HOUR LEA. NM (NO2) NM-0051 SOUTHWESTERN PUBLIC SERVICE Dry Low NOx burners, Type K. Good 30 PPMVD 05/02/2011 ACT Power Augmentation 5.110 Increase power output by lowering the natural gas Nitrogen CO. CUNNINGHAM POWER PLANT outlet air temperatur through water oxide Combustion Practices as defined in HOURLY LEA. NM neictinos into the compressor. (NO2) the permit. \*TX-0769 NAVASOTA NORTH COUNTRY 10/27/2015 ACT The CTGs will be three General Electric 83 MW Simple Cycle Turbine 5.110 natural gas Nitrogen DLN burners 9 PPMVD @ PEAKERS OPERATING COMPANY I 7FA.04 (~183 MW each for a total of 550 xides 15% O2 3-HR VAN ALSTYNE ENERGY CENTER MW), operating as peaking units in (NOx) AVERAGE (VAEC) GRAYSON, TX simple cycle mode. Each turbine will be mited to 2,500 hours of operation per year. The new CTGs will use dry low-NOx (DLN) burners and may employ vaporative cooling for power nhancement. NACOGDOCHES POWER LLC One Siemens F5 simple cycle \*TX-0764 10/14/2015 ACT 15.110 232 MW Natural Gas Simple Cycle Turbine (>25 natural gas Vitrogen Dry Low NOx burners, good 9 PPMVD @ NACOGDOCHES POWER ELECTRIC 15% O2 mbustion turbine generato ombustion practices, limited Dxides GENERATING PLANT (NOx) erations NACOGDOCHES TX \*TX-0768 0/09/2015 ACT Siemens Model SGT6-5000 F5ee – 230 MW Dry Low NOx burners PPMVD @ SHAWNEE ENERGY CENTER, LLC Simple cycle turbines greater than 25 15.110 atural gas Vitroger SHAWNEE ENERGY CENTER HILL, TX m egawatts (MW) 230 MW or Second turbine option: 15% O2 General Electric Model 7FA.05TP – (NOx) 227 MW additional GE 7F 5-Series Combustion \*TX-0733 05/12/2015 ACT GOLDEN SPREAD ELECTRIC Simple Cycle Turbine & Generator 202 MW Dry Low NOx burners 9 PPMVD AT natural gas Vitroger OOPERATIVE, INC. ANTELOPE ELK Furbine Generators xides 15% O2 NERGY CENTER HALE, TX (NOx) TX-0734 The CTGs will be three General Electric natural gas dry low-NOx (DLN) burners PPMVD @ 05/08/2015 ACT NAVASOTA SOUTH PEAKERS mple Cycle Turbine 83 MW 5.110 Vitrogen OPERATING COMPANY II. LLC. 7FA.04 (~183 MW each for a total of 550 15% O2 3-HR Oxides CLEAR SPRINGS ENERGY CENTER MW), operating as peaking units in (NOx) AVERAGE (CSEC) GUADALUPE, TX simple cycle mode. Each turbine will be limited to 2,500 hours of operation per year. The new CTGs will use dry low-NOx (DLN) burners and may employ vaporative cooling for power nhancement. The CTGs will either be the General TX-0694 02/02/2015 ACT INDECK WHARTON, L.L.C. INDECK (3) combustion turbines 220 MW LN combustors 9 PPMVD @15% 5 110 atural das Nitroaen WHARTON ENERGY CENTER Electric 7FA (~214 MW each) or the 02, 3-HR ides WHARTON, TX Siemens SGT6-5000F (~227 MW each) (NOx) ROLLING operating as peaking units in simple cycl AVERAGE NRG TEXAS POWER SR BERTRON Simple cycle natural gas turbines \*TX-0688 12/19/2014 ACT 15 110 latural Gas 225 MW Nitrogen DLN 9 PPM 3HR ELECTRIC GENERATION STATION ROLLING AVG. xides ARRIS. TX NOx) BLACK HILLS ELECTRIC 23 LB/H 1-HR \*CO-0076 12/11/2014 ACT 5.110 GE LMS100PA, natural gas fired, simple natural gas Furbines - two simple cycle gas 799.7 mmbtu/hi SCR and dry low NOx burners roger GENERATION, LLC PUEBLO AIRPORT AVE / STARTUP cvcle, combustion turbine each xides GENERATING STATION PUEBLO, CO NOx) AND SHUTDOWN \*TX-0696 09/22/2014 ACT renaska Roan'S PRAIRIE (2) simple cycle turbines 5.110 he three possible CT models are: (1) atural gas 600 MW LN combustors PPMVD @15% Nitrogen PARTNERS (TRPP), LLC ROAN'S PRAIRIE GENERATING STATION General Electric 7FA.04; (2) General O2, 3-HR ROLLING AVG Electric 7FA.05: or (3) Siemens SGT6-(NOx) 5000F. will operate 2,920 hours per yea GRIMES. TX at full load for each CT \*TX-0672 CORPUS CHRISTI LIQUEFACTION 25 PPMVD @ 09/12/2014 ACT efrigeration compressor turbines 0000 hp Bliquefied natural gas trains consisting o natural gas Vitroger Orv low emission combustors LC CORPUS CHRISTI a total of (12) GE LM2500+ DLE turbines 15% O2, 4 kides LIQUEFACTION PLANT GREGORY, T drive the propane and methane section (NOx) HOUR ROLLING moressors AVG \*TX-0695 08/01/2014 ACT INVENERGY THERMAL (2) combustion turbines 5.110 (2) GE 7FA.03, 2500 hours of operation natural gas 80 MW DLN combustors 9 PPMVD @159 trogen DEVELOPMENT LLC ECTOR COUNTY ber year each )xides 02, 3-HR ENERGY CENTER ECTOR, TX ROLLING AVG (NOx) CONSTELLATION POWER SOURCE (2) 60-MEGAWATT PRATT & WHITNEY NATURAL GAS 2.5 PPMVD @ (2) 60-MW SIMPLE CYCLE \*MD-0043 USE OF NATURAL GAS 2.5 PPMVD @ 5.8 LB/H 3-15% O2 3-HOUR HOUR BLOCK 07/01/2014 ACT 5.110 120 MW Nitroger GENERATION, INC. PERRYMAN OMBUSTION TURBINES, FIRING GÁS TURBINE GENERATOR WATER/STEAM INJECTION, AND A Oxides GENERATING STATION HARFORD, NATURAL GAS PACKAGE (NOx) SELECTIVE CATAYTIC BLOCK AVERAGE, REDUCTION (SCR) SYSTEM AVERAGE EXCLUDING EXCLUDING SU/SD SU/SD

	Coos hu		E a time a ta al	
nit	Case by		Estimated	
	Basis	Other Factors	%	Pollutant/ Compliance Notes
	BACT-	N	78	Tonutanti Compliance Notes
	PSD			
	BACT-	N		
	PSD			
	BACT-	N		Limit is NOx pomyd at 15% O2 at
	PSD	1.4		site conditions (not adjusted to
				standard conditions). Base case.
				No cost analysis was provided for
				dry low NOx burners. However,
				costs for other controls were
	DAOT			evaluated.
	BACI-	U		NOX BACT during power
	F3D			O2 and site conditions (not
				adjusted to standard conditions)
	BACT-	N		NSPS KKKK and IIII CTGs will
	PSD			operate at 2500 hours of operation
				per year at baseload.
	PACT	N		Operation of the turbing is limited
	DACI-	IN		to 2 500 hours on a 12-month
	1 00			rolling average
				ronnig average.
	BACT-	N		Operation of the turbine is limited
	PSD			to 2,920 hours on a 12-month
				rolling average.
	BACT-	N		operation of each turbine is limited
	PSD			to 4,572 hours per year
	PACT	N		
	DACI-	IN		operate at 2500 hours of operation
	FSD			operate at 2500 hours of operation
				per year at baseload.
	BACI-	U		
	P5D			
	BACT-	N		
	PSD			
	BACT-	U		The NOx limit was converted to an
	PSD			equivalent hourly based limit (the
				original permit included an event
				based limit) for periods of startup
	PACT	N		and shuldown.
	DAC1-	11		at full load for each CT
	100			
	BACT-	U		
	PSD			
	1			1
	BACT-	11		2500 br/yr operation
	PSD	Ĭ		
_				
	LAER			STARTUP EVENTS (1 CT OR 2
	1			CTS) ARE LIMITED TO 36.4
	1			LB/EVENT; AND SHUTDOWN
	1			EVENTS (1 CT OR 2 CTS) ARE
				LIMITED TO 9.27 LB/EVENT
	1	1		1

	Jin Bute.									-						
RBLC ID	Date	Facility Name & Location	Process	Process Type	Process Notes	Primary Fuel	Throughput 8 Units	Pollutar	t Control Method Description	Standard Emission Limit & Units	Emission Limit 1 & Units	Emission Limit 2 & Units	Case by Case Basis	Other Factors	Estimated Efficiency %	d y Pollutant/ Compliance Notes
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 COMBUSTION TURBINES	15.110	TWO GENERAL ELECTRIC (GE) FRAME 7EA COMBUSTION TURBINES (CTS) WITH A NOMINAL NET 87.2 MEGAWATT (MW) RATED CAPACITY, COUPLED WITH A HEAT RECOVERY STEAM GENERATOR (HRSG), EQUIPPED WITH DRY LOW-NOX COMBUSTORS, SELECTIVE CATALYTIC REDUCTION CATALYST	NATURAL GAS	130 MW	Nitrogen Oxides (NOx)	USE OF DRY LOW-NOX COMBUSTOR TURBINE DESIGN (DLN1), USE OF FACILITY PROCESS FUEL GAS AND PIPELINE NATURAL GAS DURING NORMAL OPERATION AND SCR SYSTEM	0	2.5 PPMVD @ 15% O2 3-HOUR BLOCK AVERAGE, EXCLUDING SU/SD	1304.5 LB/EVENT FOR ALL STARTUPS	LAER			48.5 LB/SHUTDOWN EVENT. LIMITS ARE TOTAL FOR BOTH FRAME 7 CTS PER STARTUP OR SHUTDOWN EVENT
*TX-0691	05/20/2014 ACT	NRG TEXAS POWER LLC PH ROBINSON ELECTRIC GENERATING STATION GALVESTON, TX	6) simple cycle turbines	15.110	General Electric Frame 7E turbines have an ISO rating of 65 MW and a nominal maximum generating capacity of 80 MW The turbines were originally constructed as Frame 7B units that were remanufactured in 1999 and upgraded to 7E machines Each of the turbines will no exceed 20 percent annual capacity (equivalent to 1,752 full load hours) in any single year or 10 percent annual capacity factor (equivalent to 876 full loa hours) averaged over any three year period, which qualifies each of the CTGs as Acid Rain Peaking Units under 40 CFR 72.2	natural gas , , d	65 MW	Nitrogen Oxides (NOx)	DLN combustors	0	15 PPMVD @15% 02, 3-HR ROLLING AVERAGE	0	BACT- PSD	N		limited use
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT LAUDERDALE PLANT BROWARD, FL	Five 200-MW combustion turbines	15.110	Throughput could vary slightly (+/- 120 MMBtu/hr) depending on final selection of turbine model and firing of natural gas or oil. Primary fuel is expected to be gas Each turbine limited to 3300 hrs per rolling 12-month period. Of these 3300 hrs, no more than 500 may use ULSD fuel oil	Natural gas	2000 MMBtu/hr (approx)	Nitrogen Oxides (NOx)	Required to employ dry low-NOx technology and wet injection. Water injection must be used when firing ULSD.	0	9 PPMVD @ 15% 02 24-HR BLOCK AVG, BY CEMS (NAT GAS)	77 LB/H 24-HR BLOCK, BY CEMS (NAT GAS)	BACT- PSD	υ		NOx CEMS required – employing EPA Method 7E. For natural gas, 9.0 ppmvd@15% O2 and 77 lb/hr. For oil, 42.0 ppmvd@15% O2 and 378.0 lb/hr.
*TX-0686	04/22/2014 ACT	GOLDEN SPREAD ELECTRIC COOPERATIVE, INC. ANTELOPE ELK ENERGY CENTER HALE. TX	Combustion Turbine-Generator(CTG)	15.110	Simple Cycle	Natural Gas	202 MW	Nitrogen Oxides (NOx)	DLN	0	9 PPM 15% O2, 3 HR. ROLLING AVG.	0	BACT- PSD	Y		
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	GE LMS-100 combustion turbines, simple cycle with water injection	15.110		natural gas	1690 MMBtu/hr	Nitrogen Oxides (NOx)	Utilize water injection when combusting natural gas or ULSD; Utilize selective catalytic reduction (SCR) with aqueous ammonia injection at all times except during startup and shutdown; Limit the time in startup or schutdown; Limit the time	0	2.5 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON NG	3.8 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON ULSD	BACT- PSD	U		
*ND-0030	09/16/2013 ACT	BASIN ELECTRIC POWER COOP. LONESOME CREEK GENERATING STATION MCKENZIE, ND	Natural Gas Fired Simple Cycle Turbines	s 15.110	The heat input is for a single unit.	Natural gas	412 MMBtu/hr	Nitrogen Oxides (NOx)	SCR	0	5 PPMVD 4 HOUR ROLLING AVERAGE EXCEPT	18.5 LB TOTAL FOR 30 MINUTES DURING	BACT- PSD	Ν	90.000	The startup limit is for each unit. The three units are limited to a total combined emission rate of 42.9 pounds per hour (1-hour
*ND-0029	05/14/2013 ACT	BASIN ELECTRIC POWER COOPERATIVE PIONEER GENERATING STATION WILLIAMS, ND	Natural gas-fired turbines	15.110	Rating is for each turbine.	Natural gas	451 MMBtu/hr	Nitrogen Oxides (NOx)	Water injection plus SCR	0	5 PPPMVD 4 HR. ROLLING AVERAGE EXCEPT FOR	19 LB PER HOUR DURING STARTUP	BACT- PSD	U	80.000	average) at an unres.
*TX-0701	05/13/2013 ACT	INVENERGY THERMAL DEVELOPMENT LLC ECTOR COUNT ENERGY CENTER ECTOR, TX	Simple Cycle Combustion Turbines Y	15.110		natural gas	180 MW	Nitrogen Oxides (NOx)	Dry low NOx combustor	0	9 PPMVD 15%O2, 3HR ROLLING BASIS	0	BACT- PSD	N		
*ND-0028	02/22/2013 ACT	MONTANA-DAKOTA UTILITIES CO. R.M. HESKETT STATION MORTON, ND	Combustion Turbine	15.110	Turbine is a GE Model PG 7121 (7EA) used as a peaking unit.	Natural gas	986 MMBTU/H	Nitrogen Oxides (NOx)	Dry low-NOx combustion (DLN)	399 LB/H 1 HOUR AVG./ANY TIME	9 PPMVD @15% OYYGEN 4 H.R.A. WHEN > 50MWE AND > 0 DEGREES F	96 PPMVD @15% OXYGEN 4 H.R.A. WHEN < 50 MWE OR < 0 DEGREES F	BACT- PSD	Y		
CA-1223	11/19/2012 ACT	PIO PICO ENERGY CENTER, LLC PIC PICO ENERGY CENTER OTAY MESA CA	COMBUSTION TURBINES (NORMAL , OPERATION)	15.110	Three simple cycle combustion turbine generators (CTG). Each CTG rated at 100 MW (nominal net).	NATURAL GAS	300 MW	Nitrogen Oxides (NOx)	WATER INJECTION, SCR	0	2.5 PPMVD @15% O2, 1-HR AVG	8.18 LB/H 1-HR AVG	BACT- PSD	U		
CA-1223	11/19/2012 ACT	PIO PICO ENÈRGY CÈNTÈR, LLC PIC PICO ENERGY CENTER OTAY MESA CA	D COMBUSTION TURBINES (STARTUP &	& 15.110	Three simple cycle combustion turbine generators (CTG). Each CTG rated at 100 MW (nominal net).	NATURAL GAS	300 MW	Nitrogen Oxides (NOx)	water injection and SCR system	0	22.5 LB/H STARTUP EVENTS	6 LB/H SHUTDOWN EVENTS	BACT- PSD	0		Third emission limit incorrectly entered into the Standard Limit field. RBLC SysOp moved the information into this Notes field. Here is the information: 26.60 LB/H 1-HR AVG, STARTUP & SHUTDOWN EVENTS 1) DURATION OF STARTUP & EACH CTG SHALL NOT EXCEED 30 MINUTES PER EVENT; 2) DURATION OF SHUTDOWNS OF EACH CTG SHALL NOT EXCEED 11 MINUTES EVENT; 3) TOTAL NUMBER OF STARTUPS SHALL NOT EXCEED 500 PER TURBINE, PER CALENDAR YEAR.

RBLC ID	Date	Facility Name & Location Process	Process Type	Process Notes	Primary Fuel	Throughput & Units	Pollutar	t Control Method Description	Standard Emission Lim & Units	t Emission Limit	t Emission Limi	Case by it Case Basis	Estimated Efficiency Other Factors %	Pollutant/ Compliance Notes		
*TX-0690	09/12/2012 ACT	NRG TEXAS POWER CEDAR BAYOU ELECTRIC GERNERATION STATION CHAMBERS, TX	15.110	The gas turbines will be one of three options: (1) Two Siemens Model F5 (SF5) CTGs each rated at nominal capability of 225 megawatts (MW). (2) Two General Electric Model 7FA (GE7FA) CTGs each rated at nominal capability of 215 MW. (3) Two Mitsubishi Heavy Industry G Frame (MHI501G) CTGs each rated at a nominal electric output of 282 MW.	Natural Gas	225 MW	Nitrogen Oxides (NOx)	DLN	0	9 PPM 3HR. ROLLING AVG.	0	BACT- PSD	N			
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. Simple Cycle Turbine (EP03) CHEYENNE PRAIRIE GENERATING STATION I ARAMIE WY	15.110		Natural Gas	40 MW	Nitrogen Oxides	SCR	36 T/YR	5 PPMV AT 15% O2 1-HOUR	5 7.7 LB/H 30-DA ROLLING	Y BACT- PSD	N			
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. Simple Cycle Trubine (EP04) CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	15.110		Natural Gas	40 MW	Nitrogen Oxides (NOx)	SCR	36 T/YR	5 PPMV AT 15% O2 1-HOUR AVERAGE	5 7.7 LB/H 30-DA ROLLING AVERAGE	Y BACT- PSD	N			
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION L ABAMIE WY	15.110		Natural Gas	40 MW	Nitrogen Oxides	SCR	36 T/YR	5 PPMV AT 15% O2 1-HOUR	7.7 LB/H 30-DA ROLLING AVERAGE	Y BACT- PSD	N			
LA-0258	12/21/2011 ACT	ENTERGY GULF STATES LA LLC CALCASIEU PLANT CALCASIEU, LA NO. 2	15.110		NATURAL GAS	1900 MM BTU/ EACH	H Nitrogen Oxides (NOx)	DRY LOW NOX COMBUSTORS	17.5 PPMVD @ 15% O2	240 lb/h Hourly Maximum	798 LB/H HOURLY MAXIMUM / STARTUP & SHUTDOWN ONLY	BACT- PSD	U	LIMITS ARE PER TURBINE EXHAUST STACK. AGGREGATE NOX EMISSIONS FROM BOTH TURBINE EXHAUST STACKS ARE LIMITED TO 391.30 TONS PER YEAR. STARTUP & SHUTDOWN OPERATIONS ARE LIMITED TO 520 HOURS PER YEAR.		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE         Simple Cycle Refrigeration Compressor           PASS LIQUEFACTION, LL SABINE         Turbines (16)           PASS LNG TERMINAL CAMERON, LA         Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Nitrogen Oxides (NOx)	water injection	20 PPMV AT 15% O2	22.94 LB/H HOURLY MAXIMUM	0	BACT- PSD	U			
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE Simple Cycle Generation Turbines (2) PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Nitrogen Oxides (NOx)	water injection	25 PPMV AT 15% O2	28.68 LB/H HOURLY MAXIMUM	0	BACT- PSD	υ			
NJ-0076	10/27/2010 ACT	PSEG FOSSIL LLC PSEG FOSSIL LLC SIMPLE CYCLE TURBINE KEARNY GENERATING STATION HUDSON, NJ	15.110	Throughput <= 8.94xE6 MMBtu/year (HHV) combined for all six gas turbines. The 6 turbines are identical LM6000 simple cycle combustion turbines.	Natural Gas	8940000 MMBtu/year (HHV)	Nitrogen Oxides (NOx)	SCR and Use of Clean Burning Fuel: Natural gas	0	2.5 PPMVD@15%O 3-HR ROLLING AVERAGE BASED ON 1-HF BLOCK	4.39 LB/H 2 AVERAGE OF THREE TESTS R	OTHER CASE-BY- CASE	Y 90.000			
NJ-0077	09/16/2010 ACT	VINELAND MUNICIPAL ELECTRIC UTILITY (VMEU) HOWARD DOWN STATION CUMBERLAND, NJ	15.110	THE PROCESS CONSISTS OF ONE NEW TRENT 60 SIMPLE CYCLE COMBUSTION TURBINE. THE TURBINE WILL GENERATE 64 MW OF ELECTRICITY USING NATURAL GAS AS A PRIMARY FUEL (UP TO 8760 HOURS PER YEAR), WITH A BACKUP FUEL OF ULTRA LOW SULFUR DIESEL FUEL (ULSD) WHICH CAN ONLY BE COMBUSTED FOR A MAXIMUM OF 500 HOURS PER YEAR AND ONLY DURING NATURAL GAS CURTAILMENT. THE MAXIMUM HEAT INPUT RATE WHILE COMBUSTING NATURAL GAS IS 590 MMBTU/HR AND THE MAXIMUM HEAT INPUT RATE WHILE COMBUSTING ULSD IS 568 MMBTU/HR. THE TURBINE WILL UTILIZE WATER INJECTION AND SELECTIVE CATALYTIC REDUCTION TO CONTROL NOX EMISSION AND A CATALYTIC OXIDIZER TO CONTROL CO AND VOC EMISSION.	NATURAL GAS	5000 MMFT3/Y	R Nitrogen Oxides (NOx)	THE TURBINE WILL UTILIZE WATER INJECTION AND SELECTIVE CATALYTIC REDUCTION (SCR) TO CONTROL NOX EMISSION AND USE CLEAN FUELS NATURAL GAS AND ULTRA LOW SULFUR DISTILLATE OIL TO MINIMIZE NOX EMISSIONS	0	2.5 PPMVD@15%0 3HR ROLLING AVERAGE BASED ON 1-HF BLOCK	5.4 LB/H 3HR 12 ROLLING AVERAGE BASED ON 1-H R BLOCK	OTHER CASE-BY- CASE R	90.000			
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC Three simple cycle combustion turbines GENERATION, LLC PUEBLO AIRPORT GENERATING STATION PUEBLO, CO	15.110	Three GE, LMS100PA, natural gas-fired, simple cycle CTG rated at 799.7 MMBtu per hour each,based on HHV.	natural gas	799.7 mmbtu/h	r Nitrogen Oxides (NOx)	Good combustor design, Water Injection and Selective Catalytic Reduction (SCR)	0	5 PPMVD AT 15% O2 1-HR AVE	15.5 LB/H 30- DAY ROLLING AVE	BACT- PSD	U	startup limit = 12.0 lb per event shutdown limit = 18.0 lb per event compliance with BACT limits monitored via continuous amissions monitors		
GA-0139	05/14/2010 ACT	SOUTHERN POWER COMPANY DAHLBERG COMBUSDTION TURBINE ELECTRIC GENERATING FACILITY (P JACKSON, GA	15.110	THE PROCESS USES FUEL OIL FOR BACKUP AT THE RATE OF 2129 MMBUT/H	NATURAL GASE	1530 MW	Nitrogen Oxides (NOx)	DRY LOW NOX BURNERS (FIRING NATURAL GAS). WATER INJECTION (FIRING FUEL OIL).	0	9 PPM@15%02 3 HOUR AVERAGE/CON DITION 3.3.23	42 PPM@15%0 3 HOUR AVERAGE/CON IION 3.3.27	2 BACT- PSD IT	U			
GA-0139	05/14/2010 ACT	SOUTHERN POWER COMPANY DAHLBERG COMBUSDTION TURBINE ELECTRIC GENERATING FACILITY (P JACKSON, GA	15.110	THE PROCESS USES FUEL OIL FOR BACKUP AT THE RATE OF 2129 MMBUT/H	NATURAL GASE	1530 MW	Nitrogen Oxides (NOx)	DRY LOW NOX BURNERS (FIRING NATURAL GAS), WATER INJECTION (FIRING FUEL OIL).	0	297 T/YR 12 CONSECUTIVE MONTH AVERAGE /CONDITION	0	BACT- PSD	U	NUMERIC LIMIT CONSIST OF NG AND FO.		
				1						Standard		Τ	Case bv	[	Estimated	
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				Process			Throughput 8	k		Emission Limit	Emission Limit	Emission Limit	t Case		Efficiency	
RBLC ID *CO-0076	Date 12/11/2014 ACT	Facility Name & Location BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPOR GENERATING STATION PUEBLO, CO	Process Four combined cycle combution turbines	<b>Type</b> 15.210	Process Notes GE, LM6000 PF, natural gas fired, combined cycle combustion turbines, wit HRSG and no duct burners.	Primary Fuel natural gas h	Units 373 mmbtu/hr each	Pollutar Nitrogen Oxides (NOx)	tt Control Method Description SCR and dry low NOx burners	& Units	1 & Units 8 LB/H 4-HR ROLLING AVE / STARTUP AND SHUTDOWN	2 & Units 0	Basis BACT- PSD	Other Factors	% Polluta The NOx equivalen original pe based lim and shutd	nt/ Compliance Notes limit was converted to an it hourly based limit (the ermit included an event it) for periods of startup lown.
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, T2	Refrigeration compressor turbines	15.210	3 liquefied natural gas trains consisting of a total of (6) GE LM2500+ DLE turbines that drive the ethylene section compressors with waste heat recovery for amine solution regeneration.	f natural gas	40000 hp	Nitrogen Oxides (NOx)	dry low emission combustors	0	25 PPMVD @15% O2, 4 HOUR ROLLING AVERAGE	0	BACT- PSD	U		
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Mitsubishi M501-GAC combustion turbine, combined cycle configuration with duct burner.	15.210	or ULSD; Duct burner 499 MMBtu/hr, natural gas	natural gs	2988 MMBtu/hr	Nitrogen Oxides (NOx)	Utilize dry low-NOx burners when combusting natural gas; Utilize water injection when combusting ULSD; Utilize selective catalytic reduction (SCR) with aqueous ammonia injection at all times except during startup and shutdown; Limit the time in startup or shutdown.	0	2 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON NG	5.5 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON ULSD	BACT- PSD	U		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE. WY	Combined Cycle Turbine (EP01)	15.210		Natural Gas	40 MW	Nitrogen Oxides (NOx)	SCR	25.5 T/YR	3 PPMV AT 15% O2 1-HOUR	4.6 LB/H 30-DAY ROLLING AVERAGE	Y BACT- PSD	N		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Combined Cycle Turbine (EP02)	15.210		Natural Gas	40 MW	Nitrogen Oxides (NOx)	SCR	25.5 T/YR	3 PPMV AT 15% O2 1-HOUR	4.6 LB/H 30-DAY ROLLING AVERAGE	/ BACT- PSD	N		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Nitrogen Oxides (NOx)	water injection	20 PPMV AT 15% O2	22.94 LB/H HOURLY MAXIMUM	0	BACT- PSD	U		
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPOR' GENERATING STATION PUEBLO, CO	Four combined cycle combution turbines	15.210	Three GE, LMS6000 PF, natural gas- fired, combined cycle CTG, rated at 373 MMBtu per hour each, based on HHV and one (1) HRSG each with no Duct Burners	natural gas	373 mmbtu/hr	Nitrogen Oxides (NOx)	Dry Low NOx (DLN) Combustor and Selective Catalytic Reduction (SCR)	0	3 PPMVD AT 15% O2 1-HR AVE	4.1 LB/H 30-DAY ROLLING AVE	r BACT- PSD	U	startup lin shutdown compliand continuou	nit: 30.0 lb per event limit: 5.0 lb per event ce is monitored with is emissions monitors
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Nitrogen Oxides (NOx)	DRY LOW NOX COMBUSTORS	0	22.65 PPMVD A 15% OXYGEN 3 HR AVERAGE AT > 50% PEAK LOAD	T 0 -	BACT- PSD	N		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY,	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/ EACH	H, Nitrogen Oxides (NOx)	LOW NOX BURNERS, FLUE GAS RECIRCULATION	0	20.4 LB/MMCF 3 HR AVERAGE	8- 0	BACT- PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Nitrogen Oxides (NOx)	DRY LOW NOX COMBUSTORS	0	22.65 PPMVD A 15% OXYGEN 3 HR AVERAGE AT > 50% PEAK LOAD	T 0 -	BACT- PSD	Ν		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/ EACH	H, Nitrogen Oxides (NOx)	LOW NOX BURNERS, FLUE GAS RECIRCULATION	0	20.4 LB/MMCF 3 HR AVERAGE	3- 0	BACT- PSD	N		
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 COMBUSTION TURBINES	15.110	TWO GENERAL ELECTRIC (GE) FRAME 7EA COMBUSTION TURBINES (CTS) WITH A NOMINAL NET 87.2 MEGAWATT (MW) RATED CAPACITY, COUPLED WITH A HEAT RECOVERY STEAM GENERATOR (HRSG), EQUIPPED WITH DRY LOW-NOX COMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYSTEM (SCR), AND OXIDATION CATALYST	NATURAL GAS	130 MW	Particula e matter filterable (FPM)	t EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS OR PIPELINE QUALITY NATURAL GAS AND GOOD COMBUSTION PRACTICES	0	0.0033 LB/MMBTU 3- HOUR BLOCK AVERAGE	0	BACT- PSD			
NJ-0076	10/27/2010 ACT	PSEG FOSSIL LLC PSEG FOSSIL LLC KEARNY GENERATING STATION HUDSON, NJ	SIMPLE CYCLE TURBINE	15.110	Throughput <= 8.94xE6 MMBtu/year (HHV) combined for all six gas turbines. The 6 turbines are identical LM6000 simple cycle combustion turbines.	Natural Gas	8940000 MMBtu/year (HHV)	Particula e matter filterable (FPM)	t Good combustion practice, Use of Clean Burning Fuel: Natural gas	0	6 LB/H AVERAGE OF THREE TESTS	0	BACT- PSD	Ν		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particula e matter filterable (FPM)	t GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	0.0019 LB/MMBTU 3-HF AVERAGE	0 R	BACT- PSD	Ν		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/ EACH	H, Particula e matter filterable (FPM)	t GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	1.9 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	Ν		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particula e matter filterable (FPM)	t GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	0.0019 LB/MMBTU 3-HF AVERAGE	0 R	BACT- PSD	Ν		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/ EACH	H, Particula e matter filterable (FPM)	t GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	1.9 LB/MMCF 3- HR AVERAGE	0	BACT- PSD	Ν		

RBLCID	Date	Facility Name & Location	Process	Process Type Process Notes	Primary Fuel	Throughput &	Pollutan	t Control Method Description	Standard Emission Limit & Units 1 & Unite	Emission Limit Case by	Other Factors	Estimated Efficiency % Pollutant/ Compliance Notes
NM-0051	05/02/2011 ACT	SOUTHWESTERN PUBLIC SERVICE CO. CUNNINGHAM POWER PLANT LEA, NM	Normal Mode (without Power Augmentation)	15.110 FIOLESS NOLES	natural gas	0	Particula e matter, filterable < 10 µ (FPM10)	Good Combustion Practices as described in the permit.	0 5.4 LB/H HOURLY	0 BACT- PSD	U	PM10 BACT as established in PSD-NM-622-M3 issued 2-10-97.
NM-0051	05/02/2011 ACT	SOUTHWESTERN PUBLIC SERVICE CO. CUNNINGHAM POWER PLANT LEA, NM	Power Augmentation	15.110 Increase power output by lowering the outlet air temperatur through water inejctinos into the compressor.	natural gas	0	Particula e matter, filterable < 10 µ (FPM10)	Good combustion practices as defined in the permit.	0 5.4 LB/H HOURLY	0 BACT- PSD	U	PM10 BACT established in PSD- NM-622-M2 issued 2-10-97.
NJ-0077	09/16/2010 ACT	VINELAND MUNICIPAL ELECTRIC UTILITY (VMEU) HOWARD DOWN STATION CUMBERLAND, NJ	SIMPLE CYCLE (NO WASTE HEAT RECOVERY)(>25 MW)	15.110 THE PROCESS CONSISTS OF ONE NEW TRENT 60 SIMPLE CYCLE COMBUSTION TURBINE. THE TURBINE WILL GENERATE 64 MW O ELECTRICITY USING NATURAL GAS AS A PRIMARY FUEL (UP TO 8760 HOURS PER YEAR), WITH A BACKUI FUEL OF ULTRA LOW SULFUR DIESEL FUEL (ULSD) WHICH CAN ONLY BE COMBUSTED FOR A MAXIMUM OF 500 HOURS PER YEAF AND ONLY DURING NATURAL GAS CURTAILMENT. THE MAXIMUM HEA' INPUT RATE WHILE COMBUSTING NATURAL GAS IS 590 MMBTU/HR AN THE MAXIMUM HEAT INPUT RATE WHILE COMBUSTING ULSD IS 568 MMBTU/HR. THE TURBINE WILL UTILIZE WATER INJECTION AND SELECTIVE CATALYTIC REDUCTION TO CONTROL NOX EMISSION AND A CATALYTIC OXIDIZER TO CONTROL CO AND VOC EMISSION.	NATURAL GAS	5000 MMFT3/YI	R Particula e matter, filterable < 10 µ (FPM10)	USE OF CLEAN BURNING FUELS; NATURAL GAS AS PRIMARY FUEL AND ULTRA LOW SULFUR DISTILLATE OIL WITH 15 PPMSULFUR BY WEIGHT AS BACKUP FUEL	0 5 LB/H AVERAGE OF THREE TESTS	0 BACT- PSD	U	
*TX-0688	12/19/2014 ACT	NRG TEXAS POWER SR BERTRON ELECTRIC GENERATION STATION HARRIS, TX	Simple cycle natural gas turbines	15.110	Natural Gas	225 MW	Particula e matter, filterable < 2.5 µ	Good Combustion Practices, natural gas	0 0	0 BACT- PSD	N	Includes PM and PM10
*TX-0686	04/22/2014 ACT	GOLDEN SPREAD ELECTRIC COOPERATIVE, INC. ANTELOPE ELK ENERGY CENTER HALE, TX	Combustion Turbine-Generator(CTG)	15.110 Simple Cycle	Natural Gas	202 MW	Particula e matter, filterable < 2.5 µ (FPM2.5)	Pipeline quality natural gas; limited hours; Good combustion practices	0 0	0 BACT- PSD	N	Includes PM and PM10
CA-1223	11/19/2012 ACT	PIO PICO ENERGY CENTER, LLC PIO PICO ENERGY CENTER OTAY MESA, CA	COMBUSTION TURBINES (NORMAL OPERATION)	15.110 Three simple cycle combustion turbine generators (CTG). Each CTG rated at 100 MW (nominal net).	NATURAL GAS	300 MW	Particula e matter, filterable < 2.5 µ (FPM2.5)	PUC-QUALITY NATURAL GAS	0 0.0065 LB/MMBTU (HHV) AT LOADS OF 80% OR HIGHER	5.5 LB/H BACT- PSD	U	
*TX-0690	09/12/2012 ACT	NRG TEXAS POWER CEDAR BAYOU ELECTRIC GERNERATION STATION CHAMBERS, TX	Simple Cycle Combustion Turbines	15.110 The gas turbines will be one of three options: (1) Two Siemens Model F5 (SF5) CTGs each rated at nominal capability of 225 megawatts (MW). (2) Two General Electric Model 7FA (GE7FA) CTGs each rated at nominal capability of 215 MW. (3) Two Mitsubis Heavy Industry G Frame (MHI501G) CTGs each rated at a nominal electric output of 263 MW.	Natural Gas ni	225 MW	Particula e matter, filterable < 2.5 µ (FPM2.5)	Good Combustion Practices, Natural Gas	0 0	0 BACT- PSD	N	Includes PM and PM10
NJ-0077	09/16/2010 ACT	VINELAND MUNICIPAL ELECTRIC UTILITY (VMEU) HOWARD DOWN STATION CUMBERLAND, NJ	SIMPLE CYCLE (NO WASTE HEAT RECOVERY)(>25 MW)	15.110 THE PROCESS CONSISTS OF ONE NEW TRENT 60 SIMPLE CYCLE COMBUSTION TURBINE. THE TURBINE WILL GENERATE 64 MW O ELECTRICITY USING NATURAL GAS AS A PRIMARY FUEL (UP TO 8760 HOURS PER YEAR), WITH A BACKUI FUEL OF ULTRA LOW SULFUR DIESEL FUEL (ULSD) WHICH CAN ONLY BE COMBUSTED FOR A MAXIMUM OF 500 HOURS PER YEAR AND ONLY DE COMBUSTED FOR A MAXIMUM OF 500 HOURS PER YEAR AND ONLY DURING NATURAL GAS CURTAILMENT. THE MAXIMUM HEA' INPUT RATE WHILE COMBUSTING NATURAL GAS IS 590 MMBTU/HR AN THE MAXIMUM HEAT INPUT RATE WHILE COMBUSTING ULSD IS 568 MMBTU/HR. THE TURBINE WILL UTILIZE WATER INJECTION AND SELECTIVE CATALYTIC REDUCTION TO CONTROL NOX EMISSION AND A CATALYTIC OXIDIZER TO CONTROL CO AND VOC EMISSION.	NATURAL GAS	5000 MMFT3/Y	R Particula e matter, filterable < 2.5 ŵ (FPM2.5)	USE OF CLEAN BURNING FUELS; NATURAL GAS AS PRIMARY FUEL AND ULTRA LOW SULFUR DISTILLATE OIL WITH 15 PPMSULFUR BY WEIGHT AS BACKUP FUEL	0 5 LB/H AVERAGE OF THREE TESTS	0 BACT- PSD	U	
*TX-0764	10/14/2015 ACT	NACOGDOCHES POWER, LLC NACOGDOCHES POWER ELECTRIC GENERATING PLANT NACOGDOCHES, TX	Natural Gas Simple Cycle Turbine (>25 MW)	15.110 One Siemens F5 simple cycle combustion turbine generator	natural gas	232 MW	Particula e matter, total (TPM)	Pipeline quality natural gas; limited hours; good combustion practices.	0 12.09 LB/HR	12.94 TPY BACT- PSD	N	Operation of the turbine is limited to 2,500 hours on a 12-month rolling average.

RBLC ID	Date	Facility Name & Location Process	Process Type Process Notes	Primary Fuel	Throughput & Units	Pollutan	t Control Method Description	Standard Emission Limit & Units 1 & Units	Emission Limit 2 & Units	Case by Case Basis	Other Factors	Estimated Efficiency % Pollutant/ Compliance Notes
*TX-0733	05/12/2015 ACT	GOLDEN SPREAD ELECTRIC Simple Cycle Turbine & Generator COOPERATIVE, INC. ANTELOPE ELK ENERGY CENTER HALE, TX	15.110 3 additional GE 7F 5-Series Combustion Turbine Generators	natural gas	202 MW	Particulat e matter, total	Pipeline quality natural gas; limited hours; good combustion practices.	0 0	0	BACT- PSD	Ν	Operation of each turbine is limited to 4,572 hours per year
CA-1223	11/19/2012 ACT	PIO PICO ENERGY CENTER, LLC PIO PICO ENERGY CENTER OTAY MESA, CA	15.110 Three simple cycle combustion turbine generators (CTG). Each CTG rated at 100 MW (nominal net).	NATURAL GAS	300 MW	Particulat e matter, total (TPM)	PUC-QUALITY NATURAL GAS	0 0.0065 LB/MMBTU (HHV) AT LOADS OF 80%	5.5 LB/H	BACT- PSD	U	
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	15.110	Natural Gas	40 MW	Particulat e matter, total	good combustion practices	0 4 LB/H 3-HOUR AVERAGE	17.5 TONS CALENDAR YEAR	BACT- PSD	N	
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	15.110	Natural Gas	40 MW	(TPM) Particulat e matter, total	good combustion practices	0 4 LB/H 3-HOUR AVERAGE	17.5 TONS CALENDAR YEAR	BACT- PSD	Ν	
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. Simple Cycle Turbine (EP05) CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	15.110	Natural Gas	40 MW	(TPM) Particulat e matter, total	good combustion practices	0 4 LB/H 3-HOUR AVERAGE	17.5 TONS CALENDAR YEAR	BACT- PSD	N	
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE         Simple Cycle Refrigeration Compressor           PASS LIQUEFACTION, LL SABINE         Turbines (16)           PASS LNG TERMINAL CAMERON, LA         A	15.110 GE LM2500+G4	Natural Gas	286 MMBTU/H	(TPM) Particulat e matter, total	Good combustion practices and fueled by natural gas	0 2.08 LB/H HOURLY MAXIMUM	0	BACT- PSD	U	also for PM10 and PM2.5
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	15.110 GE LM2500+G4	Natural Gas	286 MMBTU/H	(TPM) Particulat e matter, total	Good combustion practices and fueled by natural gas	0 2.08 LB/H HOURLY MAXIMUM	0	BACT- PSD	U	also for PM10 and PM2.5
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC Three simple cycle combustion turbines GENERATION, LLC PUEBLO AIRPORT GENERATING STATION PUEBLO, CO	15.110 Three GE, LMS100PA, natural gas-fired, simple cycle CTG rated at 799.7 MMBtu per hour each,based on HHV.	natural gas	799.7 mmbtu/hr	Particulat e matter, total	Use of pipeline quality natural gas and good combustor design	0 6.6 LB/H AVE OVER STACK TEST LENGTH	0	BACT- PSD	U	
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	15.210	Natural Gas	40 MW	Particulat e matter, total	good combustion practices	0 4 LB/H 3-HOUR AVERAGE	17.5 TONS CALENDAR YEAR	BACT- PSD	U	
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	15.210	Natural Gas	40 MW	Particulat e matter, total	good combustion practices	0 4 LB/H 3-HOUR AVERAGE	17.5 TONS CALENDAR YEAR	BACT- PSD	Ν	
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	15.210 GE LM2500+G4	natural gas	286 MMBTU/H	Particulat e matter, total	Good combustion practices and fueled by natural gas	0 2.08 LB/H HOURLY MAXIMUM	0	BACT- PSD	U	also for PM10 and PM2.5
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC Four combined cycle combution turbine GENERATION, LLC PUEBLO AIRPORT GENERATING STATION PUEBLO, CO	5 15.210 Three GE, LMS6000 PF, natural gas- fired, combined cycle CTG, rated at 373 MMBtu per hour each, based on HHV and one (1) HRSG each with no Duct Burmers	natural gas	373 mmbtu/hr	Particulat e matter, total (TPM)	Use of pipeline quality natural gas and good combustor design	0 4.3 LB/H AVE OVER STACK TEST LENGTH	0	BACT- PSD	U	
*TX-0769	10/27/2015 ACT	NAVASOTA NORTH COUNTRY PEAKERS OPERATING COMPANY I VAN ALSTYNE ENERGY CENTER (VAEC) GRAYSON, TX	15.110 The CTGs will be three General Electric 7FA.04 (~183 MW each for a total of 550 MW), operating as peaking units in simple cycle mode. Each turbine will be limited to 2,500 hours of operation per year. The new CTGs will use dry low- NOx (DLN) burners and may employ evaporative cooling for power	natural gas	183 MW	Particulat e matter, total < 10 µ (TPM10)	Pipeline Quality Natural Gas	0 8.6 LB/H	0	BACT- PSD	U	
*TX-0764	10/14/2015 ACT	NACOGDOCHES POWER, LLC NACOGDOCHES POWER ELECTRIC GENERATING PLANT NACOGDOCHES, TX	15.110 One Siemens F5 simple cycle combustion turbine generator	natural gas	232 MW	Particulat e matter, total < 10 µ	Pipeline quality natural gas; limited hours; good combustion practices.	0 12.09 LB/HR	12.94 TPY	BACT- PSD	Ν	Operation of the turbine is limited to 2,500 hours on a 12-month rolling average.
*TX-0768	10/09/2015 ACT	SHAWNEE ENERGY CENTER, LLC Simple cycle turbines greater than 25 SHAWNEE ENERGY CENTER HILL, TX megawatts (MW)	15.110 Siemens Model SGT6-5000 F5ee &€" 230 MW or Second turbine option: General Electric Model 7FA.05TP &€" 227 MW	natural gas	230 MW	(TPM10) Particulat e matter, total < 10 µ (TPM10)	Pipeline quality natural gas; limited hours; good combustion practices.	0 84.1 LB/HR	152.96 TPY	BACT- PSD	N	
*TX-0733	05/12/2015 ACT	GOLDEN SPREAD ELECTRIC Simple Cycle Turbine & Generator COOPERATIVE, INC. ANTELOPE ELK ENERGY CENTER HALE, TX	15.110 3 additional GE 7F 5-Series Combustion Turbine Generators	natural gas	202 MW	Particulat e matter, total < 10 µ	Pipeline quality natural gas; limited hours; good combustion practices.	0 0	0	BACT- PSD	N	Operation of each turbine is limited to 4,572 hours per year
*MD-0043	07/01/2014 ACT	CONSTELLATION POWER SOURCE GENERATION, INC. PERRYMAN GENERATING STATION HARFORD, MD	15.110 (2) 60-MEGAWATT PRATT & WHITNEY GAS TURBINE GENERATOR PACKAGE	NATURAL GAS	120 MW	(TPM10) Particulat e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES AND USE OF NATURAL GAS	0 5 LB/H 3 STACK TEST RUNS	0.0079 LB/MMBTU HIGI HEAT VALUE (HHV)	BACT- I PSD		
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	15.110 TWO GENERAL ELECTRIC (GE) FRAME 7EA COMBUSTION TURBINES (CTS) WITH A NOMINAL NET 87.2 MEGAWATT (MW) RATED CAPACITY, COUPLED WITH A HEAT RECOVERY STEAM GENERATOR (HRSG), EQUIPPED WITH DRY LOW-NOX COMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYSTEM (SCR), AND OXIDATION CATALYST	NATURAL GAS	130 MW	Particulat e matter, total < 10 Âμ (TPM10)	EXCLUSIVE USE OF FACILITY PROCESS FUEL GAS OR PIPELINE QUALITY NATURAL GAS AND GOOD COMBUSTION PRACTICES	0 0.007 LB/MMBTI E 3 STACK TEST RUN AVERAGE, EXCEPT SU/SD	J 300.8 LB/EVENT FOR ALL STARTUPS	BACT- PSD		5.6 LBS/SHUTDOWN EVENT. LIMITS ARE TOTAL FOR BOTH FRAME 7 CTS PER STARTUP OR SHUTDOWN EVENT.

	on Bate.									-					
RBLC ID	Date	Facility Name & Location	Process	Process Type	Process Notes	Primary Fuel	Throughput & Units	Pollutan	t Control Method Description	Standard Emission Limit & Units 1 & Units	Emission Limit	Case by Case Basis	Other Factors	Estimated Efficiency %	Pollutant/ Compliance Notes
*CO-0075	05/30/2014 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPOR GENERATING STATION PUEBLO, CO	Turbine - simple cycle gas T	15.110	One (1) General Electric, simple cycle, gas turbine electric generator, Unit 6 (CT08), model: LM6000, SN: N/A, rated at 375 MMBtu per hour.	natural gas	375 mmbtu/hr	Particulat e matter, total < 10 µ (TPM10)	Firing of pipeline quality natural gas as defined in 40 CFR Part 72. Specifically, the owner or the operator shall demonstrate that the natural gas burned has total sulfur content less than 0.5 grains/100 SCE	0 4.8 LB/H 3-HR AVE	0	BACT- U PSD	U		
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	GE LMS-100 combustion turbines, simple cycle with water injection	15.110		natural gas	1690 MMBtu/hr	Particulat e matter, total < 10 µ (TPM10)	Utilize only natural gas or ULSD fuel; Limit the time in startup or shutdown.	0 9.1 LB/H TOTAL PM 6-HR AVERAGE ON NG	22.7 LB/H TOTAL PM 6-HR AVERAGE ON ULSD	BACT- U PSD	U		
*ND-0028	02/22/2013 ACT	MONTANA-DAKOTA UTILITIES CO. R.M. HESKETT STATION MORTON, ND	Combustion Turbine	15.110	Turbine is a GE Model PG 7121 (7EA) used as a peaking unit.	Natural gas	986 MMBTU/H	Particulat e matter, total < 10 µ	Good Combustion Practices	0 7.3 LB/H AVERAGE OF 3 TEST RUNS	0	BACT- U PSD	U		
CA-1223	11/19/2012 ACT	PIO PICO ENERGY CENTER, LLC PIO PICO ENERGY CENTER OTAY MESA, CA	COMBUSTION TURBINES (NORMAL OPERATION)	15.110	Three simple cycle combustion turbine generators (CTG). Each CTG rated at 100 MW (nominal net).	NATURAL GAS	300 MW	Particulat e matter, total < 10 µ (TPM10)	PUC-QUALITY NATURAL GAS	0 0.0065 LB/MMBTU (HHV) AT LOADS OF 80% OR HIGHER	5.5 LB/H	BACT- U PSD	U		
LA-0258	12/21/2011 ACT	ENTERGY GULF STATES LA LLC CALCASIEU PLANT CALCASIEU, LA	TURBINE EXHAUST STACK NO. 1 & NO. 2	15.110		NATURAL GAS	1900 MM BTU/H EACH	Particulat e matter, total < 10 Âμ (TPM10)	USE OF PIPELINE NATURAL GAS	0 17 LB/H HOURLY MAXIMUM	17 LB/H HOURLY MAXIMUM / STARTUP & SHUTDOWN ONLY	BACT- U PSD	U		LIMITS ARE PER TURBINE EXHAUST STACK. AGGREGATE PM10 EMISSIONS FROM BOTH TURBINE EXHAUST STACKS ARE LIMITED TO 30.94 TONS PER YEAR. STARTUP & SHUTDOWN OPERATIONS ARE LIMITED TO 520 HOURS PER YEAR.
NJ-0076	10/27/2010 ACT	PSEG FOSSIL LLC PSEG FOSSIL LLC KEARNY GENERATING STATION HUDSON, NJ	SIMPLE CYCLE TURBINE	15.110	Throughput <= 8.94xE6 MMBtu/year (HHV) combined for all six gas turbines. The 6 turbines are identical LM6000 simple cycle combustion turbines.	Natural Gas	8940000 MMBtu/year (HHV)	Particulat e matter, total < 10 µ (TPM10)	t Good combustion practice, Use of Clean Burning Fuel: Natural gas	0 6 LB/H AVERAGE OF THREE TESTS	0	BACT- U PSD	U		
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPOR' GENERATING STATION PUEBLO, CO	Three simple cycle combustion turbines	3 15.110	Three GE, LMS100PA, natural gas-fired simple cycle CTG rated at 799.7 MMBtu per hour each,based on HHV.	natural gas	799.7 mmbtu/hr	Particulat e matter, total < 10 µ (TPM10)	Use of pipeline quality natural gas and good combustor design	0 6.6 LB/H AVE OVER STACK TEST LENGTH	0	BACT- U PSD	U		
GA-0139	05/14/2010 ACT	SOUTHERN POWER COMPANY DAHLBERG COMBUSDTION TURBINE ELECTRIC GENERATING FACILITY (P JACKSON, GA	SIMPLE CYCLE COMBUSTION TURBINE - ELECTRIC GENERATING PLANT	15.110	THE PROCESS USES FUEL OIL FOR BACKUP AT THE RATE OF 2129 MMBUT/H	NATURAL GASE	1530 MW	Particulat e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES PIPELINE QUALITY NATURAL GAS ULTRA LOW SULFUR DISTILLATE FUEL	0 9.1 LB/H 3 HOUR AVERAGE/CON DITION 3.3.23	69 LB/H 3 HOUR AVERAGE/CON DITION 3.3.28	BACT- U PSD	U		
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Mitsubishi M501-GAC combustion turbine, combined cycle configuration with duct burner.	15.210	or ULSD; Duct burner 499 MMBtu/hr, natural gas	natural gs	2988 MMBtu/hr	Particulat e matter, total < 10 µ (TPM10)	Utilize only natural gas or ULSD fuel; Limit the time in startup or shutdown.	0 23.6 LB/H TOTA PM 6-HR AVERAGE ON NG	L 42.3 LB/H TOTAL PM 6-HR AVERAGE ON ULSD	BACT- U PSD	U		
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPOR GENERATING STATION PUEBLO, CO	Four combined cycle combution turbine	s 15.210	Three GE, LMS6000 PF, natural gas- fired, combined cycle CTG, rated at 373 MMBtu per hour each, based on HHV and one (1) HRSG each with no Duct Burners	natural gas	373 mmbtu/hr	Particulat e matter, total < 10 µ (TPM10)	t Use of pipeline quality natural gas and good combustor design	0 4.3 LB/H AVE OVER STACK TEST LENGTH	0	BACT- U PSD	U		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particulat e matter, total < 10 µ (TPM10)	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0 0.0076 LB/MMBTU 3-HF AVERAGE	0	BACT- N PSD	Ν		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H EACH	I, Particulat e matter, total < 10 µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0 7.6 LB/MMCF 3- HR AVERAGE	0	BACT- N PSD	Ν		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particulat e matter, total < 10 µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0 0.0076 LB/MMBTU 3-HF AVERAGE	ξ 0	BACT- N PSD	Ν		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/H EACH	I, Particulat e matter, total < 10 µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0 7.6 LB/MMCF 3- HR AVERAGE	0	BACT- N PSD	Ν		
*TX-0769	10/27/2015 ACT	NAVASOTA NORTH COUNTRY PEAKERS OPERATING COMPANY I VAN ALSTYNE ENERGY CENTER (VAEC) GRAYSON, TX	Simple Cycle Turbine	15.110	The CTGs will be three General Electric 7FA.04 (~183 MW each for a total of 550 MW), operating as peaking units in simple cycle mode. Each turbine will be limited to 2,500 hours of operation per year. The new CTGs will use dry low- NOx (DLN) burners and may employ evaporative cooling for power enhancement.	natural gas	183 MW	Particulat e matter, total < 2.5 µ (TPM2.5)	Pipeline Quality Natural Gas	0 8.6 LB/H	0	BACT- N PSD	N		

										Standard		Case by		Estimated	
	5.4		<b>D</b>	Process	D Notes	Disc. E.d.	Throughput &			Emission Limit Emission Limi	t Emission Limi	t Case	011	Efficiency	
*TX-0764	10/14/2015 ACT	NACOGDOCHES POWER, LLC	Process Natural Gas Simple Cycle Turbine (>25	15.110	One Siemens F5 simple cycle	natural gas	232 MW	Pollutar	t Pipeline guality natural gas; limited	0 12.09 LB/HR	12.94 TPY	BACT-	N Other Factors		peration of the turbine is limited
		NACOGDOCHES POWER ELECTRIC GENERATING PLANT NACOGDOCHES, TX	MW)		combustion turbine generator	J		e matter, total < 2. Âu	hours; good combustion practices.			PSD		to	2,500 hours on a 12-month lling average.
								(TPM2.5							
*TX-0768	10/09/2015 ACT	SHAWNEE ENERGY CENTER, LLC	Simple cycle turbines greater than 25	15.110	Siemens Model SGT6-5000 F5ee –	natural gas	230 MW	Particula	t Pipeline quality natural gas; limited	0 84.1 LB/HR	152.96 TPY	BACT-	Ν		
		SHAWINEE EINERGT CENTER HILL, 12	(WWW)		General Electric Model 7FA.05TP –			total < 2.	5			P3D			
					227 MW			Âμ							
*TX-0733	05/12/2015 ACT	GOLDEN SPREAD ELECTRIC	Simple Cycle Turbine & Generator	15 110	3 additional GE 7E 5-Series Combustion	natural das	202 MW	(TPM2.5 Particula	) t Pipeline quality natural gas: limited	0 0	0	BACT-	N	On	peration of each turbine is limited
	00/12/2010/101	COOPERATIVE, INC. ANTELOPE ELK		10.110	Turbine Generators	natarai guo	202	e matter,	hours; good combustion practices.	° °	Ū.	PSD		to	4,572 hours per year
		ENERGY CENTER HALE, TX						total < 2.	5						
								7μ (TPM2.5							
*TX-0694	02/02/2015 ACT	INDECK WHARTON, L.L.C. INDECK	(3) combustion turbines	15.110	The CTGs will either be the General	natural gas	220 MW	Particula	t	0 0	0	BACT-	U	nai	tural gas fuel, includes PM and
		WHARTON ENERGY CENTER WHARTON, TX			Siemens SGT6-5000F (~227 MW each)			e matter, total < 2.	5			PSD		PN	W10
					operating as peaking units in simple cyc	e		Âμ							
*TX 0606	00/22/2014 ACT		(2) simple evels turbines	15 110	mode	natural das	600 MW	(TPM2.5	)	0	0	BACT	N	nat	tural gas fuel, includes PM and
17-0090	05/22/2014 ACT	PARTNERS (TRPP), LLC ROAN'S		13.110	General Electric 7FA.04; (2) General	natural gas	000 10100	e matter,	L	0	0	PSD	IN	PM	M10
		PRAIRIE GENERATING STATION			Electric 7FA.05; or (3) Siemens SGT6-			total < 2.	5						
		GRIMES, TX			5000F. will operate 2,920 hours per year at full load for each CT			Αμ (TPM2 5							
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION	Refrigeration compressor turbines	15.110	3 liquefied natural gas trains consisting of	f natural gas	40000 hp	Particula	t	0 0.72 LB/H 1	0	BACT-	U	Na	atural gas is the fuel. PM and
		LLC CORPUS CHRISTI	,		a total of (12) GE LM2500+ DLE turbines	5		e matter,	F	HOUR		PSD		PM	M10 are equal to PM2.5.
		LIQUEFACTION PLANT GREGORY, 17			compressors.			lotai < ∠. Âu	5						
								(TPM2.5	)						
*TX-0695	08/01/2014 ACT		(2) combustion turbines	15.110	(2) GE 7FA.03, 2500 hours of operation	natural gas	180 MW	Particula	t	0 0	0	BACT-	U	nat	tural gas fuel, includes PM and
		ENERGY CENTER ECTOR, TX			per year each			total < 2.	5			100		1.0	wito
								Âμ							
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG. LP	2 COMBUSTION TURBINES	15.110	TWO GENERAL ELECTRIC (GE)	NATURAL GAS	130 MW	(TPM2.5 Particula	) t EXCLUSIVE USE OF FACILITY	0 0.007 LB/MMBT	U 300.8 LB/EVEN	T BACT-		5.6	6 LBS/SHUTDOWN EVENT.
	00/00/2011/101	COVE POINT LNG TERMINAL		10.110	FRAME 7EA COMBUSTION TURBINES		100 1111	e matter,	PROCESS FUEL GAS OR PIPELINE	3 STACK TEST	FOR ALL	PSD		LIN	MITS ARE TOTAL FOR BOTH
		CALVERT, MD			(CTS) WITH A NOMINAL NET 87.2			total < 2.	5 QUALITY NATURAL GAS AND		, STARTUPS			FR	RAME 7 CTS PER STARTUP
					COUPLED WITH A HEAT RECOVERY			Αμ (TPM2.5	)	EXCEPT 30/3L				Or	R SHUTDOWN EVENT
					STEAM GENERATOR (HRSG),										
					EQUIPPED WITH DRY LOW-NOX										
					CATALYTIC REDUCTION SYSTEM										
*00.0075	05/20/2044 ACT		Turking simple such and	45 440	(SCR), AND OXIDATION CATALYST	a should be a	075	Dentiaula	t Ciria - Ania - line - availity - advanta-		0	DACT			
°CO-0075	05/30/2014 AC1	GENERATION. LLC PUEBLO AIRPORT	r urbine - simple cycle gas	15.110	gas turbine electric generator. Unit 6	natural gas	375 mmblu/nr	e matter.	as defined in 40 CFR Part 72.	4.8 LB/H 3-HR AVE	U	PSD	0		
		GENERATING STATION PUEBLO, CO			(CT08), model: LM6000, SN: N/A, rated			total < 2.	5 Specifically, the owner or the						
					at 375 MMBtu per hour.			Ăμ (TDM2.5	operator shall demonstrate that the						
								(1 F 1012.5	content less than 0.5 grains/100						
+==>	05/00/0044.007			15.110			05104		SCF.						
*TX-0691	05/20/2014 ACT	ROBINSON ELECTRIC GENERATING	(6) simple cycle turbines	15.110	an ISO rating of 65 MW and a nominal	e natural gas	65 MW	Particula e matter	t	0 0	0	BACI- PSD	U	na PM	itural gas fuel, includes PM and
		STATION GALVESTON, TX			maximum generating capacity of 80 MW			total < 2.	5						
					The turbines were originally constructed			µ (TDM2.5							
					remanufactured in 1999 and upgraded to			(TPIVIZ.5	)						
					7E machines Each of the turbines will no	t									
					exceed 20 percent annual capacity										
					any single year or 10 percent annual										
					capacity factor (equivalent to 876 full loa	d									
					hours) averaged over any three year period which qualifies each of the CTGs										
					as Acid Rain Peaking Units under 40										
					CFR 72.2										
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT	Five 200-MW combustion turbines	15.110	Throughput could vary slightly (+/- 120	Natural gas	2000 MMBtu/hr	Particula	t Good combustion practice and low-	0 0	0	BACT-	U	Th	ne fuel specifications of 2.0
		LAUDERDALE PLANT BROWARD, FL			MMBtu/hr) depending on final selection	Ű	(approx)	e matter,	sulfur fuel			PSD		gra	ains/100 standard cubic feet of
					of turbine model and firing of natural gas			total < 2.	5					nai	itural gas and 0.0015% sulfur in
					Each turbine limited to 3300 hrs per			(TPM2.5						op	acity limits for visible emissions
					rolling 12-month period. Of these 3300									(VI	E) are proposed as BACT.
					nrs, no more than 500 may use ULSD fuel oil.										
*ND-0030	09/16/2013 ACT	BASIN ELECTRIC POWER COOP.	Natural Gas Fired Simple Cycle Turbines	s 15.110	The heat input is for a single unit.	Natural gas	412 MMBtu/hr	Particula	t	0 5 LB/H	0	BACT-	N	Lin	mit is for each unit.
		LONESOME CREEK GENERATING						e matter,	5	AVERAGE OF		PSD			
		STATION WORENZIE, ND						µ		RUNS					
	0.5////02/17/17			1				(TPM2.5	)						
*ND-0029	05/14/2013 ACT	BASIN ELECTRIC POWER	Natural gas-fired turbines	15.110	Rating is for each turbine.	Natural gas	451 MMBtu/hr	Particula e matter	t	0 5.4 LB 1 HOUR	U	BACT-	U		
		GENERATING STATION WILLIAMS,						total < 2.	5						
		ND						Ăμ (ΤΡΜ2 F							
						1	1	C. 21VI T IVIZ. 3	/ 1	1				· · · · ·	

BACT Analy RBLC Seach RBLC Searc	sis: n Parameters: h Date:	Crit Large SCT							-					
			Process			Throughput &			Standard Emission Limit	Emission Limit Emission Li	Case by nit Case		Estimated Efficiency	
<b>RBLC ID</b> *TX-0701	Date 05/13/2013 ACT	Facility Name & Location         Process           INVENERGY THERMAL         Simple Cycle Combustion Turbines           DEVELOPMENT LLC ECTOR COUNTY         ENERGY CENTER ECTOR, TX	<b>Type</b> 15.110	Process Notes	Primary Fuel natural gas	Units 180 MW	Pollutan Particula e matter, total < 2. µ	t Control Method Description t Firing pipeline quality natural gas and good combustion practices	& Units	1 & Units         2 & Units           0         0	Basis BACT- PSD	Other Factors N	%	Pollutant/ Compliance Notes Includes PM and PM10
*ND-0028	02/22/2013 ACT	MONTANA-DAKOTA UTILITIES CO. Combustion Turbine R.M. HESKETT STATION MORTON, ND	15.110	Turbine is a GE Model PG 7121 (7EA) used as a peaking unit.	Natural gas	986 MMBTU/H	(TPM2.5 Particula e matter, total < 2. µ	) t Good combustion practices. 5	0	7.3 LB/H 0 AVERAGE OF THREE TEST RUNS	BACT- PSD	U		
LA-0258	12/21/2011 ACT	ENTERGY GULF STATES LA LLC CALCASIEU PLANT CALCASIEU, LA NO. 2	15.110		NATURAL GAS	1900 MM BTU/H EACH	(TPM2.5 Particula e matter, total < 2. Âμ (TPM2.5	USE OF PIPELINE NATURAL GAS	0	17 LB/H 17 LB/H HOURLY HOURLY MAXIMUM MAXIMUM / STARTUP & SHUTDOWN ONLY	BACT- PSD	U		LIMITS ARE PER TURBINE EXHAUST STACK. AGGREGATE PM2.5 EMISSIONS FROM BOTH TURBINE EXHAUST STACKS ARE LIMITED TO 30.94 TONS PER YEAR. STARTUP & SHUTDOWN OPERATIONS ARE LIMITED TO 520 HOURS PER YEAR.
NJ-0076	10/27/2010 ACT	PSEG FOSSIL LLC PSEG FOSSIL LLC SIMPLE CYCLE TURBINE KEARNY GENERATING STATION HUDSON, NJ	15.110	Throughput <= 8.94xE6 MMBtu/year (HHV) combined for all six gas turbines. The 6 turbines are identical LM6000 simple cycle combustion turbines.	Natural Gas	8940000 MMBtu/year (HHV)	Particula e matter, total < 2. µ	Good combustion practice, Use of Clean Burning Fuel: Natural gas	0	6 LB/H AVERGE 0 OF THREE TESTS	BACT- PSD	Y		
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, TX	15.210	3 liquefied natural gas trains consisting c a total of (6) GE LM2500+ DLE turbines that drive the ethylene section compressors with waste heat recovery for amine solution regeneration.	f natural gas	40000 hp	Particula e matter, total < 2. µ (TPM2.5	5 5	0	0.72 LB/H 1 0 HOUR	BACT- PSD	U		Natural gas is the fuel. PM and PM10 are equal to PM2.5.
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER TWO (2) NATURAL GAS FIRED CORPORATION MIDWEST COMBUSTION TURBINES FERTILIZER CORPORATION POSEY, IN	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particula e matter, total < 2. µ (TPM2 5	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	0.0076 0 LB/MMBTU 3-HR AVERAGE	BACT- PSD	N		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER TWO (2) NATURAL GAS FIRED CORPORATION MIDWEST COMBUSTION TURBINES FERTILIZER CORPORATION POSEY, IN	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Particula e matter, total < 2. µ	GOOD COMBUSTION PRACTICES AND PROPER DESIGN 5	0	0.0076 0 LB/MMBTU 3-HR AVERAGE	BACT- PSD	N		
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, TX	15.110	3 liquefied natural gas trains consisting c a total of (12) GE LM2500+ DLE turbines drive the propane and methane section compressors.	f natural gas	40000 hp	Sulfur Dioxide (SO2)		0	0.31 LB/H 1 0 HOUR	BACT- PSD	U		Fuel sulfur is very low for natural gas.
*TX-0695	08/01/2014 ACT	INVENERGY THERMAL (2) combustion turbines DEVELOPMENT LLC ECTOR COUNTY ENERGY CENTER ECTOR, TX	15.110	(2) GE 7FA.03, 2500 hours of operation per year each	natural gas	180 MW	Sulfur Dioxide (SO2)		0	1 GR/100 DSCF 0	BACT- PSD	U		
*TX-0701	05/13/2013 ACT	INVENERGY THERMAL Simple Cycle Combustion Turbines DEVELOPMENT LLC ECTOR COUNTY ENERGY CENTER ECTOR, TX	15.110		natural gas	180 MW	Sulfur Dioxide (SO2)	Firing pipeline quality natural gas and good combustion practices.	10	0 0	BACT- PSD	N		
NM-0051	05/02/2011 ACT	SOUTHWESTERN PUBLIC SERVICE Normal Mode (without Power CO. CUNNINGHAM POWER PLANT Augmentation)	15.110		natural gas	0	Sulfur Dioxide	5.25 gr/100 SCF total sulfur limit in fuel.	0	22.1 LB/H 0 HOURLY	BACT- PSD	U		SO2 BACT established in PSD- NM-622-M2 issued 2-10-97.
NM-0051	05/02/2011 ACT	SOUTHWESTERN PUBLIC SERVICE CO. CUNNINGHAM POWER PLANT	15.110	Increase power output by lowering the outlet air temperatur through water	natural gas	0	Sulfur Dioxide	5.25 gr/scf total sulfur in fuel	0	22.1 LB/H 0 HOURLY	BACT- PSD	U		SO2 BACT established in PSD- NM-622-M2 issued 2-10-97.
*TX-0672	09/12/2014 ACT	LLA, NM CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, TX	15.210	inejctinos into the compressor. 3 liquefied natural gas trains consisting c a total of (6) GE LM2500+ DLE turbines that drive the ethylene section compressors with waste heat recovery for amine solution regeneration.	f natural gas	40000 hp	(SO2) Sulfur Dioxide (SO2)		0	0.31 LB/H 1 0 HOUR	BACT- PSD	U		Fuel sulfur is very low for natural gas.
*TX-0764	10/14/2015 ACT	NACOGDOCHES POWER, LLC Natural Gas Simple Cycle Turbine (>25 NACOGDOCHES POWER ELECTRIC MW) GENERATING PLANT NACOGDOCHES TX	15.110	One Siemens F5 simple cycle combustion turbine generator	natural gas	232 MW	Volatile Organic Compou	Pipeline quality natural gas; limited hours; good combustion practices.	0	2 PPMVD @ 0 15% O2	BACT- PSD	N		Operation of the turbine is limited to 2,500 hours on a 12-month rolling average.
*TX-0768	10/09/2015 ACT	SHAWNEE ENERGY CENTER, LLC Simple cycle turbines greater than 25 SHAWNEE ENERGY CENTER HILL, TX megawatts (MW)	15.110	Siemens Model SGT6-5000 F5ee – 230 MW or Second turbine option: General Electric Model 7FA.05TP – 227 MW	natural gas	230 MW	Volatile Organic Compou	Pipeline quality natural gas; limited hours; good combustion practices.	0	1.4 PPMV 0	BACT- PSD	N		Operation of the turbine is limited to 2,920 hours on a 12-month rolling average.
*TX-0733	05/12/2015 ACT	GOLDEN SPREAD ELECTRIC Simple Cycle Turbine & Generator COOPERATIVE, INC. ANTELOPE ELK ENERGY CENTER HALE, TX	15.110	3 additional GE 7F 5-Series Combustion Turbine Generators	natural gas	202 MW	Volatile Organic Compou	Good combustion practices	0	2 PPMVD @ 0 15% O2	BACT- PSD	N		Operation of each turbine is limite to 4,572 hours per year
*TX-0696	09/22/2014 ACT	TENASKA ROANမS PRAIRIE PARTNERS (TRPP), LLC ROAN〙S PRAIRIE GENERATING STATION GRIMES, TX	15.110	The three possible CT models are: (1) General Electric 7FA.04; (2) General Electric 7FA.05; or (3) Siemens SGT6- 5000F. will operate 2,920 hours per year at full load for each CT	natural gas	600 MW	Volatile Organic Compou ds (VOC	good combustion	0	1.4 PPMVD 1 PPMVD @1 @15% 02 GE 02 SIEMENS OPTION OPTION	5% BACT- PSD	N		
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION Refrigeration compressor turbines LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, TX	15.110	3 liquefied natural gas trains consisting c a total of (12) GE LM2500+ DLE turbines drive the propane and methane section compressors.	f natural gas	40000 hp	Volatile Organic Compou ds (VOC	good combustion practices	0	0.6 LB/H 1 0 HOUR	BACT- PSD	U		

RBLC ID	Date	Facility Name & Location	Brocess	Process	Brocess Notes	Primary Fuel	Throughput &	Pollutan	t Control Method Description	Standard Emission Limit	Emission Limit	Emission Limit	Case by Case Basis	Other Eactors	Estimated Efficiency	Pollutant/ Compliance Notes
*MD-0044	06/09/2014 ACT	DOMINION COVE POINT LNG, LP COVE POINT LNG TERMINAL CALVERT, MD	2 COMBUSTION TURBINES	15.110	TWO GENERAL ELECTRIC (GE) FRAME 7EA COMBUSTION TURBINES (CTS) WITH A NOMINAL NET 87.2 MEGAWATT (MW) RATED CAPACITY, COUPLED WITH A HEAT RECOVERY STEAM GENERATOR (HRSG), EQUIPPED WITH DRY LOW-NOX COMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYSTEM (SCR), AND OXIDATION CATALYST	NATURAL GAS	130 MW	Volatile Organic Compour ds (VOC	THE USE OF PROCESS FUEL GAS AND PIPELINE NATURAL GAS, GOOD COMBUSTION PRACTICES, AND USE OF AN OXIDATION CATALYST	0	0.7 PPMVD @ 15% O2 3-HOUR BLOCK AVERAGE, EXCLUDING SU/SD	101.1 LB/EVENT FOR ALL STARTUPS	LAER		/6	AS LBS/SHUTDOWN EVENT. LIMITS ARE TOTAL FOR BOTH FRAME 7 CTS PER STARTUP OR SHUTDOWN EVENT
*FL-0346	04/22/2014 ACT	FLORIDA POWER & LIGHT LAUDERDALE PLANT BROWARD, FL	Five 200-MW combustion turbines	15.110	Throughput could vary slightly (+/- 120 MMBtu/hr) depending on final selection of turbine model and firing of natural gas or oil. Primary fuel is expected to be gas. Each turbine limited to 3300 hrs per rolling 12-month period. Of these 3300 hrs, no more than 500 may use ULSD fuel oil.	Natural gas	2000 MMBtu/hr (approx)	Volatile Organic Compour ds (VOC	Good combustion practice	0	3.77 LB/H THREE ONE-HR RUNS (NATURAL GAS)	8 LB/H THREE ONE-HR RUNS (OIL)	BACT- L PSD	J		Initial and annual stack tests required.
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	GE LMS-100 combustion turbines, simple cycle with water injection	15.110		natural gas	1690 MMBtu/hr	Volatile Organic Compou	Oxidation catalyst; Limit the time in startup or shutdown.	0	0	0	BACT- L PSD	J		
*SC-0161	02/19/2014 ACT	DUKE ENERGY CAROLINAS LLC, W.S. LEE STEAM STATION , SC	COMBINED CYCLE COMBUSTION TURBINES (SIEMENS)	15.110	THE FACILITY PLANS TO INSTALL EITHER TWO GE 7FA.05 OR TWO SIEMENS SGT-5000F(5) NATURAL GAS FIRED COMBUSTION TURBINE GENERATORS, EACH EQUIPPED WITH A DUCT-FIRED HEAT RECOVERY STEAM GENERATOR.		0	ds (VOC Volatile Organic Compour ds (VOC	OXIDATION CATALYST	1 PPMVD @ 15% O2 CONTINUOUS OPERATION WITHOUT DUCT BURNER	3 LB/H CONTINUOUS OPERATION WITHOUT DUCT BURNER	203 LB/H AVERAGE PER STARTUP AND SHUTDOWN EVENT	BACT- PSD			THERE ARE ALSO VOC EMISSON LIMITS ASSOCIATED WITH DUCT BURNERS (CONTINUOUS OPERATION) WHICH ARE 2.0 PPMVD @15% O2 AND 7.7 LB/HR.
*SC-0161	02/19/2014 ACT	DUKE ENERGY CAROLINAS LLC, W.S. LEE STEAM STATION , SC	COMBINED CYCLE COMBUSTION TURBINES (GE)	15.110	THE FACILITY PLANS TO INSTALL EITHER TWO GE 7FA.05 OR TWO SIEMENS SGT-5000F(5) NATURAL GAS FIRED COMBUSTION TURBINE GENERATORS, EACH EQUIPPED WITH A DUCT-FIRED HEAT RECOVERY STEAM GENERATOR.		0	Volatile Organic Compour ds (VOC	OXIDATION CATALYST	1 PPMVD @ 15% O2 CONTINUOUS OPERATION WITHOUT DUCT BURNER	2.8 LB/H CONTINUOUS OPERATION WITHOUT DUCT BURNER	133.3 LB/H AVERAGE PER STARTUP AND SHUTDOWN EVENT	BACT- PSD			THERE ARE ALSO VOC EMISSON LIMITS ASSOCIATED WITH DUCT BURNERS (CONTINUOUS OPERATION) WHICH ARE 2.0 PPMVD @15% O2 AND 7.1 LB/HR.
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Simple Cycle Turbine (EP03)	15.110		Natural Gas	40 MW	Volatile Organic Compour	Oxidation Catalyst	14 T/YR	3 PPMV AT 15% O2 3-HOUR AVERAGE	3 LB/H 3-HOUR AVERAGE	BACT- N PSD	l		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Simple Cycle Trubine (EP04)	15.110		Natural Gas	40 MW	Volatile Organic Compour	Oxidation Catalyst	14 T/YR	3 PPMV AT 15% O2 3-HOUR AVERAGE	3 LB/H 3-HOUR AVERAGE	BACT- N PSD	1		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Simple Cycle Turbine (EP05)	15.110		Natural Gas	40 MW	Volatile Organic Compou	Oxidation Catalyst	14 T/YR	3 PPMV AT 15% O2 3-HOUR AVERAGE	3 LB/H 3-HOUR AVERAGE	BACT- N PSD	1		
LA-0258	12/21/2011 ACT	ENTERGY GULF STATES LA LLC CALCASIEU PLANT CALCASIEU, LA	TURBINE EXHAUST STACK NO. 1 & NO. 2	15.110		NATURAL GAS	1900 MM BTU/ł EACH	H Volatile Organic Compou ds (VOC	DRY LOW NOX COMBUSTORS	3 PPMVD @ 15% O2	7 LB/H HOURLY MAXIMUM	132 LB/H HOURLY MAXIMUM / STARTUP & SHUTDOWN ONLY	BACT- L PSD	J		LIMITS ARE PER TURBINE EXHAUST STACK. AGGREGATE VOC EMISSIONS FROM BOTH TURBINE EXHAUST STACKS ARE LIMITED TO 45.24 TONS PER YEAR. STARTUP & SHUTDOWN OPERATIONS ARE LIMITED TO 520 HOURS PER YEAR.
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Volatile Organic Compour ds (VOC	Good combustion practices and fueled by natural gas	0	0.66 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Volatile Organic Compour	Good combustion practices and fueled by natural gas	0	0.66 LB/H HOURLY MAXIMUM	0	BACT- L PSD	J		
NJ-0076	10/27/2010 ACT	PSEG FOSSIL LLC PSEG FOSSIL LLC KEARNY GENERATING STATION HUDSON, NJ	SIMPLE CYCLE TURBINE	15.110	Throughput <= 8.94xE6 MMBtu/year (HHV) combined for all six gas turbines. The 6 turbines are identical LM6000 simple cycle combustion turbines.	Natural Gas	8940000 MMBtu/year (HHV)	Volatile Organic Compour ds (VOC	Oxidation Catalyst and good combustion practices, use of natural 1 gas.	0	4 PPMVD@15% O2 AVERAGE OF THREE TESTS	2.33 LB/H AVERAGE OF THREE TESTS	OTHER L CASE-BY- CASE	J		
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPORT GENERATING STATION PUEBLO, CO	Three simple cycle combustion turbines	15.110	Three GE, LMS100PA, natural gas-fired, simple cycle CTG rated at 799.7 MMBtu per hour each,based on HHV.	natural gas	799.7 mmbtu/hr	Volatile Organic Compour	Good Combustion Control and Catalytic Oxidation (CatOx)	0	2.5 PPMVD AT 15% O2 AVE OVER STACK	0	BACT- L PSD	J		
GA-0139	05/14/2010 ACT	SOUTHERN POWER COMPANY DAHLBERG COMBUSDTION TURBINE ELECTRIC GENERATING FACILITY (P JACKSON. GA	SIMPLE CYCLE COMBUSTION TURBINE - ELECTRIC GENERATING PLANT	15.110	THE PROCESS USES FUEL OIL FOR BACKUP AT THE RATE OF 2129 MMBUT/H	NATURAL GASE	1530 MW	Volatile Organic Compour	GOOD COMBUSTION PRACTICES	0	5 PPM@15%02 3 HOUR AVERAGE/CONT	5 PPM@15%02 3 HOUR AVERAGE/CON DITION 3 3 28	BACT- U PSD	J		
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, TX	Refrigeration compressor turbines	15.210	3 liquefied natural gas trains consisting o a total of (6) GE LM2500+ DLE turbines that drive the ethylene section compressors with waste heat recovery for amine solution regeneration.	f natural gas	40000 hp	Volatile Organic Compour ds (VOC	good combustion practices	0	0.6 LB/H 1 HOUR	0	BACT- U PSD	J		

BACT Ana RBLC Sea RBLC Sea	ysis: ch Parameters: rch Date:	Crit Large SCT								-						
	Data	Facilita Nama 8 Lagation	Dessee	Process	Decesso Notes	Drimony Fred	Throughput 8	Dellutert		Standard Emission Limit	Emission Limit	Emission Limit	Case by Case	Other Fosters	Estimated Efficiency	Dellutert/ Compliance Nates
*OR-0050	03/05/2014 ACT	TROUTDALE ENERGY CENTER, LLC TROUTDALE ENERGY CENTER, LLC MULTNOMAH, OR	Mitsubishi M501-GAC combustion turbine, combined cycle configuration with duct burner.	15.210	or ULSD; Duct burner 499 MMBtu/hr, natural gas	natural gs	2988 MMBtu/hr	Volatile Organic Compoun ds (VOC)	Oxidation catalyst; Limit the time in startup or shutdown.	0	2 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON NG	5 PPMDV AT 15% O2 3-HR ROLLING AVERAGE ON ULSD	BACT- U PSD	Uther Pactors	70	
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Combined Cycle Turbine (EP01)	15.210		Natural Gas	40 MW	Volatile Organic Compoun ds (VOC)	Oxidation Catalyst	14.7 T/YR	3 PPMV AT 15% O2 1-HOUR	3 LB/H 3-HOUR AVERAGE	BACT- N PSD	I		
*WY-0070	08/28/2012 ACT	BLACK HILLS POWER, INC. CHEYENNE PRAIRIE GENERATING STATION LARAMIE, WY	Combined Cycle Turbine (EP02)	15.210		Natural Gas	40 MW	Volatile Organic Compoun ds (VOC)	Oxidation Catalyst	14.7 T/YR	3 PPMV AT 15% O2 3-HOUR AVERAGE	3 LB/H 3-HOUR AVERAGE	BACT- N PSD	I		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Volatile Organic Compoun ds (VOC)	Good combustion practices and fueled by natural gas	0	0.66 LB/H HOURLY MAXIMUM	0	BACT- U PSD	1		
*CO-0073	07/22/2010 ACT	BLACK HILLS ELECTRIC GENERATION, LLC PUEBLO AIRPORT GENERATING STATION PUEBLO, CO	Four combined cycle combution turbines	15.210	Three GE, LMS6000 PF, natural gas- fired, combined cycle CTG, rated at 373 MMBtu per hour each, based on HHV and one (1) HRSG each with no Duct Burners	natural gas	373 mmbtu/hr	Volatile Organic Compoun ds (VOC)	good combustion control and catalyti oxidation	c 0	4 PPMVD AT 15% O2 AVE OVER STACK TEST LENGTH	0	BACT- U PSD	1		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Volatile Organic Compoun ds (VOC)	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	2.5 PPMVD AT 15% OXYGEN 1- HR AVERAGE	0	BACT- N PSD	Ī		
*IN-0173	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/ EACH	H, Volatile Organic Compoun ds (VOC)	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	5.5 LB/MMCF 3- HR AVERAGE	0	BACT- N PSD	Ī		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	TWO (2) NATURAL GAS FIRED COMBUSTION TURBINES	16.210	NATURAL GAS FIRED, OPEN-SIMPLE CYCLE COMBUSTION TURBINES WITH HEAT RECOVERY	NATURAL GAS	283 MMBTU/H, EACH	Volatile Organic Compoun ds (VOC)	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	2.5 PPMVD AT 15% OXYGEN 1- HR AVERAGE	0	BACT- N PSD	Ī		
*IN-0180	06/04/2014 ACT	MIDWEST FERTILIZER CORPORATION MIDWEST FERTILIZER CORPORATION POSEY, IN	THREE (3) AUXILARY BOILERS	16.210	NATURAL GAS USAGE IN EACH BOILER NOT TO EXCEED 1501.91 MMCF/YR	NATURAL GAS	218.6 MMBTU/ EACH	H, Volatile Organic Compoun ds (VOC)	GOOD COMBUSTION PRACTICES AND PROPER DESIGN	0	5.5 LB/MMCF 3- HR AVERAGE	0	BACT- N PSD	Ī		

LNG SCT

BACT Analysis: RBLC Seach Parameters:

**RBLC Search Date:** Standard Process Emission Limit Emission Lim Emission Limi Throughput 8 Type \$5.110 RBLC ID Date 06/09/2014 ACT Control Method Description EXCLUSIVE USE OF FACILITY & Units 1 & Units 2 & Units Facility Name & Location **Process Notes** Primary Fuel Units Process 2 COMBUSTION TURBINES ollutant \*MD-0044 OMINION COVE POINT LNG, LP TWO GENERAL ELECTRIC (GE) JATURAL GAS 30 MW Carbon 1.5 PPMVD @ 562.4 LB/EVE COVE POINT I NG TERMINAL RAME 7EA COMBUSTION TURBINE PROCESS FUEL GAS OR PIPELINE 15% O2 3-HOUR FOR ALL QUALITY NATURAL GAS, USE OF BLOCK STARTUPS CALVERT, MD (CTS) WITH A NOMINAL NET 87.2 EGAWATT (MW) RATED CAPACITY. AN OXIDATION CATALYST AND AVERAGE. COUPLED WITH A HEAT RECOVERY EXI UDING FEFICIENT COMBUSTION STEAM GENERATOR (HRSG), SU/SD EQUIPPED WITH DRY LOW-NOX COMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYSTEM (SCR), AND OXIDATION CATALYST TWO GENERAL ELECTRIC (GE) \*MD-0044 06/09/2014 ACT DOMINION COVE POINT LNG, LP 2 COMBUSTION TURBINES NATURAL GAS 15.110 130 MW USE OF DRY LOW-NOX 2.5 PPMVD @ 1304.5 COVE POINT LNG TERMINAL FRAME 7EA COMBUSTION TURBINES COMBUSTOR TURBINE DESIGN 15% O2 3-HOUR LB/EVENT FOR Oxides CALVERT, MD (CTS) WITH A NOMINAL NET 87.2 (NOx) (DLN1), USE OF FACILITY BLOCK ALL STARTU MEGAWATT (MW) RATED CAPACITY PROCESS FUEL GAS AND AVERAGE COUPLED WITH A HEAT RECOVERY PIPELINE NATURAL GAS DURING EXCLUDING STEAM GENERATOR (HRSG), NORMAL OPERATION AND SCR SU/SD EQUIPPED WITH DRY LOW-NOX SYSTEM COMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYSTEM SCR), AND OXIDATION CATALYST \*MD-0044 06/09/2014 ACT DOMINION COVE POINT LNG, LP 2 COMBUSTION TURBINES NATURAL GAS Particulat EXCLUSIVE USE OF FACILITY 15.110 130 MW TWO GENERAL ELECTRIC (GE) 0.0033 RAME 7EA COMBUSTION TURE LB/MMBTU 3-COVE POINT LNG TERMINAL PROCESS FUEL GAS OR PIPELINE matter CALVERT MD (CTS) WITH A NOMINAL NET 87.2 QUALITY NATURAL GAS AND HOUR BLOCK arable MEGAWATT (MW) RATED CAPACITY (FPM) GOOD COMBUSTION PRACTICES AVERAGE COUPLED WITH A HEAT RECOVERY STEAM GENERATOR (HRSG) EQUIPPED WITH DRY LOW-NOX OMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYSTEM CR) AND OXIDATION CATALYST 2 COMBUSTION TURBINES TWO GENERAL ELECTRIC (GE) \*MD-0044 06/09/2014 ACT DOMINION COVE POINT LNG, LP 15.110 NATURAL GAS 130 MW Particulat EXCLUSIVE USE OF FACILITY 0.007 LB/MMBTU 300.8 LB/EVE COVE POINT LNG TERMINAL FRAME 7EA COMBUSTION TURBINE PROCESS FUEL GAS OR PIPELINE 3 STACK TEST FOR ALL RUN AVERAGE. STARTUPS (CTS) WITH A NOMINAL NET 87.2 CALVERT MD total < 10 QUALITY NATURAL GAS AND IEGAWATT (MW) RATED CAPACITY GOOD COMBUSTION PRACTICES EXCEPT SU/SD COUPLED WITH A HEAT RECOVERY (TPM10) STEAM GENERATOR (HRSG). EQUIPPED WITH DRY LOW-NOX COMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYSTEM SCR), AND OXIDATION CATALYST \*MD-0044 06/09/2014 ACT DOMINION COVE POINT LNG, LP 2 COMBUSTION TURBINES TWO GENERAL ELECTRIC (GE) ATURAL GAS EXCLUSIVE USE OF FACILITY .007 LB/MMBTU 300.8 LB/EVE 30 MV COVE POINT LNG TERMINAL FRAME 7EA COMBUSTION TURBINES 3 STACK TEST FOR ALL RUN AVERAGE, STARTUPS matter PROCESS FUEL GAS OR PIPELINE (CTS) WITH A NOMINAL NET 87.2 CALVERT, MD total < 2.5 QUALITY NATURAL GAS AND EGAWATT (MW) RATED CAPACITY µ (TPM2.5) GOOD COMBUSTION PRACTICES EXCEPT SU/SD COUPLED WITH A HEAT RECOVERY STEAM GENERATOR (HRSG). EQUIPPED WITH DRY LOW-NOX COMBUSTORS, SELECTIVE CATALYTIC REDUCTION SYSTEM SCR), AND OXIDATION CATALYST \*MD-0044 06/09/2014 ACT 2 COMBUSTION TURBINES NATURAL GAS 130 MW THE USE OF PROCESS FUEL GAS DOMINION COVE POINT LNG. LP TWO GENERAL ELECTRIC (GE) 0.7 PPMVD @ 101.1 LB/EVE 15% O2 3-HOUR FOR ALL COVE POINT LNG TERMINAL RAME 7EA COMBUSTION TURBINE AND PIPELINE NATURAL GAS. Organic CALVERT, MD (CTS) WITH A NOMINAL NET 87.2 GOOD COMBUSTION PRACTICES BLOCK STARTUPS Compoi MEGAWATT (MW) RATED CAPACITY ds (VOC) AND USE OF AN OXIDATION AVERAGE, COUPLED WITH A HEAT RECOVERY CATALYST EXCLUDING STEAM GENERATOR (HRSG), SU/SD EQUIPPED WITH DRY LOW-NOX COMBUSTORS SELECTIVE CATALYTIC REDUCTION SYSTEM CR), AND OXIDATION CATALYST CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI \*TX-0672 09/12/2014 ACT Refrigeration compressor turbines 15.110 3 liquefied natural gas trains consisting o a total of (12) GE LM2500+ DLE turbines 40000 hp Carbon dry low emission combustors 29 PPMVD atural gas @15% O2, 4 LIQUEFACTION PLANT GREGORY, TX HOUR ROLLING ive the propane and methane se AVERAGE \*TX-0672 09/12/2014 ACT CORPUS CHRISTI LIQUEFACTION 29 PPMVD frigeration compressor turbines 15.210 3 liquefied natural gas trains consisting of natural gas 40000 hp Carbon dry low emission combustors LLC CORPUS CHRISTI a total of (6) GE LM2500+ DLE turbine @15% O2, 4 LIQUEFACTION PLANT GREGORY T that drive the ethylene section HOUR ROLLING npressors with waste heat recovery AVERAGE amine solution regeneration \*TX-0672 09/12/2014 ACT 25 PPMVD @ CORPUS CHRISTI LIQUEFACTION Refrigeration compressor turbines 3 liquefied natural gas trains consisting of natural gas 40000 hp Dry low emission combustors Nitroger LLC CORPUS CHRISTI a total of (12) GE LM2500+ DLE turbine 15% O2, 4 LIQUEFACTION PLANT GREGORY, TX drive the propane and methane section (NOx) HOUR ROLLING npressors. AVG CORPUS CHRISTI LIQUEFACTION 25 PPMVD \*TX-0672 09/12/2014 ACT 3 liquefied natural gas trains consisting of natural gas a total of (6) GE LM2500+ DLE turbines Refrigeration compressor turbines 15.210 40000 hp Irv low emission combustors Nitroger LLC CORPUS CHRISTI @15% O2, 4 xides LIQUEFACTION PLANT GREGORY, TX HOUR ROLLING at drive the ethylene section (NOx) pressors with waste heat recovery AVERAGE r amine solution regeneration \*TX-0672 09/12/2014 ACT CORPUS CHRISTI LIQUEFACTION 3 liquefied natural gas trains consisting of natural gas a total of (12) GE LM2500+ DLE turbines Refrigeration compressor turbines 5.110 40000 hp Particula 0.72 LB/H 1 LLC CORPUS CHRISTI matte HOUR ive the propane and methane sect LIQUEFACTION PLANT GREGORY, TX total < 2.5 (TPM2.

	Case by		Estimated	
	Basis	Other Factors	%	Pollutant/ Compliance Notes
١T	BACT-			59.2 LB/SHUTDOWN EVENT.
	PSD			LIMITS ARE TOTAL FOR BOTH
R				LIMITS ARE TOTAL FOR BOTH
s				FRAME 7 CTS PER STARTUP
				OR SHUTDOWN EVENT
	BACT-			
	PSD			
т	BACT-			5.6 LBS/SHUTDOWN EVENT
•••	PSD			LIMITS ARE TOTAL FOR BOTH
				FRAME 7 CTS PER STARTUP
				OR SHUTDOWN EVENT.
11	BACI-			
	P3D			FRAME 7 CTS PER STARTUP
				OR SHUTDOWN EVENT
١T	LAER			4.8 LBS/SHUTDOWN EVENT.
				LIMITS ARE TOTAL FOR BOTH
				OR SHUTDOWN EVENT
	BACT-	U		
	PSD			
	BACT-	U		
	PSD			
	BACT-	U		
	PSD			
	BACT-	U		
	PSD			
	BACT-	U		Natural gas is the fuel. PM and
	PSD			PM10 are equal to PM2.5.

LNG SCT

<b>—</b>			 							Standard			Case by		Estimated	<u></u>
				Process			Throughput &			Emission Limit	Emission Limit	Emission Limit	t Case		Efficiency	
RBLC ID	Date	Facility Name & Location	Process Refrigeration compressor turbines	Type 15 210	Process Notes	Primary Fuel	40000 bp	Pollutant	Control Method Description	& Units	1 & Units	2 & Units	BACT-	Other Factors	%	Pollutant/ Compliance Notes
17-0072	031212014 A01	LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, T>	X	10.210	a total of (6) GE LM2500+ DLE turbines that drive the ethylene section compressors with waste heat recovery for amine solution regeneration.		40000 Hp	e matter, total < 2.5 Âμ (TPM2.5)			HOUR		PSD	5		PM10 are equal to PM2.5.
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, T>	Refrigeration compressor turbines X	15.110	3 liquefied natural gas trains consisting of a total of (12) GE LM2500+ DLE turbines drive the propane and methane section compressors.	f hatural gas	40000 hp	Sulfur Dioxide (SO2)		0	0.31 LB/H 1 HOUR	0	BACT- L PSD	J		Fuel sulfur is very low for natural gas.
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, TO	Refrigeration compressor turbines X	15.210	3 liquefied natural gas trains consisting of a total of (6) GE LM2500+ DLE turbines that drive the ethylene section compressors with waste heat recovery for amine solution regeneration.	f hatural gas	40000 hp	Sulfur Dioxide (SO2)		0	0.31 LB/H 1 HOUR	0	BACT- U PSD	J		Fuel sulfur is very low for natural gas.
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, T	Refrigeration compressor turbines X	15.110	3 liquefied natural gas trains consisting of a total of (12) GE LM2500+ DLE turbines drive the propane and methane section compressors.	f natural gas	40000 hp	Volatile Organic Compoun ds (VOC)	good combustion practices	0	0.6 LB/H 1 HOUR	0	BACT- L PSD	J		
*TX-0672	09/12/2014 ACT	CORPUS CHRISTI LIQUEFACTION LLC CORPUS CHRISTI LIQUEFACTION PLANT GREGORY, TX	Refrigeration compressor turbines X	15.210	3 liquefied natural gas trains consisting of a total of (6) GE LM2500+ DLE turbines that drive the ethylene section compressors with waste heat recovery for amine solution regeneration.	f hatural gas	40000 hp	Volatile Organic Compoun ds (VOC)	good combustion practices	0	0.6 LB/H 1 HOUR	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Carbon Monoxide	Good combustion practices and fueled by natural gas	58.4 PPMV AT 15% OXYGEN	43.6 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Carbon Monoxide	Good combustion practices and fueled by natural gas	25 PPMV AT 15% O2	17.46 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Carbon Monoxide	Good combustion practices and fueled by natural gas	58.4 PPMV AT 15% O2	43.6 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Nitrogen Oxides (NOx)	water injection	20 PPMV AT 15% O2	22.94 LB/H HOURLY MAXIMUM	0	BACT- L PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Nitrogen Oxides (NOx)	water injection	25 PPMV AT 15% O2	28.68 LB/H HOURLY MAXIMUM	0	BACT- L PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Nitrogen Oxides (NOx)	water injection	20 PPMV AT 15% O2	22.94 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Particulat e matter, total (TPM)	Good combustion practices and fueled by natural gas	0	2.08 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		also for PM10 and PM2.5
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Particulat e matter, total (TPM)	Good combustion practices and fueled by natural gas	0	2.08 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		also for PM10 and PM2.5
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Particulat e matter, total (TPM)	Good combustion practices and fueled by natural gas	0	2.08 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		also for PM10 and PM2.5
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Refrigeration Compressor Turbines (16)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Volatile Organic Compoun	Good combustion practices and fueled by natural gas	0	0.66 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Simple Cycle Generation Turbines (2)	15.110	GE LM2500+G4	Natural Gas	286 MMBTU/H	Volatile Organic Compoun ds (VOC)	Good combustion practices and fueled by natural gas	0	0.66 LB/H HOURLY MAXIMUM	0	BACT- U PSD	J		
LA-0257	12/06/2011 ACT	SABINE PASS LNG, LP & SABINE PASS LIQUEFACTION, LL SABINE PASS LNG TERMINAL CAMERON, LA	Combined Cycle Refrigeration Compressor Turbines (8)	15.210	GE LM2500+G4	natural gas	286 MMBTU/H	Volatile Organic Compoun ds (VOC)	Good combustion practices and fueled by natural gas	0	0.66 LB/H HOURLY MAXIMUM	0	BACT- L PSD	J		

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## **APPENDIX B**

### **BACT Cost Effectiveness Calculations**

### (Compression Turbines)

### Content Claimed Trade Secret in accordance with AS 46.14.520

	Liquefaction Plant Best Available Control	AKLNG-4030-HSE-RTA-DOC-00001
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## **APPENDIX C**

### **BACT Cost Effectiveness Calculations**

### (Power Generation Turbines)

Content Claimed Trade Secret in accordance with AS 46.14.520

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## **APPENDIX D**

Alaska LNG Minutes of Meeting with ADEC, BACT and Dispersion Modeling Overview, GTP and Liquefaction Facilities, May 18, 2016



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## Appendix D

## Alaska LNG Minutes of Meeting with ADEC, BACT and Dispersion Modeling Overview, GTP and Liquefaction Facilities, May 18, 2016

	MINUTES OF MEETING (MOM)	USAI-PS-BPDCC-00-000002-005
	BACT AND DISPERSION MODELING	<mark>13-Ост-15</mark>
Alaska LING	OVERVIEW	REVISION: 1A
	CONFIDENTIAL	PAGE 1 OF 3

MEETING DETAILS			
Sub-Project Name	Integrated	Date of Meeting	May 18, 2016
Meeting Subject	BACT and Dispersion Modeling Overview, GTP and Liquefaction Facilities	Location	ADEC Juneau, AK offices

ATTENDEES				
Attended By	Organization	Attended By	Organization	
Jim Pfeiffer	AkLNG	James Renovatio	ADEC	
Bart Leininger	ALG for AkLNG	Alan Schuler	ADEC	
Tom Damiana	AECOM for AkLNG			
John Kuterbach	ADEC			
Zeena Siddeek	ADEC			

DISTRIBUTION (Attendees plus the following individuals)			
NameOrganizationNameOrganization			

AGENDA ITEMS				
Item	Agenda Item(s)	Leader	Time	
1	Introductions and Safety Moment	Jim Pfeiffer	15 min.	
2	Project Overview and Status	Jimi Pfeiffer	30 min.	
3	BACT Considerations	Bart Leininger	30 min.	
4	Dispersion Modeling Considerations	Tom Damiana	30 min.	
5	Wind Tunnel Overview (not covered due to time constraints)	Tom Damiana	NA	
6	Next Steps	Jim Pfeiffer	15 min.	

ACTION ITEMS				
Item	Action Items/Topics	Assigned To	Due Date	
1	Determine the appropriate baseline NOx and CO emission rate for gas turbines – BACT cost-effectiveness calculations	Zeena Siddeek	May 31, 2016	
2	Determine the appropriate interest rate to be used in BACT cost- effectiveness calculations	Zeena Siddeek	May 31, 2016	
3	Provide wind tunnel protocol to ADEC and EPA for their review and consideration.	Jim Pfeiffer	Early June 2016	
4	Provide a workshop for ADEC staff on the wind tunnel experiments.	Jim Pfeiffer	TBD	



MINUTES OF MEETING (MOM) BACT AND DISPERSION MODELING OVERVIEW CONFIDENTIAL

	DISCUSSION				
Item	Agenda Item(s) / Notes	Comments			
1	Jim provided an overview of the project and summarized the current status of the NEPA analysis. During the discussion, Kuterbach indicated that the ADEC Commissioner will be very interested project GHG emissions and reduction/energy efficiency strategies.	Discussions about the project were characterized as preliminary and ADEC should expect the project designs to change as engineering progresses.			
2	<ul> <li>BACT assumptions for cost-effectiveness calculations were reviewed. The following points were gleaned from the discussion:</li> <li>According to Siddeek, baseline NOx and CO emissions from turbines should follow the assumptions used for Pt. Thomson Project. Siddeek thought that 25 ppmv for NOx and 50 ppmv for CO was used. Siddeek would confirm the baseline that should be used in the analysis.</li> <li>Siddeek indicated that 7% interest is the guideline for cost-effectiveness calculations. However, lower interest rates have been used (e.g., 4%). Siddeek was going to review the Pt. Thomson BACT determination to see what was assumed.</li> <li>Kuterbach would not provide an exact cost-effectiveness guideline for criteria pollutant emissions (i.e., NOx, CO, etc.). He suggested that if costs were less than \$6,000 - \$7,000 per ton, a technology would be cost-effective. EPA has been looking at ADEC BACT determinations and have implied that technologies costing \$10,000 - \$12,000 per ton could be cost-effective.</li> <li>ADEC indicated that BACT must consider normal operations and transient operations, including start-up and shutdown. ADEC would impose numerical emissions limitations for normal operations (e.g., ppmv NOx @ 15% O<sub>2</sub>); work practices standards (e.g., time limitations, etc.) would be imposed for transient operations.</li> <li>Kuterbach indicated that the permit would be issued on the basis of the control technology and BACT emission limit. ADEC expects that the control technology will be active at all times, unless otherwise specified in the permit. His example: IC engine BACT determination must occur at al times, and not just to meet the associated numeric performance limit.</li> </ul>				
3	<ul> <li>GHG BACT was discussed. Below are the following points from the discussion:</li> <li>ADEC does not have a BACT cost-effectiveness threshold for GHGs and admitted that they have limited experience considering BACT for GHGs.</li> <li>ADEC indicated that Carbon Capture and Sequestration (CCS) must be evaluated in the BACT analysis. Kuterbach indicated that AkLNG must consider the feasibility and cost-effectiveness of installing facilities at GTP to concentrate and re-inject CO2 emissions from dilute streams (e.g., turbine exhaust).</li> <li>Kuterbach indicated that BACT must consider energy efficiency options, including heat recovery. Specifically, the analysis must consider how energy is used and the options for recovering energy from the combustion processes. For cases where waste heat recovery is not used, the analysis must address/justify the reasons why. Inherent design limitations must be explicitly stated.</li> </ul>				

MINUTES OF MEETING (MOM)	USAI-PS-BPDCC-00-000002-005
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	DISCUSSION				
Item	Agenda Item(s) / Notes	Comments			
4	The topic of temporary raw gas usage during GTP start-up was discussed. ADEC (Kuterbach) agreed that raw gas could be used at GTP if justified under a separate BACT analysis. The separate BACT analysis may consider feasibility, duration, and cost for implementing more significant controls to achieve lower emissions. Alternative BACT limits are acceptable under these conditions.				
5	AkLNG inquired about potential expiration of the PSD permits during the extended construction period. Kuterbach stated that PSD permits do not expire due to the length of construction. They only expire if the project does not commence construction within 18 months or when construction goes dormant for 18 months or longer.				
6	<ul> <li>The following discussion points came up during the dispersion modeling portion of the presentation.</li> <li>ADEC (Schuler) indicated that EPA OAQPS and ADEC will need to approve the use of the wind tunnel results to characterize downwash at CCP and CGF. Approval will be required for PSD permit issuance. ADEC agreed that EPA and ADEC approval will not be required for the NEPA analysis. However, any potential objections by EPA and ADEC should be addressed during the NEPA process.</li> <li>Schuler confirmed that the use of the wind tunnel results is a technical issue and not an alternative modeling approach. ADEC is looking to EPA for expertise on the wind tunnel issues because ADEC staff lacks experience with these methods.</li> <li>Schuler noted that the State of Idaho is requesting EPA Region X approval/expertise in using wind tunnel results in modeling.</li> <li>AkLNG agreed to provide the wind tunnel protocol and results to ADEC and the EPA within the next few weeks.</li> <li>AkLNG indicated that upper atmospheric meteorological data from Barrow, AK, and the onsite data collected from LNG will be used to demonstrate that existing met. data sources from 10 meter towers are conservative in characterizing the meteorological conditions at tall stacks. ADEC (Schuler) did not object to this approach. AkLNG confirmed that upper atmospheric met. data will be collected at Deadhorse to support the PSD permit application.</li> <li>Schuler noted that the Modeling Review Procedures Manual was issued on May 18<sup>th</sup>. Schuler reminded the Project that the manual is only a guideline.</li> </ul>	<ul> <li>The following was not discussed with ADEC during the meeting:</li> <li>Minor source modeling for the compressor stations.</li> <li>AQRV (i.e., visibility) modeling, which is under consideration by the Federal Land Managers (FLMs).</li> </ul>			
7	Due to time constraints, the wind tunnel overview slides were not discussed. AkLNG agreed to provide a workshop to ADEC staff if interested.				

### **Bart Leininger**

From:Siddeek, Fathima Z (DEC) <fathima.siddeek@alaska.gov>Sent:Wednesday, May 25, 2016 2:59 PMTo:Bart LeiningerCc:'james.pfeiffer@exxonmobil.com'; Dunn, Patrick E (DEC); SiddeelSubject:Baseline for NOx and CO controls for BACT cost effectiveness</fathima.siddeek@alaska.gov>	k, Fathima Z (DEC)
--	--------------------

Bart,

During the May 18<sup>th</sup> meeting, you asked what we would accept for baseline emissions for NOx and CO and the interest rates for BACT cost estimates. I did some investigation on our recent BACT decisions and here is what I found:

For NOx BACT cost estimates, we have accepted baseline emissions calculated using manufacturer guaranteed NOx emission rates for gas turbines equipped with DLN technology. We found that turbines without Dry Low NOx (DLN) are no longer available in the market. We also verified from a turbine vendor that a base model turbine without controls, will have to be designed and custom built and that it would cost significantly more.

Although we did not have to review CO BACT cost estimates for a turbine equipped with DLN, we would similarly accept baseline emissions calculated using manufacturer emission rates. ExxonMobil opted to use catalytic oxidation in their SoLoNOx turbines to reduce the CO emissions to 2.5 ppmv. Since they used maximum CO controls, we did not review BACT cost analysis.

The 1990 EPA draft guidance manual, although not legally binding, is still adopted as a guide for estimating BACT cost estimates. This manual being 26 years old, does not address this specific case, but we think that it is reasonable to assume Dry Low NOx (DLN) technology as the base for the turbine emissions.

With regard to the interest rate, we accepted 7% because a lower rate would not have altered the conclusion for cost effectiveness in all of the BACT decisions in the past 4 years.

Let me know if you have any further questions.

Zeena Siddeek Supervisor, Permits Section (Juneau Office) Division of Air Quality Alaska Department of Environmental Conservation (907) 465-5303

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## **APPENDIX E**

### **Emissions and BACT Cost Effectiveness Calculations**

(Diesel Tanks, Condensate Tanks, and Condensate Loading)



### Alaska LNG Project Condensate Loading Operation Product Loading Activity Emission Calculation

Input Parameters					
S = Saturation Factor	0.60	Submerged Load	ding, Dedicated Normal Service		
M = Molecular Weight	77	Condensate Estin	Condensate Estimate		
P = True Vapor Pressure (psia)	4.275	See "Condensate	See "Condensate Properties"		
I = Liquid Temperature "R	505		$45^{\circ}F + 460 = ^{\circ}R$		
C = Storage Capacity (bbl)	589,197	24,746,28	80 gallons $(42 \text{ gallons} = 1 \text{ bbl})$		
A = Annual Production (bbl)	589,197	24,746,28	80 gallons (42 gallons = 1 bbl)		
R = Max Loading Rate (bbl/hr)	67.26	2,82	25 gallons (42 gallons = 1 bbl)		
D = Max Daily Production (bbl)	1,614	67,79	98 gallons (42 gallons = 1 bbl)		
D2 = Average Daily Production (bbl)	1,291	54,23	38 gallons (42 gallons = 1 bbl)		
eff = Vapor Recovery Efficiency	0.95	Thermal Oxidizer	r plus VRU		
VOC/THC = Reactivity	1.000	Assume all THC	is VOC.		
$L_{LTHC}$ = Loading loss (lb/1000 gal) = 12.46	5 (S)(P)(M)/T =	4.8737	IbTHC/1000 gal		
L <sub>L</sub> VOC= Loading loss (lb/1000 gal) = 12.4	$6 (S)(P)(M)^{React/T} =$	4.8737	lb ROC/1000 gal		
Total Uncontrolled Hydrocarbon Losse	s (VOC):				
Hourly					
$THL_{H} = (R)(42 \text{ gal/bbl})(L_{LROC}/1000) =$		13.77	lbs/hr		
Max Daily					
$THL_{D} = (D)(42 \text{ gal/bbl})(L_{LROC}/1000) =$		330.43	lbs/day		
Average Daily					
$IHL_{D2} = (D2)(42 \text{ gal/bbl})(L_{LROC}/1000) =$		264.34	lbs/day		
Quarterly					
$THL_{Q} = THLD(91)(1/2000) =$		15.08	TPQ		
Total Emissions THI = $(\Lambda)(42 \text{ col/bbl})(1 - (1000)(1/2000)$	) _	<u></u>	TRY		
$\Pi L_A = (A)(42 \text{ gai/bbl})(L_{LROC} 1000)(1/2000)$	) =	60.30			
Total Controlled Hydrocarbon Losses (	VOC):				
Hourly THL <sub>HC</sub> = (THL <sub>H</sub> )(1-eff) =		0.69	lbs/hr		
$ HL_{DC} = ( HL_{D})(1-e\pi) =$		16.52	lbs/day		
$THLQ_{C} = (THLQ)(1-eff) =$		0.75	TPQ		
Total Emissions					
$HL_{AC} = (HL_{A})(1-eff) =$		3.02	TPY		

### Notes:

1. Data provided by the applicant

C = Annual Transport Volume.

- 2. AP-42, (Chapter 5, 5th Edition, January 1995), Table 5.2-1
- 3. Molecular weight of condensate based on estimated mole fraction of condensate constituents.
- 4. Vapor pressure for condensate based on estimated mole fractions.
- 5. R is calculated by adding 460 to <sup>0</sup>F. Average annual high temperature at the Kenai Airport used.
- 6. Assumed 24 hours/day of loading operations.
- 7. Assumed 95% capture and control efficiency for use of thermal oxidizer and VRU.

## Alaska LNG Project Condensate and Diesel Tanks Tank Emission Calculations

Source	Stream	Capacity	Throughput	Turnover
		gal	gal/year	
Tank 21	Condensate	475,890	24,746,280	52.0
Tank 22	Condensate	126,904	15,330,000	120.8
Tank 23	ULSD	3,520	364,600	103.6
Tank 24	ULSD	342	17,766	51.9
Tank 25	ULSD	342	17,766	51.9

Source	Stream	Uncontro	olled VOC Emission	s (lb/yr)	Uncont	rolled VOC Emissio	ns (tpy)
		(Working)	(Standing)	(Total)	(Working)	(Standing)	(Total)
Tank 21	Condensate	146,010.07	7,556.65	153,566.72	73.01	3.78	76.78
Tank 22	Condensate	50,482.53	3,100.55	53,583.07	25.24	1.55	26.79
Tank 23	ULSD	2.44	0.32	2.76	0.00	0.00	0.00
Tank 24	ULSD	0.14	0.02	0.16	0.00	0.00	0.00
Tank 25	ULSD	0.14	0.02	0.16	0.00	0.00	0.00
Tank Totals		196,495.31	10,657.56	207,152.87	98.25	5.33	103.58

Source	Stream	Controlled VOC Emissions	
		(lb/year)	(TPY)
Tank 21	Condensate	1,535.67	0.77
Tank 22	Condensate	535.83	0.27
Tank 23	ULSD	2.76	0.00
Tank 24	ULSD	0.16	0.00
Tank 25	ULSD	0.16	0.00
Tank Totals		2,074.58	1.04

### Notes:

Condensate Tanks to be controlled by a thermal oxidizer. Assume 99% control efficiency (capture and control). Diesel tank controls include the use of fixed roof tanks and submerged loading operations.

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### Alaska LNG Project Diesel Storage Tanks Thermal Oxidizer Cost Effectiveness Analysis

**Cost Quantification:** 

			Default %	EPA Equation /	
Cost Category	Project Cost	Default Estimate	Applied	Estimate Basis	Reference
			- -		
			Direct Capit	tal Costs	
Purchased Equipment:					
Purchased Equipment Costs	\$96,287		-	A	EPA Cost Control Manual, Equation 2.29
Instrumentation & Controls		\$2,889	3%	C = 0.03 x A	AECOM equipment estimating data
Freight		\$49,106.55	51%	D = 0.51 x (A+B)	AECOM equipment estimating data
Taxes (Enter sales tax rate in "% Applied")		\$0	0.0%	TaxRate x (A+B+C)	No sales tax in Alaska
Total Purchased Equipment Cost (PE)	\$148,283		-	PE	
Direct Installation Costs:	·		-		
Foundation & Supports		\$2,966	2%	0.02 x PE	AECOM equipment estimating data
Erection and Handling		\$23,725	16%	0.16 x PE	AECOM equipment estimating data
Electrical		\$31,139	21%	0.21 x PE	AECOM equipment estimating data
Piping		\$11,863	8%	0.08 x PE	AECOM equipment estimating data
Insulation		\$10,380	7%	0.07 x PE	AECOM equipment estimating data
Painting		\$148	0%	0.00 x PE	AECOM equipment estimating data
Site Preparation	\$6,740.11		7%	Project-Specific	engineering judgement
Total Direct Installation Cost (DI)	\$86,961		-	DI	
Total Direct Capital Costs (DC)	\$235,243		-	DC = PE + DI	

Indirect Capital Costs							
Indirect Costs:							
Engineering & Supervision		\$41,519	28%	0.28 x PE	AECOM equipment estimating data		
Construction and Field Expenses		\$13,345	9%	0.09 x PE	AECOM equipment estimating data		
Contractor Fees		\$4,448	3%	0.03 x PE	AECOM equipment estimating data		
Startup-up		\$2,966	2%	0.02 x PE	AECOM equipment estimating data		
Performance Testing		\$1,483	1%	0.01 x PE	AECOM equipment estimating data		
Total Indirect Costs (TIC)	\$63,761		-	IC			

Capital Investment:					
Project Contingency		\$44,850.74	15%	E = 0.15 x (DC+IC)	OAQPS (15% of DC & TIC)
Preproduction Cost		\$10,315.67	3%	F = 0.03 x (DC+IC+Cont)	OAQPS (2% of DC & TIC & Proj Contingency)
Total Capital Investment	\$354,171		-	TCI = DC + IC + E + F + G	

## ALASKA LNG

Direct Annual Costs							
Direct Annual Costs:							
Operating Labor	\$-		-		Vendor Supplied		
Supervisory Labor		\$0	15%	15% of Op. Labor	OAQPS (15% of Op Labor)		
Maintenance Labor		\$5,313	1.5%	0.015 x TCI	OAQPS (1.5% of TCI)		
Maintenance Materials		\$5,313	-	100% of Maint. Labor	OAQPS (15% of Maint. Labor)		
Annual Electricity Cost		\$307	-	See parameters below	See parameters below		
Fuel Penalty Costs (specify)	\$-		-		Vendor Supplied		
Other Maintenance Cost (specify)	\$ -		-		Vendor Supplied		
Total Direct Annual Costs	\$10,933		_	DAC			

Indirect Annual Costs							
Indirect Annual Costs:							
Overhead		\$6,375	60.0%	0.600 x Op/Super/Maint Labor & Mtls	OAQPS (60% of Op/Super/Maint. Labor & Mtls)		
Property Tax		\$3,542	1.0%	0.0100 x TCI	OAQPS (1%)		
Insurance		\$3,542	1.0%	0.010 x TCI	OAQPS (1%)		
General Administrative		\$7,083	2.0%	0.020 x TCI	OAQPS (2%)		
Total Indirect Annual Costs	\$20,542		-	DAC			

Capital Recovery Cost						
Equipment Life (years)		10	-	n	Vendor Supplied	
Interest Rate	7.00%	7.00%	-	i	7% per Agrium US Inc, Kenai Nitrogen Operations Facility Air Quality Control Construction Permit AQ0083CPT06	
Capital Recovery Factor	0.1424		-	$CRF = i/(1-(1+i)^{-n})$	-	
Capital Recovery Cost (CRC)	\$50,426		-		OAQPS Eqn 2.54 (Section 4.2, Ch. 2)	
Total Annual Costs	\$81,901		-	TAC = DA + IDAC + CRC	OAQPS Eqn 2.56 (Section 4.2, Ch. 2)	

### Cost Effectiveness Analysis:

		Reference
Uncontrolled VOC (tpy)	0.0015	Calculated below
Controlled VOC Emissions (tpy)	0.00003	Calculated below
VOC Reduction (tpy)	0.0015	Calculated below
Total Annual Costs	\$81,901	Calculated above
Cost Effectiveness (\$/ton/yr)	\$54,260,681	OAQPS Eqn 2.58 (Section 4.2, Ch. 2)



### **Design Parameters:**

Enter values in boxes below. Where default value is available, entered value will override default. Required data is highlighted yellow.

Combustion Unit Sizing			
			Reference
Thermal Oxidizer Sizing	500	scfm	Engineering Estimate
VOC Emission Rates			
		_	Reference
Diesel Tank Uncontrolled Emissions	0.0015	ТРҮ	EPA TANKS Calculations
		-	
Controlled Diesel Tank Emissions:	98%	Control Efficiency	Engineering Estimate
Operational Parameters			
		_	Reference
Max annual op hours [Default: 8760 hr/yr]	8760	hr/yr	
Annual Electricity Costs: Enter values below. Where def	ault value is available, e	entered number overrides default.	
		_	Reference
Power demand:	0.39	kW	EPA Cost Control Manual, Equation 2.42
Electricity Cost [Default: 0.1572 \$/kWh]	0.09	\$/kWh	

Power demand estimated per EPA Cost Control Manual, Ch 3-2, Equation 2.42 for fan power demands.

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