



SC DEPARTMENT *of* **ENVIRONMENTAL SERVICES**

Bureau of Air Quality Prevention of Significant Deterioration Preliminary Determination BACT Review

**Duke Energy Carolinas, LLC - Anderson County Combined Cycle Station
Corner of Hwy 81 S and True Temper Road
Anderson, South Carolina 29624
Anderson County**

Permit No. PSD-50000026 v1.0
Agency Air Number: 0200-0310
September 11, 2026

This review was performed by the Bureau of Air Quality of the South Carolina Department of Environmental Services in accordance with South Carolina Regulations for the Prevention of Significant Air Quality Deterioration.

Reviewed by:

David D. Nasol
Environmental Engineering Associate
Bureau of Air Quality

Approved by:

Steve McCaslin, P. E., Director
Air Permitting Division
Bureau of Air Quality

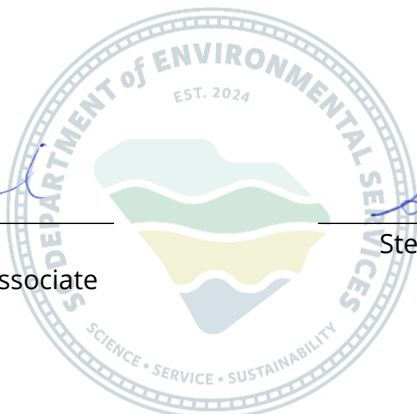


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1.0 Timeline (Permitting Action History)

February 19, 2026	A Prevention of Significant Deterioration (PSD) pre-application meeting was held with representatives from Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station (Duke Energy Carolinas, or DEC), ALL4, and the South Carolina Department of Environmental Services (SCDES), Bureau of Air Quality (BAQ).
March 11, 2026	SCDES received a PSD permit application from Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station.
March 13, 2026	Air Permitting of the BAQ submitted a copy of the application to the U.S. Environmental Protection Agency (EPA) via the EPA's Electronic Permit System.
March 25, 2026	The BAQ determined that the application was incomplete. Correction requests were sent via ePermitting.
April 7, 2026	The BAQ received an updated PSD permit application from Duke.
April 21, 2026	A meeting was held with representatives from Duke, ALL4, and the BAQ to discuss correction requests.
May 1, 2026	The BAQ determined that the application was incomplete. Correction requests were sent via ePermitting.
May 6, 2026	The BAQ received an updated PSD permit application from Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station.
May 6, 2026	The Air Permitting of the BAQ received email correspondence from Kathleen Musmanno of EPA Region 4.
May 13, 2026	The BAQ determined that the application was incomplete. Correction requests were sent via ePermitting.
May 13, 2026	An additional meeting was held with representatives from Duke, ALL4, and the BAQ to discuss correction requests.
May 27, 2026	The BAQ received email correspondence from Andrea Stacy of the National Park Service.
May 29, 2026	SCDES received an updated PSD permit application from Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station.

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June 2, 2026	SCDES received an updated PSD permit application from Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station.
June 4, 2026	Air Permitting of the BAQ submitted a copy of the application to the U.S. Environmental Protection Agency (EPA) via the EPA's Electronic Permit System.
June 4, 2026	Air Permitting of BAQ emailed a letter to representatives of the U.S. EPA, Fish and Wildlife, National Park Service, and Department of Agriculture, informing them that the BAQ had deemed the application complete.
July 31, 2026	Air Permitting of BAQ emailed draft permitting documents to Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station and ALL4 for review.
August 14, 2026	Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station provided their comments on the draft documents to SCDES.
August 28, 2026	Air Permitting of BAQ received an updated PSD permit application from Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station.
August 31, 2026	Air Permitting of BAQ emailed draft modeling documents to Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station and ALL4 for review.
September 1, 2026	Air Permitting of BAQ emailed draft modeling documents to Kathleen Musmanno and Lorinda Shepherd of EPA Region 4 for review.
September 3, 2026	Air Permitting of BAQ emailed draft permitting documents to Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station and ALL4 for review.
September 4, 2026	Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station and ALL4 provided their comments on the draft modeling documents to SCDES.
September 9, 2026	Duke Energy Carolinas, LLC – Anderson County Combined Cycle Station provided their comments on the draft permitting documents to Air Permitting of BAQ.
September 11, 2026	The BAQ placed the PSD Preliminary Determination and PSD Construction Permit No. PSD-50000026 v1.0 on public notice for a thirty-(30) day comment period. All appropriate Federal and State Officials were notified.

2.0 Introduction and Preliminary Determination

2.1 Project Overview

Due to emissions increases associated with this proposal, the project is subject to S.C. Regulation 61-62.5, Standard No. 7, "Prevention of Significant Deterioration (PSD)." This regulation is equivalent to the Federal Prevention of Significant Deterioration of Air Quality regulations in Title 40 Code of Federal Regulations (CFR) Section 52.21. Pursuant to these regulations, new major stationary sources and modifications to major stationary sources of air pollution must demonstrate that they will not significantly deteriorate the air quality in their region. The facility has potential emissions for the pollutants listed in Table 1 below, which exceed the significance levels allowed in this regulation. The PSD review was conducted for each of these pollutants and includes a Best Available Control Technology (BACT) determinations and Ambient Air Impact Analyses.

As shown in Table 1, this project exceeds the significant threshold as defined under PSD for each pollutant listed.

Table 1 - PSD Applicability Analysis			
Pollutant	Controlled Emissions Increase	PSD Significant Threshold	Significant Increase?
	TPY	TPY	
PM	276.59	25	Yes
PM ₁₀	390.68	15	Yes
PM _{2.5}	390.68	10	Yes
SO ₂	59.99	40	Yes
NO _x	629.84	40	Yes
CO	588.05	100	Yes
VOC	133.96	40	Yes
H ₂ SO ₄	4.57	7	No
Lead	0.02	0.6	No
CO ₂ e	6,014,704	75,000	Yes
Fluorides	---	3.0	No

3.0 Detailed Process Description

This project is for the installation of a new combined-cycle power block consisting of two (2) advanced-class General Electric (GE) 7HA.03 combustion turbines (CTs), two (2) heat recovery steam generators (HRSG), and one (1) steam turbine (ST) along with an air-cooled condenser (ACC) system to minimize water use. The combined cycle combustion turbines (CCCTs) will primarily fire natural gas and utilize No. 2 fuel oil [ultra-low sulfur diesel (ULSD)] as a backup fuel source. The maximum nominal heat input on natural gas for each CCCT is expected to be 4,989 MMBtu/hr (includes the CT and duct firing in the HRSG) and the maximum nominal heat input on ULSD is expected to be 4,257 MMBtu/hr.

Each CT will be equipped with dry low-NO_x combustors (DLN), selective catalytic reduction (SCR) technology, and an oxidation catalyst for emissions control and continuous emissions monitoring systems (CEMS) for measurement of NO_x, CO, O₂, and CO₂. The HRSG are equipped with supplemental duct firing (natural gas-fired). The combustion turbines will also be equipped with monitored bypass stacks to allow the units to be operated in simple-cycle mode. The turbines will be “hydrogen capable” should this fuel source be commercially available at a point in the future; however, the application is not requesting authorization to combust hydrogen at this time. The ACC system will consist of fin-fan air-cooled heat exchangers.

Additional proposed equipment will include: one (1) 123.6 MMBtu/hr natural gas-fired auxiliary boiler to provide steam to start up the power block in combined-cycle mode, one (1) 2,943 horsepower (hp) emergency diesel-fired generator, one (1) 385.7 hp emergency diesel-fired fire water pump engine, two (2) 10.2 MMBtu/hr natural gas-fired dew point heaters, two (2) ULSD storage tanks, and an electric-driven compressor station that includes a natural gas-fired emergency generator and 24 small natural gas-fired heaters.

4.0 Regulatory Applicability

The project results in potential emissions that exceed the PSD significant thresholds. By virtue of the proposed increase, this project is subject to review under the following standards in S.C. Regulation 61-62 and Federal standards:

- S.C. Regulation 61-62.5, Standard No. 1, *Emissions from Fuel Burning Operations*
- S.C. Regulation 61-62.5, Standard No. 2, *Ambient Air Quality Standards*
- S.C. Regulation 61-62.5, Standard No. 4, *Emissions from Process Industries*
- S.C. Regulation 61-62.5, Standard No. 7, *Prevention of Significant Deterioration*
- S.C. Regulation 61-62.6, *Control of Fugitive Particulate Matter*
- S.C. Regulation 61-62.7, *Good Engineering Practice Stack Height*
- S.C. Regulation 61-62.60, *South Carolina Designated Facility Plan and New Source Performance Standards*
- 40 CFR 60, *Standards of Performance for New Stationary Sources*
- S.C. Regulation 61-62.60 and 40 CFR 60, *Standards of Performance of New Stationary Sources, Subpart A, General Provisions*
- S.C. Regulation 61-62.60 and 40 CFR 60, *Standards of Performance of New Stationary Sources, Subpart Db, Standards of Performance for Industrial - Commercial - Institutional Steam Generating Units*
- S.C. Regulation 61-62.60 and 40 CFR 60, *Standards of Performance of New Stationary Sources, Subpart Dc, Standards of Performance for Small Industrial Commercial - Institutional Steam Generating Units*
- S.C. Regulation 61-62.60 and 40 CFR 60, *Standards of Performance of New Stationary Sources, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*
- S.C. Regulation 61-62.60 and 40 CFR 60, *Standards of Performance of New Stationary Sources, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Combustion Engines*
- S.C. Regulation 61-62.60 and 40 CFR 60, *Standards of Performance of New Stationary Sources, Subpart KKKKa, Standards of Performance for Stationary Combustion Engines*
- S.C. Regulation 61-62.60 and 40 CFR 60, *Standards of Performance of New Stationary Sources, Subpart TTTTa, Standards of Performance for Greenhouse Gas Emissions for Modified Coal-Fired Steam Electric Generating Units and New Construction and Reconstruction Stationary Combustion Turbine Electric Generating Units*
- S.C. Regulation 61-62.63 and 40 CFR 63, *National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories, Subpart A, General Provisions*
- S.C. Regulation 61-62.63 and 40 CFR 63, *National Emission Standards For Hazardous Air Pollutants For Source Categories, Subpart ZZZZ, National Emission Standards For Hazardous Air Pollutants For Stationary Reciprocating Internal Combustion Engines*

- S.C. Regulation 61-62.70, *Title V Operating Permit Program*
- S.C. Regulation 61-62.72 and 40 CFR 72, 73, 74, 75, and 76, *Acid Rain*
- S.C. Regulation 61-62.97 and 40 CFR 97 *Cross-State Air Pollution Rule*
- 40 CFR 98, *Mandatory Greenhouse Gas Reporting*

5.0 Best Available Control Technology (BACT) Determination

5.1 BACT Requirement

BACT is defined as “an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant, taking into account energy, environmental, and economic impacts.” As per S.C. Regulation 61-62.5, Standard No. 7, the BACT requirement applies to each individual new or modified affected emissions unit and pollutant emitting activity at which a net emissions increase would occur. In no case can the application of BACT result in emissions of any pollutant which would exceed emissions allowed under any applicable standard under 40 CFR 60, *New Source Performance Standard (NSPS)*, 61, *National Emission Standards for Hazardous Air Pollutants (NESHAP)*, or 63, *NESHAP for Source Categories*.

Chapter B of the draft *New Source Review Workshop Manual* (October 1990) defines the BACT determination process as a 5-step process.

- Step 1 - Identify All Control Technologies
- Step 2 - Eliminate Technically Infeasible Options
- Step 3 - Rank Remaining Control Technologies by Control Effectiveness
- Step 4 - Evaluate Most Effective Controls and Document Results
- Step 5 - Select BACT

Opacity is not considered to be a PSD pollutant and therefore, opacity itself does not require a BACT evaluation and establishment of a BACT limit. However, BACT can include the use of visible emission limitations or work practice standards for regulated PSD pollutants. Opacity limits have been included in the draft permit as required by State and Federal regulations. BACT cannot be less stringent than an applicable NSPS or NESHAP as outlined in 40 CFR 60, 61, and 63.

The primary resource for establishing BACT is the RACT/BACT/LAER Clearinghouse (RBLC) on the Technology Transfer Network (TTN) maintained by the EPA. To establish BACT for a PSD source, state regulatory agencies query the RBLC. This database contains information about available control technologies for specific industry sources and lists the limits that other pollution control agencies have established for similar source types.

BAQ queried the RBLC for all process types and NSR applicable pollutants. An RBLC advanced search was queried using a standard industrial classification (SIC) code of 4911. In addition to the RBLC, operating permits for existing facilities with similar processes and the various control options used by those facilities were reviewed.

5.2 BACT for Carbon Monoxide (CO)

Table 2 lists the CO emissions resulting from the following process/point sources.

1. CT-1, CT-2, AUX-1, DPH-1, DPH-2, CS Heaters-1, CS Heaters-2, EDG-1, CS-ENG, DFP-1, Compressor Station

Table 2 - Potential CO Emissions	
Equipment	Potential CO Emissions (lb/hr)
CT-1	(No. 2 Fuel Oil) 19.9 (Natural Gas) 22 (Bypass) 59.07
CT-2	(No. 2 Fuel Oil) 19.9 (Natural Gas) 22 (Bypass) 59.07
AUX-1	10.18
DPH-1	0.84
DPH-2	0.84
CS Heaters-1	9.88E-04 (each)
CS Heaters-2	0.12 (each)
EDG-1	16.93
DFP-1	2.22
Compressor Station	616.59
CS-ENG	2.65

As stated in the regulatory definition, BACT is “an emissions limitation ... based on the maximum degree of reduction for each regulated NSR pollutant ... taking into account energy, environmental, and economic impacts” When BAQ determines that the imposition of an emissions limitation is not feasible, then “a design, equipment, work practice, operational standard, or combination thereof, may be prescribed” as BACT instead.

5.2.1 Step 1: Identify All Available Control Technologies

The BACT analysis identifies the following control technologies that could reduce CO emissions:

CT-1, CT-2 – Good Combustion Practices, Clean Fuels, Oxidation Catalyst

AUX-1 – Good Combustion Practices, Oxidation Catalyst, Thermal Oxidation

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 – Good Combustion Practices, Oxidation Catalyst, Thermal Oxidation

EDG-1, CS-ENG – Good Combustion Practices, Oxidation Catalyst

DFP-1 – Good Combustion Practices, Oxidation Catalyst

Compressor Station – Minimizing Flaring Events, Good Operating Practices

5.2.2 Step 2: Technical Feasibility of Options

After the identification of control options, the second step in the BACT assessment is to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that would prohibit the implementation of the control or if the highest control efficiency of the option would result in an emission level that is higher than any applicable regulatory limits.

CT-1, CT-2 feasible options:

- Good combustion practices, including the use of clean fuels: Good combustion practices, including the use of clean fuels, are essential for the operation and lifespan of the proposed CCCTs, and will be used. The CTs will fire natural gas as the primary fuel with ULSD fired in a limited capacity as a backup fuel. The duct burners will fire only natural gas. Therefore, good combustion practices are technically feasible for the CCCTs.
- Oxidation Catalyst: Catalytic oxidation has been applied successfully on CCCTs similar to those proposed by DEC and is considered technically feasible. The CCCTs will include an oxidation catalyst as part of their design.

AUX-1 infeasible options:

- Oxidation Catalyst: Catalytic oxidation is a proven post-combustion control technology for natural gas combustion that uses a catalyst matrix to oxidize CO and VOC. For the auxiliary boiler to meet the minimum temperature requirement for catalytic oxidation to be effective, the system would need to be equipped with a supplementary pre-heater to raise the exhaust gas temperature. This add-on control option increases the complexity, costs, and emissions from pre-heating associated with increasing the auxiliary boiler's exhaust temperature. Despite the requirement to raise the exhaust gas temperature to initiate and sustain the reaction, catalytic oxidation was identified as a CO control technology for an auxiliary boiler at one facility (Cronus Chemicals: Tuscola, IL Facility) in a review of the RBLC database and recently permitted facilities. While permitted, this facility has not yet been built and has not demonstrated the use of an oxidation catalyst on an auxiliary boiler in practice. Furthermore, the boiler at the Cronus Chemicals facility is different in its design than the proposed auxiliary boiler. Because the proposed auxiliary boiler design has a maximum exhaust temperature below the effective operating range for an oxidation catalyst and it will be a limited use unit, the addition of an oxidation catalyst as an add-on control technology for the proposed auxiliary boiler is considered technically infeasible.

AUX-1 feasible options:

- Good combustion practices: Good combustion practices are essential for the operation and lifespan of the proposed auxiliary boiler and will be used. Therefore, good combustion practices are technically feasible.
- Thermal oxidation: Thermal oxidation is a technically feasible control technology for the proposed auxiliary boiler.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 infeasible options:

- Oxidation Catalyst: Catalytic oxidation is a proven post-combustion control technology that uses a catalyst matrix to oxidize CO, VOC, and other pollutants. For the gas-fired heaters to

meet the minimum temperature requirement for catalytic oxidation to be effective, the system would need to be equipped with a supplementary pre-heater to raise the exhaust gas temperature. This add-on control option increases the complexity, costs, and emissions from pre-heating associated with the overall system. In addition, PM and moisture in the exhaust stream can cause fouling and deactivation of the catalyst. Because of the gas-fired heaters' small size, low exhaust temperature, and the fact that no catalytic oxidation add-on technology was identified for similar sized gas-fired heaters in the RBLC database or in the review of recently permitted facilities, Therefore, oxidation catalyst is considered technically infeasible for the proposed gas-fired heaters.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 feasible options:

- Good Combustion Practices: Good combustion practices are essential for the operation and lifespan of the proposed gas-fired heaters and will be used with these gas-fired heaters. Therefore, good combustion practices are technically feasible.
- Thermal Oxidation: Thermal oxidation is a technically feasible control for control for the proposed gas-fired heaters.

EDG-1, CS-ENG infeasible options:

- Oxidation Catalyst: Catalytic oxidation is not considered to be technically feasible due to the nature of the emergency generator engines and their intermittent operations. The engines will typically only operate for a short time each month for readiness testing and maintenance checks. The exhaust gas will not reach the temperature required for the oxidation catalyst to provide CO control during these periods.

EDG-1, CS-ENG feasible options:

- Good Combustion Practices: Good combustion practices, which include combustion system design and proper operation and maintenance practices, have been applied successfully to emergency generator engines and are considered technically feasible for the proposed emergency generator engines.

DFP-1 infeasible options:

- Oxidation Catalyst: Catalytic oxidation is not considered to be technically feasible due to the relatively small size of the fire water pump engine and intermittent operations.

DFP-1 feasible options:

- Good Combustion Practices: Good combustion practices, which include combustion system design and proper operation and maintenance practices, have been applied successfully to fire water pump engines and are considered technically feasible for the proposed fire water pump engine.

Compressor Station feasible options:

- Minimizing Flaring Events: Minimizing flaring events is a technically feasible control for flaring events at the compressor station.
- Good Operating Practices: Good operating practices is a technically feasible control for flaring events at the compressor station.

5.2.3 Step 3: Ranking of Control Technologies by Control Effectiveness

CT1, CT2 ranking:

All the technically feasible options were chosen for the combustion turbines; therefore, a ranking is not necessary.

AUX-1 ranking:

Although good combustion practices are the only technology that is typically used for the control of CO (efficiency varies) from an auxiliary boiler, it is possible that a thermal oxidizer may be technically feasible and based on the U.S. EPA fact sheet, can achieve at least 99% control.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 ranking:

Although good combustion practices are the only technology that is typically used for the control of CO (efficiency varies) from small heaters, it is possible that a thermal oxidizer may be technically feasible and based on the U.S. EPA fact sheet, can achieve at least 99% control.

EDG-1, CS-ENG ranking:

Good combustion practices are the only technology considered technically feasible. Therefore, a ranking is not necessary.

DFP-1 ranking:

Good combustion practices are the only technology considered technically feasible. Therefore, a ranking is not necessary.

Compressor Station ranking:

Both minimizing flaring events and good operating practices will be implemented for the compressor station. Therefore, a ranking is not necessary.

5.2.4 Step 4: Evaluation of Most Effective Controls

CT1, CT2:

All the technically feasible options were chosen for the combustion turbines; therefore, a top-down analysis was not required.

AUX-1: Good combustion practices will be implemented as part of the design and operation of the auxiliary boiler. Use of a thermal oxidizer was evaluated based on the heat input of the proposed auxiliary boiler, the Method 19 f factor for natural gas, its PTE, and an annual cost based on the U.S. EPA fact sheet for thermal oxidizers, which indicates annual cost can range from \$8 to \$98/scfm. The analysis, presented in Appendix D of the application, shows that installation of a thermal oxidizer is not cost effective. It would also require additional natural gas to be fired and result in additional combustion emissions. Therefore, DEC is proposing the use of good combustion practices as CO BACT for the proposed auxiliary boiler.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

While an oxidation catalyst and thermal oxidation may, in theory, be considered technically feasible, because the additional fuel required to raise the temperature of the gas stream would ultimately

increase the emissions from the heaters, these add-on control technologies were not considered “available” for use. Use of a thermal oxidizer was evaluated based on the heat input of the proposed heaters, the Method 19 f factor for natural gas, heater PTE, and an annual cost based on the U.S. EPA fact sheet for thermal oxidizers, which indicates annual cost can range from \$8 to \$98/scfm. The analysis, presented in Appendix D of the application, shows that installation of a thermal oxidizer is not cost effective. Therefore, DEC is proposing the use of good combustion practices as CO BACT for the proposed gas-fired heaters.

EDG-1, CS-ENG:

Good combustion practices will be implemented as part of the design and operation of the emergency generator engines. Therefore, economic, environmental, and/or energy impacts were not evaluated.

DFP-1:

Good combustion practices will be implemented as part of the design and operation of the firewater pump engine. Therefore, economic, environmental, and/or energy impacts were not evaluated.

Compressor Station:

Minimizing flaring events and good operating practices will be implemented as part of the design and operation of the compressor station. Therefore, economic, environmental, and/or energy impacts were not evaluated.

5.2.5 Step 5: Select BACT Controls and Limits

CT1, CT2:

DEC proposes to use good combustion practices, including the use of clean fuels, and catalytic oxidation as CO BACT for the CCCTs for normal operations in combined cycle mode to achieve the emissions limits presented in [Table 3](#).

To determine the appropriate BACT limits, a search of the RBLC database and recently permitted facilities was conducted for similar CCCTs. The results of the RBLC search of recently permitted facilities can be found in Appendix B of the application and the proposed limits are within the range of recent determinations. These limits are based on emissions data obtained from the CCCT manufacturer, GE. The 24-hour averaging period aligns with recent determinations (there are several determinations with a 24-hour averaging period, and two with a 30-day averaging period) and is proposed to account for emissions variability across the anticipated variable operating scenarios of the CCCTs. DEC also proposes a 24-hour averaging period when firing ULSD due to the anticipated limited use of this fuel. Many of the RBLC entries for fuel oil firing have no averaging period associated with them.

During normal operations in combined cycle mode, DEC proposes the use of good combustion practices, including the use of clean fuels, and an oxidation catalyst for the CCCTs to achieve an emissions limit of 2 ppmvd @ 15% O₂ when firing natural gas and an emissions limit of 1.7 ppmvd @ 15% O₂ when firing ULSD in the CTs. DEC is proposing a limit of 500 full load equivalent hours per year per turbine for firing ULSD. Compliance will be monitored using a CO CEMS. DEC proposes that for hours with multiple emissions standards, the applicable limit for that hour is determined based

on the operating condition that corresponded to the highest emissions standard. This approach is equivalent to that in NSPS Subpart KKKKa at 40 CFR 60.4320a(b)(1).

During bypass operations (simple cycle mode with no duct burner operation), DEC proposes to use good combustion practices, including the use of clean fuels as CO BACT for the CTs to achieve an emissions limit of 9.0 ppmvd @ 15% O₂ on a 24-hr rolling average. It is important to note that the proposed operating scenario for bypass operations is limited to 500 full load equivalent hours per year. It is not technically practical or cost effective to install a second oxidation catalyst in the proposed bypass stack due to the nature of bypass operations, which could include fast-start generation demand required by the regional electric grid operator, and for the limited hours of operation. Bypass operations typically occur during startup/shutdown, emergencies, and maintenance, which are short duration events. It is not economically or technically feasible to control the system during short durations due to a high cost for a low emissions reduction payoff. Additionally, during bypass, temperatures and velocity are higher, which makes it difficult for control equipment to function properly or survive long-term. Exhaust flow can be inconsistent during bypass operations and control systems typically require steady-state conditions to work effectively. The controls are usually placed downstream in the exhaust path, not in the bypass ducts. Even if it were technically feasible to design controls for bypass ducts that are not used frequently, it would not be economically feasible to operate a separate control system to serve bypass operations.

DEC is also proposing to establish secondary CO BACT limits for startup and shutdown. Startup is defined as the period from initial firing to the minimum emissions compliance load (MECL), which is mode 6A2 for this particular turbine model. Shutdown is defined as the period from MECL to flame out. A cold start occurs after the CT has been shutdown for 72 hours or more. A warm start occurs when the CT has been shutdown for more than 8 hours but less than 72 hours. A hot start occurs when the CT has been shutdown for less than 8 hours. Time is necessary to bring the HRSG and steam turbine up to temperature after a shutdown without damaging the equipment. [Table 3](#) provides a summary of proposed limitations on startup and shutdown events. Separate BACT for startup and shutdown is necessary because the CO catalyst will not achieve control until a certain exhaust gas temperature is reached. DEC proposes to limit the emissions from startup and shutdown events in a 12-month period. DEC will adhere to optimal operational practices during periods of startup and shutdown. Periods of start-up and shutdown would be excluded from the calculations to demonstrate compliance with the CO BACT limits presented in [Table 3](#).

DEC also requested the following operational flexibility, given the stringency of the proposed numeric BACT limits and the challenges complying with the BACT for normal operation during tuning, no-load, and other transitory conditions (similar allowances are provided in other facilities' turbine BACT conditions):

- The CO BACT limits do not apply during a burner tuning session, water injection system adjustments, and manufacturer-required full-speed, no-load (FSNL) tests (also referred to as green rotor run in), provided the tuning session, adjustments, and testing are performed in accordance with the manufacturer's specifications or determined best practices. DEC will provide SC DES with advance notification of planned tuning, adjustments, and FSNL testing events. Routine maintenance of the turbine and these resulting tests to ensure optimum operations are critical to the long-term operation of the turbine and to minimizing emissions.

- The CO BACT limits do not apply during a fuel switch, for no more than two hours (120 minutes) per fuel switch, and up to four hours (240 minutes) per 24-hour period.

AUX-1:

DEC proposes to use good combustion practices and to limit operation to a 10% capacity factor as CO BACT for the auxiliary boiler. A search of the RBLC database and other recently permitted facilities was conducted for similar auxiliary boilers. The results of the RBLC search of recently permitted facilities can be found in Appendix B of the application and the proposed BACT is consistent with recent determinations. Because the unit will be a limited-use unit, a numeric emissions limit and stack testing are not proposed. Proper operation and maintenance and combustion of only natural gas will serve to ensure good combustion practices are being used.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

DEC proposes good combustion practices for the gas-fired heaters as CO BACT. A search of the RBLC database and recently permitted facilities was conducted, and the search results can be found in Appendix B of the application. The proposed BACT is consistent with recent determinations. Due to the size of the heaters, DEC did not propose stack testing or numeric emissions limits.

EDG-1, CS-ENG:

A review was conducted of CO BACT determinations for emergency generator engines, including a search of the RBLC database and a review of information concerning recently permitted facilities with emergency generator engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices and limited annual operating hours for testing/maintenance as BACT for the emergency generator engines. Due to the expected limited operation of the engine, stack testing is not proposed. Purchase of NSPS-compliant engines will ensure compliance with BACT.

DFP-1:

A review was conducted of CO BACT determinations for fire water pump engines, including a search of the RBLC database and a review of recently permitted facilities with fire water pump engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices, limited annual operating hours for testing/maintenance, and a CO emissions limit of 2.6 g/hp-hr as BACT for the fire water pump engine. Due to the expected limited operation of the engine, stack testing is not proposed. Use of only ULSD and NSPS compliance will ensure compliance with BACT.

Compressor Station:

To determine the appropriate proposed BACT, a review of the RBLC database and recently permitted facilities was conducted. The results of this search can be found in Appendix B of the application. DEC proposes that minimizing flaring events and using good operating practices for control of CO emissions is BACT. CO emissions from the flaring at the compressor station will be limited to one event per year. Due to the limited occurrence of flaring and the temporary nature of the flare, a numeric emissions limit and stack testing are not proposed.

Table 3 - Selection of CO BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
CT-1, CT-2 Natural Gas – Normal Operation	Catalytic oxidation and good combustion practices	2 ppmvd @ 15% O ₂ , 24-hour rolling average
CT-1, CT-2 No. 2 Fuel Oil – Normal Operation	Catalytic oxidation and good combustion practices	1.7 ppmvd @ 15% O ₂ , 24-hr rolling average
CT-1, CT-2 Startup/Shutdown	Adhere to optimal operational practices to minimize emissions and time in SU/SD Limiting emissions per 12- month period from Cold Starts Warm Starts Hot Starts Shutdowns	Maximum emissions per 12-month period: 401 tons from startup and shutdown
CT-1, CT-2 Natural gas – Simple- cycle	Good combustion practices	9 ppmvd @ 15% O ₂ , 24-hr rolling average
CT-1, CT-2 burner tuning sessions, water injection system adjustments, and manufacturer-required FSNL tests	Tuning, adjustments, and testing performed in accordance with the manufacturer's specifications or determined best practices	---
CT-1, CT-2 fuel switch	Limiting the duration of fuel switches	Less than or equal to two hours (120 minutes) per fuel switch Less than or equal to four hours (240 minutes) per 24-hour period
AUX-1	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	Good combustion practices, combust only natural gas	---
EDG-1	Installation of NSPS- compliant engine, good combustion practices, and limited operating hours for	2.6 g/hp-hr

Table 3 - Selection of CO BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
	testing/maintenance, combust only No. 2 Fuel Oil	
CS-ENG	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	4.0 g/hp-hr
DFP-1	Installation of U.S. EPA Tier 2 certified engine, good combustion practices, and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	2.6 g/hp-hr
Compressor Station	Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year	---

5.3 BACT for Nitrogen Oxides (NO_x)

Table 4 lists the NO_x emissions resulting from the following process/point sources.

1. CT-1, CT-2, AUX-1, DPH-1, DPH-2, CS Heaters-1, CS Heaters-2, EDG-1, CS-ENG, DFP-1, Compressor Station

Table 4 - Potential NO_x Emissions	
Equipment	Potential NO_x Emissions (lb/hr)
CT-1	(No. 2 Fuel Oil) 98.0 (Natural Gas) 45.2 (Bypass) 233.4
CT-2	(No. 2 Fuel Oil) 98.0 (Natural Gas) 45.2 (Bypass) 233.4
AUX-1	16.96
DPH-1	1.00
DPH-2	1.00
CS Heaters-1	2.94E-04 (each)
CS Heaters-2	7.06E-03 (each)
EDG-1	30.96

Table 4 - Potential NO_x Emissions	
Equipment	Potential NO_x Emissions (lb/hr)
CS-ENG	1.32
DFP-1	2.54
Compressor Station	135.25

As stated in the regulatory definition, BACT is “an emissions limitation ... based on the maximum degree of reduction for each regulated NSR pollutant ... taking into account energy, environmental, and economic impacts ...” When BAQ determines that the imposition of an emissions limitation is not feasible, then “a design, equipment, work practice, operational standard, or combination thereof, may be prescribed” as BACT instead.

5.3.1 Step 1: Identify All Available Control Technologies

The BACT analysis identifies the following control technologies that could reduce NO_x emissions:

CT-1, CT-2 – Good Combustion Practices, Clean Fuels, Water or Steam Injection, Dry Low-NO_x Combustors, Selective Catalytic Reduction, Selective Non-Catalytic Reduction, Low-NO_x Burners, Ultra Low-NO_x Burners

AUX-1 – Good Combustion Practices, Selective Catalytic Reduction, Selective Non-Catalytic Reduction, Low-NO_x Burners, Ultra Low-NO_x Burners, Flue Gas Recirculation

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 – Good Combustion Practices, Selective Catalytic Reduction, Selective Non-Catalytic Reduction, Low-NO_x Burners, Ultra Low-NO_x Burners, Flue Gas Recirculation

EDG-1, CS-ENG – Good Combustion Practices, Selective Catalytic Reduction

DFP-1 – Good Combustion Practices, Selective Catalytic Reduction

Compressor Station – Minimizing Flaring Events, Good Operating Practices

5.3.2 Step 2: Technical Feasibility of Options

After the identification of control options, the second step in the BACT assessment is to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that would prohibit the implementation of the control or if the highest control efficiency of the option would result in an emission level that is higher than any applicable regulatory limits.

CT-1, CT-2 infeasible options:

- Selective Non-Catalytic Reduction (SNCR): SNCR requires a temperature window that is higher than the exhaust temperatures from natural gas-fired CTs. Therefore, SNCR is considered technically infeasible for the proposed CCTs due to the temperature at which the turbines

will operate, the residence time of the technology, and the lack of historical use of SNCR on CTs.

CT-1, CT-2 feasible options:

- Good Combustion Practices: Good combustion practices, including the use of clean fuels, are essential for the operation and lifespan of the proposed CCCTs and will be used. The CCCTs will fire natural gas with ULSD as a back-up fuel. The duct burners will fire only natural gas. Therefore, good combustion practices are technically feasible for the CCCTs.
- Water or Steam Injection: Water or steam injection has been shown to be technically feasible for use on CTs and will be used.
- Dry Low-NOx Combustors (DLN): DLN combustors are technically feasible for use on CCCTs and will be used.
- Selective Catalytic Reduction (SCR): SCR is technically feasible for use on CCCTs and will be used.
- Low-NOx Burners (LNB) / Ultra Low-NOx Burners (ULNB): LNB/ULNB have been found to be technically feasible for use on CCCTs and are therefore carried further in the analysis.

AUX-1 infeasible options:

- Selective Catalytic Reduction: The auxiliary boiler will be used on an as-needed basis (no more than 10% capacity factor) to maintain the CCCTs in a condition that will minimize the startup time while not exposing the steam turbine and HRSGs to thermally induced stresses. While an SCR may be technically feasible on larger boilers that are not subject to limited as-needed operation, because most of the proposed auxiliary boiler operation is expected to be at low load where the exhaust gas temperature will be below the minimum needed for effective SCR control, SCR is not considered technically feasible for the proposed auxiliary boiler. In addition, while the auxiliary boiler will operate at full load occasionally, the duration at which the boiler will operate is expected to be so short that the SCR could rarely be used effectively. Therefore, the SCR control technology is not considered to be technically feasible for the auxiliary boiler and is not considered further.
- Selective Non-Catalytic Reduction: SNCR requires a temperature window that is higher than the exhaust temperatures from the auxiliary boiler. Therefore, SNCR is considered technically infeasible for the proposed auxiliary boiler.
- Flue Gas Recirculation: FGR is not likely to be effective for a limited-use unit that will employ a standard burner and experience low-load operation. Typically, vendors do not supply FGR on its own with a standard burner, but combine FGR with LNB/ULNB to achieve NOx reductions (FGR is built into ULNB, for example). Using FGR also typically requires use of an air preheater to reduce moisture in the recirculated air and it also requires extra fan power. FGR results in additional maintenance due to higher moisture from the recirculated air, and a more complex boiler and combustion management system. In addition, based on a Bay Area AQMD cost calculation to add FGR to a small boiler, it is not cost effective. DEC's auxiliary boilers do not employ FGR, so it was not considered further.

AUX-1 feasible options:

- Good Combustion Practices: Good combustion practices are essential for the operation and lifespan of the proposed auxiliary boiler and will be used. Therefore, good combustion practices are technically feasible.

- Low-NOx Burners: The use of LNB has been found to be technically feasible for use in auxiliary boilers and therefore is considered further in the evaluation.
- Ultra Low-NOx Burners: The use of ULNB is not feasible at low operating loads because of challenges with flame stability and flame impingement on boiler tubes. Combustion instability can occur at the leaner fuel to air ratios at which ULNB operate. ULNB have a narrower operating range between their minimum and maximum firing rates than conventional burners that can limit a boiler's flexibility in adapting to fluctuating load requirements. However, for purposes of this analysis, ULNB were considered feasible.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 infeasible options:

- Selective Catalytic Reduction: While an SCR may be considered a technically feasible control technology for larger combustion units, and can be used as supplemental control with LNB or ULNB, it has not been applied on gas-fired heaters of similar size as the proposed units (less than 1 MMBtu/hr each). Therefore, it is not considered a technically "available" control option for this analysis. Even if an SCR were able to be applied to the group of 24 compressor station heaters that total about 1.5 MMBtu/hr heat input when added together, the EPA SCR cost spreadsheet¹ indicates the cost would be over \$40,000/ton, which is not cost effective. If an SCR were able to be applied to the two dew point heaters together, the EPA cost spreadsheet indicates that it would be more than \$15,287/ton, which is not cost effective.
- Selective Non-Catalytic Reduction: SNCR requires a temperature window that is higher than the exhaust temperatures from small gas-fired heaters. Therefore, SNCR is considered technically infeasible for the proposed gas-fired heaters.
- Flue Gas Recirculation: FGR has not been applied on gas-fired heaters as small as the proposed units. FGR works on larger combustion units that are fired at high temperatures and produce thermal NOx. Small heaters such as these do not operate at high temperatures and with stable flames such that recirculating any exhausted air would provide any appreciable NOx reduction. Recirculating air back into the unit would likely impact flame stability to introduce cooler air into such a small firebox. Diluting the combustion air in such a small heater would significantly shrink the stable operating window, and the operating load to run a recirculation fan and its controls would likely exceed the heat output of the small heaters themselves. Therefore, it is not considered a technically available control option for this analysis.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 feasible options:

- Good Combustion Practices: Good combustion practices are essential for the operation and lifespan of the proposed gas-fired heaters and will be used. Therefore, good combustion practices are technically feasible.
- Low-NOx Burners: The use of LNB may be technically feasible for use on small gas-fired heaters and is considered further in the evaluation.
- Ultra Low-NOx Burners: The use of ULNB may be technically feasible for use on small gas-fired heaters and is considered further in the evaluation.

EDG-1, CS-ENG infeasible option:

¹ <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>

- Selective Catalytic Reduction: SCR has been applied in base-load diesel engine applications where engines are operated primarily at high capacity for extended periods of time for industrial and power generation purposes. Because of the quick startups and short operating durations, SCR is not technically feasible for emergency engines.

EDG-1, CS-ENG feasible option:

- Good Combustion Practices: Good combustion practices, which include combustion system design and proper operation and maintenance practices, have been applied successfully to emergency generator engines and are considered technically feasible for the proposed emergency generator engines.

DFP-1 infeasible option:

- Selective Catalytic Reduction: SCR is not a demonstrated NOx control technology for fire water pump engines. SCR has been applied in base-load diesel engine applications where engines are operated primarily at high capacity for extended periods of time for industrial and power generation purposes. Based upon a review of the RBLC and recently permitted facilities, no specific controls were identified for firewater pump engines operating less than 500 hours/12-month rolling period. SCR is also not technically feasible in applications requiring quick startups and short operating durations. Therefore, SCR technology is not considered to be technically feasible for the firewater pump engine.

DFP-1 feasible option:

- Good Combustion Controls: Good combustion practices, which include combustion system design and proper operation and maintenance practices, have been applied successfully to fire water pump engines and are considered technically feasible for the proposed fire water pump engine.

Compressor Station feasible options:

- Minimizing Flaring Events: Minimizing flaring events is a technically feasible control for flaring operations at the compressor station.
- Good Operating Practices: Implementing good operating practices is a technically feasible control for flaring operations at the compressor station.

5.3.3 Step 3: Ranking of Control Technologies by Control Effectiveness

CT-1, CT-2 ranking:

The information provided by the facility regarding the efficiencies of the remaining control devices was obtained from vendor data and AP-42. The controls are ranked from the most to least effective based on their NOx emission reduction potential control efficiency in Table 5.

Table 5 – CT-1, CT-2 NO_x Control Option Efficiency	
Control Option	Efficiency (%)
Selective Catalytic Reduction (SCR)	80-94% (based on vendor data)
Water or Steam Injection	60-70% (based on AP-42)
Dry Low-NO _x Combustors (DLN)	15-60% (based on AP-42 and vendor data)
Good combustion practices	Varies by design

As evidenced in the RBLC, the controls that are both available and feasible for the CCCT can be used in combination to achieve BACT emissions levels. The Project will combine several feasible control technologies including SCR on the CCCTs, good combustion practices, including the use of clean fuels, DLN combustors for the CTs, water injection for the CTs when combusting fuel oil, and LNB for the duct burners. The combination of these controls ensures the CCCTs can meet the BACT emissions level. The duct burners have LNB. According to the HRSG vendor, Vogt Power, the burner is the only style available for use in this type of design. The duct burners are in supported “runners” across a duct – they are not the same design as a gas-fired package boiler, so there are limited options for emissions control (e.g., traditional boiler NO_x controls like ULNB and FGR are not available).

AUX-1 ranking:

The information provided by the facility regarding the efficiencies of the remaining control devices was obtained from vendor data and AP-42. The controls are ranked from the most to least effective based on their NO_x emission reduction potential control efficiency in Table 6.

Table 6 – AUX-1 NO_x Control Option Efficiency	
Control Option	Efficiency (%)
Ultra Low-NO _x Burners	90%
Low-NO _x Burners	70%
Good combustion practices	Varies by design

The remaining control technologies ranked starting with the most effective technology are ULNB (90% reduction assuming a 9 ppm NO_x burner versus a standard 100 ppm NO_x burner), LNB (70% reduction assuming a 30 ppm NO_x burner versus a standard 100 ppm NO_x burner), and good combustion practices (reduction varies based on design and operation).

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 ranking:

The rankings for this equipment are the same as the rankings for the auxiliary boiler – see AUX-1 ranking section above for discussion.

EDG-1, CS-ENG ranking:

Good combustion practices are the only technology considered technically feasible. Therefore, a ranking is not necessary.

DFP-1 ranking:

Good combustion practices are the only technology considered technically feasible. Therefore, a ranking is not necessary.

Compressor Station ranking:

Both minimizing flaring events and good operating practices will be implemented for the compressor station. Therefore, a ranking is not necessary.

5.3.4 Step 4: Evaluation of Most Effective Controls

The top-down approach for determining BACT suggests that all available control technologies be ranked in descending order of control effectiveness. The most stringent or “top” control option is the default BACT emission limit unless the applicant demonstrates, and the permitting authority in its informed opinion agrees, that energy, environmental, and/or economic impacts justify the conclusion that the most stringent control option is not achievable in that case. Upon elimination of the most stringent control option based upon energy, environmental, and/or economic considerations, the next most stringent alternative is evaluated in the same manner. This process continues until BACT is selected.

CT-1, CT-2:

SCR, DLN, LNB, water injection (when combusting fuel oil), and good combustion practices will be implemented as part of the design and operation of the CCCTs. Therefore, economic, environmental, and/or energy impacts were not assessed.

AUX-1:

Although ULNB and LNB are feasible control technologies for natural gas-fired combustion units, the technologies are not economically feasible for this Project. Implementing a ULNB would cost more than \$19,000/ton and implementing LNB would cost more than \$10,000/ton (see Appendix D of the application for the cost calculations), which is not cost effective.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

The use of LNB and ULNB would require adjustments to heater and burner design including additional excess air, resulting in an efficiency reduction and additional fuel firing. A cost effectiveness analysis for installing LNB and ULNB on the heaters is presented in Appendix D of the application based on vendor information and published cost analysis methodologies and shows that the incremental decrease in emissions that ULNB and LNB would achieve (reduction in emissions from 100 ppm NO_x to 30 or 9 ppm NO_x) is not cost effective for this Project. The cost effectiveness is above \$7,500/ton for all scenarios, which is the marginal cost effectiveness threshold U.S. EPA used for NO_x controls on non-EGUs in the 2023 Good Neighbor Plan. Therefore, good combustion practices is the only practical control option for NO_x control for the gas-fired heaters.

EDG-1, CS-ENG:

Good combustion practices will be implemented as part of the design and operation of the emergency generator engines. Therefore, economic, environmental, and/or energy impacts were not evaluated.

DFP-1:

Good combustion practices will be implemented as part of the design and operation of the firewater pump engine. Therefore, economic, environmental, and/or energy impacts were not evaluated.

Compressor Station:

Minimizing flaring events and good operating practices will be implemented as part of the design and operation of the compressor station. Therefore, economic, environmental, and/or energy impacts were not evaluated.

5.3.5 Step 5: Select BACT Controls and Limits

The proposed BACT limits are based on what the manufacturer has indicated can be achieved over the life of the equipment and DEC's operating experience with similar units and are consistent with the RBLC.

CT-1, CT-2:

The proposed BACT limits are based on what the manufacturer has indicated can be achieved over the life of the equipment and DEC's operating experience with similar units and are consistent with the RBLC. DEC proposes to use SCR, DLN, LNB, water injection (when combusting fuel oil), and good combustion practices, including the use of clean fuels, as NO_x BACT for the CCCTs for normal operations (combined cycle mode) to achieve the emissions limits presented in Table 7. Note that these limits include operation of the duct burners. NO_x CEMS will be used.

To ascertain the appropriate BACT limits, a search of the RBLC database and other recently permitted facilities was conducted for similar CCCTs. The results of the RBLC search of recently permitted facilities can be found in Appendix B of the application and the proposed limits are within the range of recent determinations. The proposed BACT limits are based on a review of the RBLC and information obtained from the manufacturer, GE. The 24-hour averaging period aligns with recent determinations and is proposed to account for operational variability (cycling) of the CCCTs.

During normal operations, DEC proposes the use of good combustion practices, including the use of clean fuels, DLN, and SCR to achieve an emissions limit of 2.5 ppmvd @ 15% O₂ for the CCCTs when firing natural gas as BACT. The operating temperature of the GE H frame turbine design that DEC will install at the Facility results in NO_x emissions of approximately 33 ppm at the turbine exit, compared to 9-11 ppm for the F frame design, which is smaller and operates at significantly lower firing temperatures. Therefore, even achieving 2.5 ppm NO_x is pushing the limit of the SCR technology because over 90% control will be required. GE has indicated that the SCR will likely need to be replaced every five years to meet the proposed BACT limit, rather than the typical 20-year replacement frequency, due to the expected operating conditions (e.g., the higher operating temperature). The H frame was selected for this project because it has greater power output than the F frame and is more efficient (per GE's website, at least 64% in combined cycle mode, versus less than 60% for the F frame). The heat rate of the H frame turbine selected for this project is lower than the F frame, meaning less fuel is fired to achieve the same power output. Because the H frame technology's efficiency, it meets EPA's stringent GHG standards in NSPS Subpart TTTTa for units with a capacity factor greater than 40%, which is the minimum level for GHG BACT.

There are other facilities in the RBLC that use SCR, DLN, LNB, and good combustion practices with a numeric BACT limit of 2 ppmvd@15% O₂; however, DEC is not required to select the lowest entry in the RBLC as BACT, and the proposed BACT limits are based on the level of performance the specific proposed design, size, fuel, and turbine model is expected to achieve over the life of the unit and on DEC experience operating similar units. Water injection would not help achieve 2 ppm NO_x when firing gas because it is necessary only when firing oil. When firing gas in DLN burners, fuel and air are thoroughly mixed before ignition, which caps peak flame temperature and suppresses thermal NO_x formation without needing a diluent like water. Water injection is used when burning fuel oil because liquid fuel and air cannot be premixed in the same way; oil is burned with a diluted diffusion flame, not a premixed lean flame. It has already been stated that 2.5 ppm NO_x is challenging for an SCR to meet. To consistently achieve a BACT limit of 2 ppm over the life of the project, DEC would have to over-inject ammonia, resulting in ammonia slip higher than estimated (or optimal) and causing additional secondary PM formation.

The turbine manufacturer and model are not provided for all the RBLC entries and may not be comparable to the technology that will be installed with this Project. Some entries with limits lower than DEC is proposing are addressed below.

- Lincoln Land and Energy Center, Pawnee Illinois: The project included the installation of two natural gas-fired Siemens combined-cycle combustion turbines with a capacity of 3,647 MMBtu/hr each. These units were designed by a different manufacturer and are significantly smaller than the proposed DEC CTs; therefore, this project is not directly comparable to DEC's Project.
- Renovo Energy Center, Clinton, Pennsylvania: The project proposed to install two GE natural gas-fired CCTs. The permit was appealed and the project was cancelled; therefore, the proposed BACT limits were never demonstrated in practice.
- Chickahominy Power LLC, Charles City County, VA: The project included three Mitsubishi Hitachi Power Systems natural gas-fired CTs with a capacity of 4,066 MMBtu/hr each equipped with a HRSG, SCR, and LNB. This facility used a different manufacturer for its Project and installed smaller turbines than proposed for this Project; therefore, this project is not directly comparable to DEC's Project.
- Novi Energy Center C4GT, LLC, Charles City County, VA: The project proposed to install a 1,100 MW natural gas-fired combined cycle electric generating plant. The project was cancelled and never constructed; therefore, the proposed BACT limits were never demonstrated in practice.
- Maple Creek Energy, Fairbanks, Indiana: The project included one combined cycle natural gas-fired turbine that would be either a Siemens (3,800 MMBtu/hr) or a GE (4,200 MMBtu/hr) unit equipped with a HRSG, SCR, and LNB. The Siemens turbine is not an equivalent design and is smaller than the proposed GE 7HA.03 turbine. The GE turbine is also smaller than DEC proposes to install; however, the application did not include vendor data, so the project cannot be compared to DEC's Project.
- Plant Barry Generating Station, Bucks, Alabama: The project included two combined cycle natural-gas fired combustion turbines equipped with HRSG, SCR, and oxidation catalyst. The RBLC indicates a 2 ppm NO_x limit for the combustion turbines; however, the November 9, 2020 Air Permit (Permit Number 503-1001-X014) contains a 4 ppm limit, which is less stringent than the proposed limit for DEC's Project.

DEC is proposing an emissions limit of 6.0 ppmvd @ 15% O₂ for the CCCTs when firing ULSD during normal operations and to limit ULSD firing to 500 full load equivalent hours per year per CT. Compliance will be demonstrated using a NO_x CEMS. DEC proposes that for hours with multiple applicable emissions standards, the applicable limit for that hour is determined based on the condition that corresponds to the highest emissions standard. This approach is equivalent to that in NSPS Subpart KKKKa at 40 CFR 60.4320a(b)(1).

During bypass operations (simple cycle mode with no duct burner operation), DEC proposes to use good combustion practices, including the use of clean fuels, and DLN as NO_x BACT for the CTs to achieve an emissions limit of 15 ppmvd @ 15% O₂ on a 24-hr rolling average. This limit will be achieved by implementing control logic to lower the firing temperature during bypass mode. It is important to note that the proposed operating scenario for bypass operations is limited to 500 full load equivalent hours per year. It is not technically practical or cost effective to install a second SCR system in the proposed bypass stack due to the nature of bypass operations, which could include fast-start generation demand required by the regional electric grid operator, and for the limited hours of operation. Bypass operations typically occur during startup/shutdown, emergencies, and maintenance, which are short duration events. It is not economically or technically feasible to control the system during short durations due to a high cost for a low emissions reduction payoff. Additionally, during bypass, temperatures and velocity are higher, which make it difficult for control equipment to function properly or survive long-term. Exhaust flow can be inconsistent during bypass operations and control systems typically require steady-state conditions to work effectively. The controls are usually placed downstream in the exhaust path, not in the bypass ducts. Even if it were technically feasible to design controls for bypass ducts that are not used frequently, it would not be economically feasible to operate a separate control system to serve bypass operations.

DEC is also proposing to establish secondary NO_x BACT limits for startup and shutdown. Table 7 provides a summary of the proposed limitations on startup and shutdown events. Startup is defined as the period from initial firing to MECL, which is mode 6A2 for this particular turbine model. Shutdown is defined as the period from MECL to flame out. A cold start occurs after the CT has been shutdown for 72 hours or more. A warm start occurs when the CT has been shutdown for more than 8 hours but less than 72 hours. A hot start occurs when the CT has been shutdown for less than 8 hours. Time is necessary to bring the HRSG and steam turbine up to temperature after a shutdown without damaging the equipment. Separate startup and shutdown BACT is necessary because the SCR will not achieve control until a certain exhaust gas temperature is reached. DEC proposes to limit the startup and shutdown emissions in a 12-month period. DEC will adhere to optimal operational practices during periods of startup and shutdown. Periods of operation in start-up and shutdown mode would be excluded from the calculations to demonstrate compliance with the emissions limits presented in Table 7.

DEC also requested the following operational flexibility, given the stringency of the proposed numeric BACT limits and the challenges complying with the BACT for normal operation during tuning, no-load, and other transitory conditions (similar allowances are provided in other facilities' turbine BACT conditions):

- The NO_x BACT limits do not apply during a burner tuning session (although 40 CFR Part 60, Subpart KKKKa requirements will apply), water injection system adjustments, and manufacturer-required full-speed, no-load (FSNL) tests (also referred to as green rotor run in), provided the tuning session and testing are performed in accordance with the manufacturer's specifications or determined best practices. DEC will provide SC DES with advance notification of planned tuning, adjustments, and FSNL testing events. Routine maintenance of the turbine and these resulting tests to ensure optimum operations are critical to the long-term operation of the turbine and to minimizing emissions.
- The NO_x BACT limits do not apply during a fuel switch, for no more than two hours (120 minutes) per fuel switch, and up to four hours (240 minutes) per 24-hour period.

AUX-1:

DEC proposes to use good combustion practices and a 10% capacity factor as BACT for the auxiliary boiler. A review was conducted of NO_x BACT determinations for auxiliary boilers, including a search of the RBLC database and a review of information concerning recently permitted facilities with auxiliary boilers. The results of this search can be found in Appendix B of the application and the proposed BACT is consistent with recent determinations. As such, DEC proposes good combustion practices and a 10% capacity factor limitation as BACT to control NO_x emissions from the proposed auxiliary boiler. Because the unit will be a limited-use unit, numeric emissions limits and stack testing are not proposed. Proper operation and maintenance and combustion of only natural gas will serve to ensure good combustion practices are being used.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

DEC proposes to use good combustion practices as NO_x BACT for the small gas-fired heaters. A review of the RBLC database and recently permitted facilities for small heaters firing natural gas was conducted. The results of the RBLC and recently permitted facilities search are summarized in Appendix B of the application and the proposed BACT is consistent with recent determinations. Due to the size of the units, numeric limits and stack testing are not proposed. Use of natural gas and proper operation and maintenance will ensure compliance with BACT.

EDG-1, CS-ENG:

A review was conducted of NO_x BACT determinations for emergency generator engines, including a search of the RBLC database and a review of information concerning recently permitted facilities with emergency generator engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices and limited annual operating hours for testing/maintenance as BACT for the emergency generator engines. Due to the expected limited operation of the engines, stack testing is not proposed. Purchase of NSPS-compliant engines will ensure compliance with BACT.

DFP-1:

A review was conducted of NO_x BACT determinations for fire water pump engines, including a search of the RBLC database and a review of recently permitted facilities with fire water pump engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices and limited annual operating hours for testing/maintenance as BACT for the fire water pump engine to achieve a NO_x

emissions limit of 3.0 g/hp-hr. Due to the expected limited operation of the engine, stack testing is not proposed. Use of only ULSD and NSPS compliance will ensure compliance with BACT.

Compressor Station:

To determine the appropriate proposed BACT, a review of the RBLC database and recently permitted facilities was conducted. The results of this search can be found in Appendix B of the application. DEC proposes that minimizing flaring events and using good operating practices for control of NOx emissions is BACT. NOx emissions from the flaring at the compressor station will be limited to one event per year. Due to the limited occurrence of flaring and the temporary nature of the flare, a numeric emissions limit and stack testing are not proposed.

Table 7 - Selection of NO_x BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
CT-1, CT-2 Natural Gas – Normal Operation	SCR, DLN, LNB, and good combustion practices	2.5 ppmvd @ 15% O ₂ , 24-hour rolling average
CT-1, CT-2 No. 2 Fuel Oil – Normal Operation	SCR, DLN, LNB, water injection, and good combustion practices	6.0 ppmvd @ 15% O ₂ , 24-hour rolling average
CT-1, CT-2 Startup/Shutdown	Adhere to optimal operational practices to minimize emissions and time in SU/SD Limiting emissions per 12- month period from Cold Starts Warm Starts Hot Starts Shutdowns	Maximum emissions per 12-month period: 98.9 tpy
CT-1, CT-2 (Natural gas, simple- cycle)	Good combustion practices	15 ppmvd @ 15% O ₂ , 24-hour rolling average
CT-1, CT-2 burner tuning sessions, water injection system adjustments, and manufacturer-required FSNL tests	Tuning, adjustments, and testing performed in accordance with the manufacturer's specifications or determined best practices	---
CT-1, CT-2 fuel switch	Limiting the duration of fuel switches	Less than or equal to two hours (120 minutes) per fuel switch

Table 7 - Selection of NO_x BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
		Less than or equal to four hours (240 minutes) per 24-hour period
AUX-1	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	Good combustion practices, combust only natural gas	---
EDG-1	Installation of U.S. EPA Tier 2 certified engine, good combustion practices and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	4.8 g/hp-hr
CS-ENG	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	2.0 g/hp-hr
DFP-1	Installation of U.S. EPA Tier 2 certified engine, good combustion practices, and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	3.0 g/hp-hr
Compressor Station	Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year.	---

5.4 BACT for Volatile Organic Compounds (VOCs)

Table 8 lists the VOC emissions resulting from the following process/point sources.

1. CT-1, CT-2, AUX-1, DPH-1, DPH-2, CS Heaters-1, CS Heaters-2, EDG-1, CS-ENG, DFP-1, Compressor Station, TK-1, TK-2

Table 8 - Potential VOC Emissions	
Equipment	Potential VOC Emissions (lb/hr)
CT-1	(No. 2 Fuel Oil) 18.4 (Natural Gas) 13.6 (Bypass) 7.894
CT-2	(No. 2 Fuel Oil) 18.4 (Natural Gas) 13.6 (Bypass) 7.89
AUX-1	0.67
DPH-1	0.055
DPH-2	0.055
CS Heaters-1	1.62E-05 (each)
CS Heaters-2	3.88E-04 (each)
EDG-1	1.69
CS-ENG	0.93
DFP-1	0.97
Compressor Station	(Flaring) 1.57 (Piping) 1.14E-04
TK-1	0.18
TK-2	0.18

As stated in the regulatory definition, BACT is “an emissions limitation ... based on the maximum degree of reduction for each regulated NSR pollutant ... taking into account energy, environmental, and economic impacts” When BAQ determines that the imposition of an emissions limitation is not feasible, then “a design, equipment, work practice, operational standard, or combination thereof, may be prescribed” as BACT instead.

5.4.1 Step 1: Identify All Available Control Technologies

The BACT analysis identifies the following control technologies that could reduce VOC emissions:

CT-1, CT-2 – Good Combustion Practices, Clean Fuels, Oxidation Catalyst

AUX-1 – Good Combustion Practices, Oxidation Catalyst, Thermal Oxidation

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 – Good Combustion Practices, Oxidation Catalyst, Thermal Oxidation

EDG-1, CS-ENG – Good Combustion Practices, Oxidation Catalyst

DFP-1 – Good Combustion Practices, Oxidation Catalyst

Compressor Station – Instrument Leak Detection and Repair (LDAR) programs, auditory, visual, and olfactory (AVO) monitoring, leakless piping technology, minimizing flaring events

TK-1, TK-2 – Good operating practices, submerged fill pipe, exterior surfaces painted white, fixed roofs

5.4.2 Step 2: Technical Feasibility of Options

After the identification of control options, the second step in the BACT assessment is to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that would prohibit the implementation of the control or if the highest control efficiency of the option would result in an emission level that is higher than any applicable regulatory limits.

CT-1, CT-2 feasible options:

- Good combustion practices, including the use of clean fuels: Good combustion practices, including the use of clean fuels, are essential for the operation and lifespan of the proposed CCCTs, and will be used. The CTs will fire natural gas as the primary fuel with ULSD fired in a limited capacity as a backup fuel. The duct burners will fire only natural gas. Therefore, good combustion practices are technically feasible for the CCCTs.
- Oxidation Catalyst: Catalytic oxidation has been applied successfully on CCCTs similar to those proposed by DEC and is considered technically feasible. The CCCTs will include an oxidation catalyst as part of their design.

AUX-1 infeasible options:

- Oxidation Catalyst: Catalytic oxidation is a proven post-combustion control technology for natural gas combustion that uses a catalyst matrix to oxidize CO, VOC, and other pollutants. For the auxiliary boiler to meet the minimum temperature requirement for catalytic oxidation to be effective, the system would need to be equipped with a supplementary pre-heater to raise the exhaust gas temperature. This add-on control option increases the complexity, costs, and emissions from pre-heating associated with increasing the auxiliary boiler's exhaust temperature. Despite the requirement to raise the exhaust gas temperature to initiate and sustain the reaction, catalytic oxidation was identified as a CO control technology for an auxiliary boiler at one (1) use of an oxidation catalyst on an auxiliary boiler in practice. Furthermore, the boiler at the Cronus Chemicals facility is different in its design than the proposed auxiliary boiler. Because the proposed auxiliary boiler design has a maximum exhaust temperature below the effective operating range of an oxidation catalyst, the addition of an oxidation catalyst as an add-on control technology for the proposed auxiliary boiler is considered technically infeasible.

AUX-1 feasible options:

- Good Combustion Practices: Good combustion practices are essential for the operation and lifespan of the proposed auxiliary boiler and will be used. Therefore, good combustion practices are technically feasible.
- Thermal oxidation: Thermal oxidation reduces VOC emissions by supplying sufficient oxygen at temperatures of at least 1,400 to 1,500°F. Because the exhaust gas temperature of the proposed auxiliary boiler is significantly lower than the temperature that is required, a

supplementary-fired burner would be needed to achieve the operating temperature of a thermal oxidation system. Because the combustion of the fuel for an oxidation system would itself result in VOC emissions, it is presumed that thermal oxidation would result in minimal overall VOC emissions reductions. Furthermore, no applications of thermal oxidation were demonstrated for a natural gas-fired boiler in a review of the RBLC database. In fact, boilers are sometimes used for thermal oxidation of process gases, they are not typically controlled by thermal oxidizers. Therefore, while thermal oxidation as a VOC control technology may be considered technically feasible, it is not an “available” VOC control option for the proposed limited-use auxiliary boiler.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 infeasible options:

- Oxidation Catalyst: While the use of an oxidation catalyst may be considered a technically feasible control technology, it has not been demonstrated in practice on gas-fired heaters small in size, such as the proposed units. Therefore, it is not considered a technically available control option for this analysis.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 feasible options:

- Good Combustion Practices: Good combustion practices are essential for the operation and lifespan of the proposed gas-fired heaters and will be used. Therefore, good combustion practices are technically feasible.
- Thermal Oxidation: Thermal oxidation is a technically feasible control for the gas-fired heaters.

EDG-1, CS-ENG infeasible options:

- Oxidation Catalyst: Catalytic oxidation is not considered to be technically feasible due to the intermittent operations of the emergency generator engines. Except for the possibility of emergencies, the emergency generator engines will typically only operate a few hours each month for readiness testing and maintenance checks. The catalysts are usually made of a precious metal and operate at high temperatures. The exhaust gas will not reach the required temperature for the catalytic oxidizer to function during testing periods. Therefore, it is not a technically feasible control technology for the emergency generator engines.

EDG-1, CS-ENG feasible options:

- Good Combustion Practices: Good combustion practices, which include combustion system design and proper operation and maintenance practices, have been applied successfully to emergency generator engines and are considered technically feasible for the proposed emergency generator engines.

DFP-1 infeasible options:

- Oxidation Catalyst: Catalytic oxidation is not considered to be technically feasible due to the small size of the fire water pump engine and intermittent operations. The catalysts are usually made of a precious metal and operate at high temperatures. In addition, issues with catalytic oxidation include the catalyst’s susceptibility to poisoning by fine particles in the exhaust gas, which reduces the catalyst’s effectiveness. For these reasons, it is not a technically feasible control technology for the fire water pump engine.

DFP-1 feasible options:

- Good combustion practices, which include combustion system design and proper operation and maintenance practices, have been applied successfully to fire water pump engines and are considered technically feasible for the proposed fire water pump engine.

Compressor Station infeasible options:

- Leakless Piping Technology: Leakless valve technology is used when extremely toxic or hazardous materials have the potential to be emitted, natural gas is not considered highly toxic and will not be stored in the amount considered to be hazardous. Additionally, leakless valve technology has not been achieved in practice for natural gas piping components. Therefore, leakless valve technology is not considered available for natural gas piping components.

Compressor Station feasible options:

- Instrument Leak Detection and Repair (LDAR) programs: LDAR programs are a feasible option for controlling fugitive emissions from natural gas piping and components.
- Auditory, visual, and olfactory (AVO) monitoring: AVO monitoring is a feasible option for controlling fugitive emissions from natural gas piping and components.
- Minimizing flaring events: Minimizing flaring events is a technically feasible control for flaring operations at the compressor station.

TK-1, TK-2 feasible options:

- Good operating practices: Good operating practices such as proper breather vent settings and maintenance of the tank reduce VOC emissions and are technically feasible.
- Submerged fill pipe: Based on AP-42 Section 5.2, use of submerged fill, instead of splash fill, reduces VOC emissions from organic liquid storage tanks and is technically feasible.
- Exterior surfaces painted white: Based on AP-42 Section 7.1, use of white paint instead of darker color paint reduces VOC emissions from organic liquid storage tanks and is technically feasible.
- Fixed roofs: Based on AP-42 Section 7.1, use of a fixed roof instead of an open top reduces VOC emissions from organic liquid storage tanks and is technically feasible.

5.4.3 Step 3: Ranking of Control Technologies by Control Effectiveness

CT1, CT2 ranking:

All the technically feasible options were chosen for the combustion turbines; therefore, ranking effectiveness by control was not required.

AUX-1 ranking:

Although good combustion practices are the only technology typically used for the control of VOC (efficiency varies) from an auxiliary boiler, it is possible that a thermal oxidizer may be technically feasible and based on the U.S. EPA fact sheet, can achieve at least 99% control.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 ranking:

Although good combustion practices are the only technology typically used for the control of VOC (efficiency varies) from small gas-fired heaters, it is possible that a thermal oxidizer may be technically feasible and based on the U.S. EPA fact sheet, can achieve at least 99% control.

EDG-1, CS-ENG ranking:

Good combustion practices are the only technology considered technically feasible. Therefore, a ranking is not necessary.

DFP-1 ranking:

Good combustion practices are the only technology considered technically feasible. Therefore, a ranking has not been considered to establish a top technology.

Compressor Station:

Minimizing flaring events is the only control technology technically feasible for the flaring operations at the compressor station; therefore, a ranking was not established for the flaring operations.

LDAR programs and AVO monitoring are the two control options for fugitive emissions from natural gas piping and components.

LDAR programs and use of remote sensing devices (i.e., infrared camera) have been determined by U.S. EPA to be equivalent control methods for natural gas piping fugitive emissions. Quarterly instrument monitoring with a leak detection threshold of 10,000 ppmv (TCEQ 28M LDAR Program) is generally assigned a control efficiency of 75% for valves, relief valves, sampling connections, 75% for compressors, and 30% for flanges. Quarterly instrument monitoring with a leak detection threshold of 500 ppmv (TCEQ 28VHP LDAR Program) is generally assigned a control efficiency of 97% for valves, relief valves, and sampling connections, 85% for compressors, and 30% for flanges.

For components containing inorganic or odorous compounds, periodic AVO walk-through inspections provide predicted control efficiencies of 97% control for valves, flanges, relief valves, and sampling connections, and 95% for compressors. Because pipeline natural gas is odorized with very small quantities of mercaptan, as-observed AVO is a very effective method for identifying and correcting leaks in natural gas piping. Therefore, AVO is able to achieve equivalent or better control efficiencies compared to LDAR.

The information provided by the facility regarding the efficiencies of the remaining control devices was obtained from information from TCEQ 28VHP LDAR Program. The controls are ranked from the most to least effective based on their VOC emission reduction potential control efficiency in Table 9.

Table 9 - VOC Control Option Efficiency	
Control Option	Efficiency (%)
AVO Monitoring	97% for valves, flanges, relieve valves, and sampling connections
	95% for Compressors
LDAR Programs	Leak Detection Threshold of 10,000 ppmv: 75% for valves, relief valves, sampling connections, compressors, 30% for flanges
	Leak Detection Threshold of 500 ppmv: 97% for valves, relief valves, and sampling connections, 85% for compressors, 30% for flanges.

TK-1, TK-2 ranking:

All the technically feasible options were chosen for the storage tanks; therefore, a ranking by control effectiveness was not required.

5.4.4 Step 4: Evaluation of Most Effective Controls

The top-down approach for determining BACT suggests that all available control technologies be ranked in descending order of control effectiveness. The most stringent or “top” control option is the default BACT emission limit unless the applicant demonstrates, and the permitting authority in its informed opinion agrees, that energy, environmental, and/or economic impacts justify the conclusion that the most stringent control option is not achievable in that case. Upon elimination of the most stringent control option based upon energy, environmental, and/or economic considerations, the next most stringent alternative is evaluated in the same manner. This process continues until BACT is selected.

CT1, CT2:

All the technically feasible options were chosen for the combustion turbines; therefore, a top-down analysis was not required.

AUX-1:

Good combustion practices will be implemented as part of the design and operation of the auxiliary boiler. Use of a thermal oxidizer was evaluated based on the heat input of the proposed auxiliary boiler, the Method 19 f factor for natural gas, its PTE, and an annual cost based on the U.S. EPA fact sheet for thermal oxidizers, which indicates annual cost can range from \$8 to \$98/scfm. The analysis, presented in Appendix D of the application, shows that installation of a thermal oxidizer is not cost effective. It would also require additional natural gas to be fired and result in additional combustion emissions.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

Good combustion practices will be implemented as part of the design and operation of the heaters. Use of a thermal oxidizer was evaluated based on the heat input of the proposed heaters, the Method 19 f factor for natural gas, heater PTE, and an annual cost based on the U.S. EPA fact sheet for thermal oxidizers, which indicates annual cost can range from \$8 to \$98/scfm. The analysis, presented in Appendix D of the application, shows that installation of a thermal oxidizer is not cost effective. It would also require additional natural gas to be fired and result in additional combustion emissions.

EDG-1, CS-ENG:

Good combustion practices will be implemented as part of the design and operation of the emergency generator engines. Therefore, economic, environmental, and/or energy impacts were not evaluated.

DFP-1:

Good combustion practices will be implemented as part of the design and operation of the firewater pump engine. Therefore, economic, environmental, and/or energy impacts were not evaluated.

Compressor Station:

AVO will be implemented in the design and operation of the natural gas piping components. Because AVO is able to achieve equivalent or better control efficiencies compared to LDAR, there is no additional environmental benefit to implementing LDAR. Therefore, LDAR is not considered further.

TK-1, TK-2:

All the technically feasible options were chosen for the storage tanks; therefore, the economic, environmental, and/or energy impacts were not evaluated.

5.4.5 Step 5: Select BACT Controls and Limits

CT-1, CT-2:

The proposed BACT limits are based on what the manufacturer has indicated can be achieved over the life of the equipment and DEC's operating experience with similar units and are consistent with the RBLC. DEC proposes to use good combustion practices, including the use of clean fuels, and catalytic oxidation as VOC BACT for the CCCTs for normal (combined cycle) operations to achieve the emissions limits presented in [Table 10](#). Note that the proposed limits are VOC as methane and include operation of the duct burners. Periods of operation in start-up and shutdown mode would be

excluded from any calculations performed to demonstrate compliance with the emissions limits presented in [Table 10](#).

A review was conducted for VOC BACT determinations for CCCTs, including a search of the RBLC database and a review of information concerning recently permitting facilities with CCCTs. The results of this search can be found in Appendix B of the application, and the proposed limits are within the range of recent determinations. These limits are based on emissions data provided by the CCCT manufacturer, GE.

During normal operations, DEC proposes VOC BACT as 2.2 ppmvd (as CH₄) @ 15% O₂ when firing natural gas in the CTs. DEC also proposes VOC BACT as 3.2 ppmvd (as CH₄) @ 15% O₂ when firing ULSD in the CTs, in addition to limiting ULSD firing to 500 full load equivalent hours per year per CT. These limits will be achieved using catalytic oxidation and good combustion practices, including the use of clean fuels.

To demonstrate compliance with VOC BACT, DEC will use a 3-run stack test for the averaging period. Ongoing compliance with the CO BACT limits monitored using a CO CEMS will be the ongoing indicator of good combustion.

During bypass operations (simple cycle mode), DEC proposes to use good combustion practices, including the use of clean fuels as VOC BACT for the CCCTs to achieve an emissions limit of 1.5 ppmvd (as CH₄) @ 15% O₂. It is important to note that the proposed operating scenario for bypass operations is limited to 500 full load equivalent hours per year. It is not technically practical or cost effective to install a second oxidation catalyst in the proposed bypass stack due to the nature of bypass operations, which could include fast-start generation demand required by the regional electric grid operator, and for the limited hours of operation. Bypass operations typically occur during startup/shutdown, emergencies, and maintenance, which are short duration events. It is not economically or technically feasible to control the system during short durations due to a high cost for a low emissions reduction payoff. Additionally, during bypass, temperatures and velocity are higher, which make it difficult for control equipment to function properly or survive long-term. Exhaust flow can be inconsistent during bypass operations and control systems typically require steady-state conditions to work effectively. The controls are usually placed downstream in the exhaust path, not in the bypass ducts. Even if it were technically feasible to design controls for bypass ducts that are not used frequently, it would not be economically feasible to operate a separate control system to serve bypass operations.

DEC is also proposing to establish secondary VOC BACT limits for startup and shutdown. Startup is defined as the period from initial firing to the minimum emissions compliance load (MECL), which is mode 6A2 for this particular turbine model. Shutdown is defined as the period from MECL to flame out. A cold start occurs after the CT has been shutdown for 72 hours or more. A warm start occurs when the CT has been shutdown for more than 8 hours but less than 72 hours. A hot start occurs when the CT has been shutdown for less than 8 hours. Time is necessary to bring the HRSG and steam turbine up to temperature after a shutdown without damaging the equipment. Table 10 provides a summary of proposed limitations on startup and shutdown events. Separate startup and shutdown BACT is necessary because the oxidation catalyst will not achieve control until a certain exhaust gas temperature is reached. DEC proposes to limit the emissions from startup and shutdown events in a

12-month period. No emissions testing during startup and shutdown is proposed because these events are short in duration and are transient operating conditions. DEC will adhere to optimal operational practices during periods of startup and shutdown. Periods of startup and shutdown would be excluded from any emissions calculations performed to demonstrate compliance with numeric VOC BACT emissions limits.

DEC also requests the following operational flexibility, given the stringency of the proposed numeric BACT limits and the challenges complying with the BACT for normal operation during tuning, no-load, and other transitory conditions (similar allowances are provided in other facilities' turbine BACT conditions):

- The VOC BACT limits do not apply during a burner tuning session, water injection system adjustments, and manufacturer-required full-speed, no-load (FSNL) tests (also referred to as green rotor run in), provided the tuning session, adjustment, and testing are performed in accordance with the manufacturer's specifications or determined best practices. DEC will provide SCDES with advance notification of tuning, adjustment, and FSNL testing events. Routine maintenance of the turbine and these resulting tests to ensure optimum operations are critical to the long-term operation of the turbine and to minimizing emissions.
- The VOC BACT limits do not apply during a fuel switch, for no more than two hours (120 minutes) per fuel switch, and up to four hours (240 minutes) per 24-hour period.

AUX-1:

DEC proposes to use good combustion practices and to limit operation to a 10% capacity factor to control VOC emissions from the auxiliary boiler. A review was conducted of VOC BACT determinations for auxiliary boilers, including a search of the RBLC database and a review of recently permitted facilities with auxiliary boilers. The results of this search can be found in Appendix B of the application, and the proposed BACT is consistent with recent determinations. Because the unit will be a limited-use unit, numeric emissions limits and stack testing are not proposed. Proper operation and maintenance and combustion of only natural gas will serve to ensure good combustion practices are being used.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

DEC proposes good combustion practices for the small gas-fired heaters to minimize emissions of VOC. A review of the RBLC database and recently permitted facilities was conducted. These results are summarized in Appendix B of the application and the proposed BACT is consistent with recent determinations. Due to the size of the heaters, numeric limits and stack testing are not proposed. Use of only natural gas and proper operation and maintenance of the heaters will ensure compliance with BACT.

EDG-1, CS-ENG:

A review was conducted of VOC BACT determinations for emergency generator engines, including a search of the RBLC database and a review of recently permitted facilities with emergency generator engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices and limited annual operating hours for testing/maintenance as BACT for the emergency generator

engines. Due to the expected limited operation of the engines, stack testing is not proposed. Purchase of NSPS-compliant engines will ensure compliance with BACT.

DFP-1:

A review was conducted of VOC BACT determinations for fire water pump engines, including a search of the RBLC database and a review of recently permitted facilities with fire water pump engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices, limited annual operating hours for testing/maintenance, and a VOC emissions limit of 1.1 g/hp-hr as BACT for the fire water pump engine. Due to the expected limited operation of the engine, stack testing is not proposed. Use of only ULSD and NSPS compliance will ensure compliance with BACT.

Compressor Station:

To determine the appropriate proposed BACT, a review of the RBLC database and recently permitted facilities was conducted. DEC proposes to perform monthly AVO inspections of the fugitive emissions components of the natural gas piping as BACT. If a leak is detected, DEC will make a first attempt at repair expeditiously. Additionally, DEC proposes to minimize pigging and flaring events that result in VOC emissions to once per year. For natural gas piping, the standard industry work practice of periodic walkthrough inspections is the only practical means of minimizing emissions and is therefore considered to be BACT for the proposed natural gas piping components. No numeric emissions limits or testing are proposed.

VOC emissions during pigging and flaring operations will be limited to one event per year, and VOC emissions from the compressor station components will be limited by the AVO program. Due to the limited occurrence of flaring and the temporary nature of the flare, neither stack testing nor a numeric emissions limit is proposed. Compliance with BACT for fugitive emissions will be ensured by conducting the AVO inspection program and responding to detected leaks. Due to uncertainty around the exact composition of the natural gas and the number of components to be included at the Facility, DEC did not propose a numeric limit as BACT for piping fugitives.

TK-1, TK-2:

To determine the appropriate BACT, a review of the RBLC database and recently permitted facilities was conducted. The results of this search can be found in Appendix B of the application. DEC proposes the following as BACT for the ULSD storage tanks:

- Submerged fill pipe;
- Fixed roof;
- Exterior surfaces painted white;
- Good operating practices; and
- Limit VOC emissions to 1.56 tons of VOC per 12-month rolling period. Emissions will be calculated using the U.S. EPA's TANKS software.

Table 10 - Selection of VOC BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
CT-1, CT-2 Natural Gas – Normal Operation	Catalytic oxidation and good combustion practices	2.2 ppmvd @ 15% O ₂ (as CH ₄) Demonstrated by a 3-run stack test
CT-1, CT-2 No. 2 Fuel Oil – Normal Operation	Catalytic oxidation and good combustion practices	3.2 ppmvd @ 15% O ₂ (as CH ₄) Demonstrated by a 3-run stack test
CT-1, CT-2 Startup/Shutdown	Adhere to optimal operational practices to minimize emissions and time in SU/SD Limiting emissions per 12- month period from Cold Starts Warm Starts Hot Starts Shutdowns	Maximum emissions per 12-month period: 12.8 tons during startup and shutdown
CT-1, CT-2 (Natural gas – Simple- cycle)	Good combustion practices	1.0 ppmvd @ 15% O ₂ (as CH ₄)
CT-1, CT-2 burner tuning sessions, water injection system adjustments, and manufacturer-required FSNL tests	Tuning, adjustments, and testing performed in accordance with the manufacturer's specifications or determined best practices	---
CT-1, CT-2 fuel switch	Limiting the duration of fuel switches	Less than or equal to two hours (120 minutes) per fuel switch Less than or equal to four hours (240 minutes) per 24-hour period
AUX-1	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	Good combustion practices, combust only natural gas	---
EDG-1	Installation of U.S. EPA Tier 2 certified engine, good combustion practices and limited operating hours for	0.26 g/hp-hr

Table 10 - Selection of VOC BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
	testing/maintenance, combust only No. 2 Fuel Oil	
CS-ENG	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	1.0 g/hp-hr
DFP-1	Installation of U.S. EPA Tier 2 certified engine, good combustion practices, and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	1.1 g/hp-hr
Compressor Station	Flaring: Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year Piping Leaks: Monthly Leak Detection and Repair using AVO	---
TK-1, TK-2	Submerged fill pipe, fixed roof, exterior surfaces painted white, good operating practices, and limit VOC emissions	1.56 tons VOC per 12-month rolling period calculated using U.S. EPA's TANKS software

5.5 BACT for Particulate Matter (PM, PM₁₀, and PM_{2.5})

Table 11 lists the PM, PM₁₀, and PM_{2.5} emissions resulting from the following process/point sources.

1. CT-1, CT-2, AUX-1, DPH-1, DPH-2, CS Heaters-1, CS Heaters-2, EDG-1, CS-ENG, DFP-1

Table 11 - Potential PM, PM₁₀, and PM_{2.5} Emissions	
Equipment	Potential PM, PM₁₀, and PM_{2.5} Emissions (lb/hr)
CT-1	(No. 2 Fuel Oil) PM = 65.5 (No. 2 Fuel Oil) PM ₁₀ = 119 (No. 2 Fuel Oil) PM _{2.5} = 119

Table 11 - Potential PM, PM₁₀, and PM_{2.5} Emissions	
Equipment	Potential PM, PM₁₀, and PM_{2.5} Emissions (lb/hr)
	(Natural Gas) PM = 29.5 (Natural Gas) PM ₁₀ = 39.9 (Natural Gas) PM _{2.5} = 39.9
CT-2	(No. 2 Fuel Oil) PM = 65.5 (No. 2 Fuel Oil) PM ₁₀ = 119 (No. 2 Fuel Oil) PM _{2.5} = 119 (Natural Gas) PM = 29.5 (Natural Gas) PM ₁₀ = 39.9 (Natural Gas) PM _{2.5} = 39.9
AUX-1	PM = 0.23 PM ₁₀ = 0.92 PM _{2.5} = 0.92
DPH-1	PM = 0.019 PM ₁₀ = 0.076 PM _{2.5} = 0.076
DPH-2	PM = 0.019 PM ₁₀ = 0.076 PM _{2.5} = 0.076
CS Heaters-1	PM = 5.59E-06 (each) PM ₁₀ = 2.24E-05 (each) PM _{2.5} = 2.24E-05 (each)
CS Heaters-2	PM = 1.34E-04 (each) PM ₁₀ = 5.36E-04 (each) PM _{2.5} = 5.36E-04 (each)
EDG-1	PM = 0.97 PM ₁₀ = 1.13 PM _{2.5} = 1.13
CS-ENG	PM = 3.99E-02 PM ₁₀ = 8.15E-02 PM _{2.5} = 8.15E-02
DFP-1	PM = 0.13 PM ₁₀ = 0.15 PM _{2.5} = 0.15

As stated in the regulatory definition, BACT is “an emissions limitation ... based on the maximum degree of reduction for each regulated NSR pollutant ... taking into account energy, environmental, and economic impacts” When BAQ determines that the imposition of an emissions limitation is not feasible, then “a design, equipment, work practice, operational standard, or combination thereof, may be prescribed” as BACT instead.

5.5.1 Step 1: Identify All Available Control Technologies

The BACT analysis identifies the following control technologies that could reduce PM, PM₁₀, and PM_{2.5} emissions:

CT-1, CT-2 – good combustion practices, low-sulfur fuels, fabric filter baghouses, electrostatic precipitators (ESPs), wet electrostatic precipitators (WESPs), and scrubbers

AUX-1 – good combustion practices, fabric filter baghouses, ESPs, WESPs, and scrubbers

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 – good combustion practices, fabric filter baghouses, ESPs, WESPs, and Scrubbers

EDG-1, CS-ENG – Good combustion practices, Add-On Control Technologies

DFP-1 – Good Combustion Practices, Add-on Control Technologies

5.5.2 Step 2: Technical Feasibility of Options

After the identification of control options, the second step in the BACT assessment is to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that would prohibit the implementation of the control or if the highest control efficiency of the option would result in an emission level that is higher than any applicable regulatory limits.

CT-1, CT-2 infeasible options:

- Fabric filter baghouses, electrostatic precipitators (ESPs), wet electrostatic precipitators (WESPs), and scrubbers: These add-on control technologies for reducing PM, PM₁₀, and PM_{2.5} emissions are not technically feasible for use with CCCTs due to high operating temperatures during the combustion process and the CCCTs' inherently low PM, PM₁₀, and PM_{2.5} emissions. The outlet PM loading from combustion of natural gas is below the level at which these technologies would be effective. These technologies are meant to control larger particles and the PM that results from natural gas combustion is primarily less than 1 micron in diameter and generally would not be controlled. For example, a fabric filter typically relies on some buildup of a filter cake to help provide control of dust; no such filter cake would form in this application. Additionally, a review of the RBLC database confirms that these control technologies have not been utilized on a natural gas-fired CCCT.

CT-1, CT-2 feasible options:

- Good combustion practices: Good combustion practices are essential for the operation and lifespan of the proposed CCCTs and will be used. Therefore, good combustion practices are technically feasible for the CCCTs.
- Low-sulfur fuels: Low-sulfur fuels, such as natural gas and ULSD, are considered technically feasible and will be used.

AUX-1 infeasible options:

- Fabric filter baghouses, ESPs, WESPs, and scrubbers: Fabric filter baghouses, ESPs, WESPs, and scrubbers are post combustion technologies for reducing PM, PM₁₀, and PM_{2.5} emissions. A review of recently permitted facilities and a search of the RBLC database found that fabric filter baghouses, ESPs, WESPs, and/or scrubbers were not identified as control technologies that have been applied on natural gas-fired auxiliary boilers similar to the proposed auxiliary boiler. The outlet PM loading from combustion of natural gas is below the level at which these technologies would be effective. These technologies are meant to control larger particles and the PM that results from natural gas combustion is primarily less than 1 micron in diameter and generally would not be controlled. For example, a fabric filter typically relies on some buildup of a filter cake to help provide control of dust; no such filter cake would form in this application. Therefore, while fabric filter baghouses, ESPs, WESPs, and/or scrubbers may be considered technically feasible as control technologies for PM, PM₁₀, and PM_{2.5} for other types of boilers (e.g., solid fuel boilers), they are not “available” for the proposed auxiliary boiler and are not considered further.

AUX-1 feasible options:

- Good Combustion Practices: As mentioned above, add-on controls are not feasible. Good combustion practices are essential for the operation and lifespan of the proposed auxiliary boiler and will be used. Therefore, good combustion practices are technically feasible.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 infeasible options:

- Fabric filter baghouses, ESPs, WESPs, and scrubbers: Fabric filter baghouses, ESPs, WESPs, and scrubbers are add-on technologies for reducing PM, PM₁₀, and PM_{2.5} emissions. A review of recently permitted facilities and a search of the RBLC database found that fabric filter baghouses, ESPs, WESPs, and/or scrubbers were not identified as control technologies that have been applied on heaters similar in size and application to the proposed gas-fired heaters. The outlet PM loading from combustion of natural gas is below the level at which these technologies would be effective. These technologies are meant to control larger particles and the PM that results from natural gas combustion is primarily less than 1 micron in diameter and generally would not be controlled. For example, a fabric filter typically relies on some buildup of a filter cake to help provide control of dust; no such filter cake would form in this application. Therefore, while fabric filter baghouses, ESPs, WESPs, and/or scrubbers may be considered technically feasible as control technologies for PM, PM₁₀, and PM_{2.5} for heaters firing a fuel other than natural gas, they are not technically feasible for the proposed gas-fired heaters (for the same reasons provided for the other proposed gas-fired combustion units) and are not considered further.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 feasible options:

- Good Combustion Practices: Good combustion practices are essential for the operation and lifespan of the proposed gas-fired heaters and will be used. Therefore, good combustion practices are technically feasible.

EDG-1, CS-ENG infeasible options:

- **Add-On Control Technologies:** Because the engines will operate as emergency generators, reliability in an emergency must be taken into consideration. Diesel particulate filters on emergency generators can become clogged when running the engine routinely at low loads for weekly testing. Clogging can lower engine performance or cause a shutdown. In developing the NSPS Tier classifications for emergency engines, U.S. EPA decided not to include DPFs because the risk of malfunctions was not worth the small decrease in PM emissions. Based on the anticipated operation of the Project engines, DPFs are considered technically infeasible.

EDG-1, CS-ENG feasible options:

- **Good Combustion Practices:** Good combustion practices, including combustion system design as well as proper operation and maintenance practices, have been applied successfully to emergency generator engines and are considered technically feasible.

DFP-1 infeasible options:

- **Add-On Control Technologies:** Because the firewater pump engine will operate during an emergency, reliability must be taken into consideration. Diesel particulate filters (DPFs) on emergency use engines can become clogged when running the engine routinely at low loads for weekly testing. Clogging can lower engine performance or cause a shutdown. In developing the NSPS Tier classifications for emergency engines, U.S. EPA decided not to include DPFs because the risk of malfunctions was not worth the small decrease in PM emissions. Based on the anticipated operation of the firewater pump engine, DPFs are considered technically infeasible.

DFP-1 feasible options:

- **Good Combustion Practices:** Good combustion practices, including combustion system design as well as proper operation and maintenance practices, have been applied successfully to fire water pump engines and are considered technically feasible for the proposed fire water pump engine.

5.5.3 Step 3: Ranking of Control Technologies by Control Effectiveness

CT-1, CT-2 ranking:

The most stringent particulate control method demonstrated for natural gas-fired and ULSD-fired CCTs is the use of low-ash and low-sulfur fuel. Good combustion practices, including the use of low-sulfur fuels, is the only remaining technology; therefore, a ranking is not necessary.

AUX-1 ranking:

Good combustion practices, including use of clean fuel, are the only remaining technically feasible control technology used for the control of PM, PM10, and PM2.5 emissions. Therefore, a ranking is not necessary.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 ranking:

Good combustion practices are the only technically feasible control technology for PM, PM10, and PM2.5 from the proposed gas-fired heaters. Therefore, a ranking is not necessary.

EDG-1, CS-ENG ranking:

Good combustion practices are the only technology considered technically feasible. Therefore, a ranking is not necessary.

DFP-1 ranking:

Good combustion practices are the only technology considered technically feasible. Therefore, a ranking is not necessary.

5.5.4 Step 4: Evaluation of Most Effective Controls

The top-down approach for determining BACT suggests that all available control technologies be ranked in descending order of control effectiveness. The most stringent or “top” control option is the default BACT emission limit unless the applicant demonstrates, and the permitting authority in its informed opinion agrees, that energy, environmental, and/or economic impacts justify the conclusion that the most stringent control option is not achievable in that case. Upon elimination of the most stringent control option based upon energy, environmental, and/or economic considerations, the next most stringent alternative is evaluated in the same manner. This process continues until BACT is selected.

CT-1, CT-2:

Good combustion practices, including the use of low-sulfur fuels, will be implemented as part of the design and operation of the CCCTs. Therefore, economic, environmental, and/or energy impacts were not evaluated.

AUX-1:

The only feasible control technology for the proposed auxiliary boiler is good combustion practices. Therefore, the economic, environmental, and/or energy impacts were not evaluated.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

The only feasible control technology for the proposed small gas-fired heaters is good combustion practices. Therefore, the economic, environmental, and/or energy impacts were not evaluated.

EDG-1, CS-ENG:

Good combustion practices will be implemented as part of the design and operation of the emergency generator engines. Therefore, economic, environmental, and/or energy impacts were not evaluated.

DFP-1:

Good combustion practices will be implemented as part of the design and operation of the firewater pump engine. Therefore, economic, environmental, and/or energy impacts were not evaluated.

5.5.5 Step 5: Select BACT Controls and Limits

CT-1, CT-2:

The proposed BACT limits are based on what the manufacturer has indicated can be achieved over the life of the equipment and DEC’s operating experience with similar units and are consistent with the RBLC. DEC proposes good combustion practices, including the use of low-sulfur fuels, as PM,

PM₁₀, and PM_{2.5} BACT for the CCCTs to achieve the emissions limits presented in [Table 12](#). Note that these limits include operation of the duct burners.

To determine the proposed BACT limits for the CCCTs, a search of the RBLC database and recently permitted facilities was conducted for similar CCCTs. The results of this search can be found in Appendix B of the application, and the proposed limits are within the range of recent determinations. These limits are based on manufacturer data for the CCCTs.

A separate BACT for startup and shutdown is not necessary for PM. An initial stack test will be conducted using Methods 5 and 202 for PM. On-going compliance will be monitored using emissions factors developed during the initial stack test for natural gas and fuel supplier sulfur content certifications for ULSD. Good combustion practices will be confirmed by compliance with the CO BACT, as measured by the CO CEMS.

AUX-1:

DEC proposes good combustion practices, a 10% capacity factor limitation, and combustion of only natural gas as BACT for the auxiliary boiler to minimize emissions of PM, PM₁₀, and PM_{2.5}. The same control technologies are applied for each pollutant. A search was conducted of the RBLC database and recently permitted facilities, and these results can be found in Appendix B of the application. The proposed BACT is consistent with recent determinations. No stack testing or numeric limits are proposed due to the limited use of the auxiliary boiler.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

Good combustion practices will be implemented as part of the design and operation of the gas-fired heaters and are considered BACT. The same control technologies are applied for each pollutant. A search was conducted of the RBLC database and recently permitted facilities, and these results can be found in Appendix B of the application. The proposed BACT is consistent with recent determinations. Due to the small size of the heaters, numeric emissions limits and stack testing are not proposed. Use of only natural gas as fuel and proper operation and maintenance will ensure compliance with BACT.

EDG-1, CS-ENG:

The same control techniques are used to limit emissions of PM, PM₁₀, and PM_{2.5} from the emergency generator engines, so DEC has presented a proposed BACT for the three pollutants. A review was conducted of PM, PM₁₀, and PM_{2.5} BACT determinations for emergency generator engines, including a search of the RBLC database and a review of recently permitted facilities with emergency generator engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices and limited annual operating hours for testing/maintenance as BACT for the emergency generator engines. Due to the expected limited operation of the engines, stack testing is not proposed. Purchase of NSPS-compliant engines will ensure compliance with BACT.

DFP-1:

The same control techniques are used to limit emissions of PM, PM₁₀, and PM_{2.5} from the fire water pump engine, so DEC has presented one BACT discussion for the three pollutants. A review was conducted of PM, PM₁₀, and PM_{2.5} BACT determinations for fire water pump engines, including a

search of the RBLC database and a review of recently permitted facilities with fire water pump generator engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices, limited annual operating hours for testing/maintenance, a filterable PM emissions limit of 0.15 g/hp-hr and a PM₁₀/PM_{2.5} emissions limit of 0.18 g/hp-hr as BACT for the fire water pump engine. Due to the expected limited operation of the engine, stack testing is not proposed. Use of only ULSD and NSPS compliance will ensure compliance with BACT.

Table 12 - Selection of PM, PM₁₀, and PM_{2.5} BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
CT-1, CT-2 Natural Gas	Good combustion practices, low sulfur fuels	Filterable PM: 5.9E-03 lb/MMBtu PM ₁₀ /PM _{2.5} : 8.0E-03 lb/MMBtu Demonstrated by a 3-run stack test
CT-1, CT-2 No. 2 Fuel Oil	Good combustion practices, low sulfur fuels	Filterable PM: 0.015 lb/MMBtu PM ₁₀ /PM _{2.5} : 0.028 lb/MMBtu Demonstrated by a 3-run stack test
AUX-1	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	Good combustion practices, combust only natural gas	---
EDG-1	Installation of U.S. EPA Tier 2 certified engine, good combustion practices and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	Filterable PM: 0.15 g/hp-hr PM ₁₀ /PM _{2.5} : 0.17 g/hp-hr
CS-ENG	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	---
DFP-1	Installation of an engine certified to the emissions standards in Table 4 of NSPS Subpart IIII, good combustion practices and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	Filterable PM: 0.15 g/hp-hr PM ₁₀ /PM _{2.5} : 0.18 g/hp-hr

5.6 BACT for Sulfur Dioxide (SO₂)

Table 13 lists the SO₂ emissions resulting from the following process/point sources.

1. CT-1, CT-2, AUX-1, DPH-1, DPH-2, CS Heaters-1, CS Heaters-2, EDG-1, CS-ENG, DFP-1, Compressor Station

Table 13 - Potential SO₂ Emissions	
Equipment	Potential SO₂ Emissions (lb/hr)
CT-1	(No. 2 Fuel Oil) 6.46 (Natural Gas) 6.82
CT-2	(No. 2 Fuel Oil) 6.46 (Natural Gas) 6.82
AUX-1	0.07
DPH-1	6.00E-03
DPH-2	6.00E-03
CS Heaters-1	1.76E-06 (each)
CS Heaters-2	4.24E-05 (each)
EDG-1	0.03
CS-ENG	2.47E-03
DFP-1	4.09E-03
Compressor Station	13.64

As stated in the regulatory definition, BACT is “an emissions limitation ... based on the maximum degree of reduction for each regulated NSR pollutant ... taking into account energy, environmental, and economic impacts” When BAQ determines that the imposition of an emissions limitation is not feasible, then “a design, equipment, work practice, operational standard, or combination thereof, may be prescribed” as BACT instead.

5.6.1 Step 1: Identify All Available Control Technologies

The BACT analysis identifies the following control technologies that could reduce SO₂ emissions:

CT-1, CT-2 – good combustion practices, low-sulfur fuels, scrubber/flue gas desulfurization

AUX-1 – good combustion practices, scrubber/flue gas desulfurization

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 – good combustion practices, scrubber/flue gas desulfurization

EDG-1, CS-ENG – good combustion practices, scrubber/flue gas desulfurization

DFP-1 – Good Combustion Practices, Scrubber/Flue Gas Desulfurization

Compressor Station – Minimizing Flaring Events, Good Operating Practices

5.6.2 Step 2: Technical Feasibility of Options

After the identification of control options, the second step in the BACT assessment is to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that would prohibit the implementation of the control or if the highest control efficiency of the option would result in an emission level that is higher than any applicable regulatory limits.

CT-1, CT-2 infeasible options:

Scrubbers: A scrubber (or desulfurization unit) is a control technology used to control SO₂ emissions. Scrubbers (wet or dry) use chemical and mechanical processes to remove SO₂ from exhaust gases with pollutant concentrations ranging from 250 to 10,000 ppmv. The sulfur content of natural gas and fuel oil is well below this level. Therefore, scrubbers are not technically feasible for CCCTs for flue gas desulfurization because of the low level of SO₂ emissions. Additionally, there are no acid gas scrubbers installed on power sector CCCTs primarily firing natural gas and are not considered available for these sources.

CT-1, CT-2 feasible options:

- Good combustion practices: Good combustion practices, including the use of low-sulfur fuels, are essential for the operation and lifespan of the proposed CCCTs. The CCCTs will fire natural gas as the primary fuel with ULSD fired in a limited capacity as backup fuel, both of which are inherently low in sulfur. The duct burners will only fire natural gas. Therefore, good combustion practices are technically feasible for the CCCTs.

AUX-1 infeasible options:

- Scrubber/Flue Gas Desulfurization: A scrubber (or desulfurization unit) is a control technology used to control SO₂ emissions. Scrubbers (wet or dry) use chemical and mechanical processes to remove SO₂ from the exhaust streams with pollutant concentrations ranging from 250 to 10,000 ppmv. The sulfur content of natural gas is well below this level. According to a search of recently permitted facilities and the RBLC database, there are currently no natural gas-fired auxiliary boilers that employ this technology. Therefore, scrubbers are not considered “available” or technically feasible for the auxiliary boiler.

AUX-1 feasible options:

- Good combustion practices: Good combustion practices are essential for the operation and lifespan of the auxiliary boiler and will be used. Therefore, good combustion practices are technically feasible for the proposed auxiliary boiler.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 infeasible options:

- Scrubber/Flue Gas Desulfurization: Scrubbers (wet or dry) use chemical and mechanical processes to remove SO₂ from the exhaust streams with pollutant concentrations ranging

from 250 to 10,000 ppmv. The sulfur content of natural gas is well below this level. According to a search of recently permitted facilities and the RBLC database, there are currently no natural gas-fired heaters that employ this technology. Therefore, scrubbers are not considered “available” or technically feasible for the gas-fired heaters.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 feasible options:

- Good Combustion Practices: Good combustion practices are essential for the operation and lifespan of the gas-fired heaters and will be used. Therefore, good combustion practices are technically feasible.

EDG-1, CS-ENG infeasible options:

- Scrubber/Flue Gas Desulfurization: A scrubber (or desulfurization unit) is a control technology used to abate SO₂ emissions. Scrubbers (wet or dry) use chemical and mechanical processes to remove SO₂ from exhaust gases exhaust streams with pollutant concentrations ranging from 250 to 10,000 ppmv. The sulfur content of natural gas and ULSD is well below this level. According to a search of recently permitted facilities and the RBLC database, there are currently no emergency generator engines that employ this technology. Therefore, scrubbers are not considered available or technically feasible for these sources.

EDG-1, CS-ENG feasible options:

- Good combustion practices: Good combustion practices, including the use of low-sulfur fuels, are implemented in the design of the engine. Typical design features include electronic fuel/air ratio and timing controllers, pre-chamber ignition, and intercoolers. Good combustion practices are standard for new engines and will be used.

DFP-1 infeasible options:

- Scrubber/Flue Gas Desulfurization: A scrubber (or desulfurization unit) is a control technology used to abate SO₂ emissions. Scrubbers (wet or dry) use chemical and mechanical processes to remove SO₂ from exhaust streams with pollutant concentrations ranging from 250 to 10,000 ppmv. The sulfur content of ULSD is well below this level. According to a search of recently permitted facilities and the RBLC database, there are currently no fire water pump engines that employ this technology. Therefore, scrubbers are not considered available or technically feasible for these sources.

DFP-1 feasible options:

- Good Combustion Practices: Good combustion practices are essential for the operation and lifespan of the fire water pump engine. Therefore, good combustion practices are technically feasible for the proposed fire water pump engine.

Compressor Station feasible options:

- Minimizing Flaring Events: Minimizing flaring events is a technically feasible control for flaring operations at the compressor station.
- Good Operating Practices: Good operating practices is a technically feasible control for flaring operations at the compressor station.

5.6.3 Step 3: Ranking of Control Technologies by Control Effectiveness

CT-1, CT-2 ranking:

Good combustion practices, including the use of low-sulfur fuels, are the only available technologies used for the control of SO₂. Therefore, a ranking is not necessary to establish the top technology.

AUX-1 ranking:

Good combustion practices are the only remaining technically feasible technologies for controlling SO₂ emissions. Therefore, a ranking is not necessary.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 ranking:

Good combustion practices are the only remaining technically feasible technologies for controlling SO₂ emissions. Therefore, a ranking is not necessary.

EDG-1, CS-ENG ranking:

Good combustion practices are the only remaining technically feasible technologies for controlling SO₂ emissions. Therefore, a ranking is not necessary.

DFP-1 ranking:

Good combustion practices are the only remaining technically feasible technologies for controlling SO₂ emissions. Therefore, a ranking is not necessary.

Compressor Station ranking:

Both minimizing flaring events and good operating practices will be implemented for the compressor station. Therefore, a ranking is not necessary.

5.6.4 Step 4: Evaluation of Most Effective Controls

The top-down approach for determining BACT suggests that all available control technologies be ranked in descending order of control effectiveness. The most stringent or “top” control option is the default BACT emission limit unless the applicant demonstrates, and the permitting authority in its informed opinion agrees, that energy, environmental, and/or economic impacts justify the conclusion that the most stringent control option is not achievable in that case. Upon elimination of the most stringent control option based upon energy, environmental, and/or economic considerations, the next most stringent alternative is evaluated in the same manner. This process continues until BACT is selected.

CT-1, CT-2:

Good combustion practices, including the use of low-sulfur fuels, will be implemented as part of the design and operation of the CCCTs; therefore, economic, environmental, and/or energy impacts were not assessed.

AUX-1:

Good combustion practices will be implemented as part of the design and operation of the auxiliary boiler. Therefore, economic, environmental, and/or energy impacts were not assessed in this BACT analysis.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

Good combustion practices will be implemented as part of the design and operation of the gas-fired heaters. Therefore, economic, environmental, and/or energy impacts were not assessed in this BACT analysis.

EDG-1, CS-ENG:

Good combustion practices will be implemented as part of the design and operation of the emergency generator engines. Therefore, economic, environmental, and/or energy impacts were not assessed in this BACT analysis.

DFP-1:

Good combustion practices will be implemented as part of the design and operation of the firewater pump engine. Therefore, economic, environmental, and/or energy impacts were evaluated.

Compressor Station:

Minimizing flaring events and good operating practices will be implemented as part of the design and operation of the compressor station. Therefore, economic, environmental, and/or energy impacts were not evaluated.

5.6.5 Step 5: Select BACT Controls and Limits

CT-1, CT-2:

DEC proposes to use good combustion practices, including the use of low-sulfur fuels, as SO₂ and BACT for the CCCTs to achieve the emissions limits presented in [Table 14](#). Emissions limits for SO₂ will be the same during all modes of operation (i.e., normal, bypass, startup, and shutdown operations) and include operation of the duct burners.

To determine the appropriate BACT limits, a search of the RBLC database and recently permitted facilities was conducted for similar CCCTs. The results of this search can be found in Appendix B of the application, and the proposed limits are within the range of recent determinations. These limits are based on manufacturer data for the CCCTs. No continuous monitoring is proposed for compliance with the proposed BACT limits; compliance will be achieved by firing only natural gas in the duct burners and primarily firing natural gas in the CCCTs with limited ULSD use as backup fuel. Fuel supplier information will be retained to confirm the oil burned is ULSD.

AUX-1:

DEC proposes to use good combustion practices (including use of only natural gas as a fuel) and to limit operation to a 10% capacity factor to control SO₂ emissions from the auxiliary boiler. A review was conducted of SO₂ BACT determinations for auxiliary boilers, including a search of the RBLC database and a review of recently permitted facilities with auxiliary boilers. The RBLC search results

can be found in Appendix B of the application, and the proposed BACT is consistent with recent determinations. Because the unit will be a limited-use unit and emissions will be minimized as much as possible by using only natural gas as a fuel, a numeric limit and stack testing are not proposed.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

DEC proposes to use good combustion practices (combustion of natural gas only) as SO₂ BACT for the small gas-fired heaters. A search was conducted of the RBLC database and recently permitted facilities and can be found in Appendix B of the application. The proposed BACT is consistent with recent determinations. Due to the size of the gas-fired heaters, no numeric emissions limits or stack testing are proposed. Combustion of only natural gas will ensure compliance with BACT.

EDG-1, CS-ENG:

A review was conducted of SO₂ BACT determinations for emergency generator engines, including a search of the RBLC database and a review of recently permitted facilities with emergency generator engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices, use of low-sulfur fuels, and limited annual operating hours for testing/maintenance as BACT for the emergency generator engines. Due to the expected limited operation of the engines, stack testing is not proposed. NSPS compliance will ensure compliance with BACT.

DFP-1:

A review was conducted of SO₂ BACT determinations for fire water pump engines, including a search of the RBLC database and a review of recently permitted facilities with fire water pump engines. The results of this search can be found in Appendix B of the application, and the proposed limit is within the range of recent determinations. DEC proposes good combustion practices, limited annual operating hours for testing/maintenance, and a limit of 15 ppm sulfur in the engine's ULSD fuel as BACT for the fire water pump engine to limit SO₂ emissions. Due to the expected limited operation of the engine, stack testing is not proposed. Use of only ULSD and NSPS compliance will ensure compliance with BACT.

Compression Station:

To determine the appropriate proposed BACT, a review of the RBLC database and recently permitted facilities was conducted. The results of this search can be found in Appendix B of the application. DEC proposes that minimizing flaring events and using good operating practices (including the flaring of only natural gas, a clean fuel) for control of SO₂ emissions is BACT. Due to the limited occurrence of flaring and the temporary nature of the flare, a numeric emissions limit and stack testing are not proposed.

Table 14 - Selection of SO₂ BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
CT-1, CT-2 Natural Gas	Good combustion practices, low-sulfur fuels	0.00137 lb/MMBtu
CT-1, CT-2 No. 2 Fuel Oil	Good combustion practices, low-sulfur fuels	0.00152 lb/MMBtu

Table 14 - Selection of SO₂ BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
AUX-1	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	Good combustion practices, combust only natural gas	---
EDG-1	Installation of U.S. EPA Tier 2 certified engine, good combustion practices and limited operating hours for testing/maintenance, combust only ultra-low sulfur diesel	15 ppm Sulfur in fuel
CS-ENG	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	---
DFP-1	Installation of an engine certified to the emissions standards in Table 4 of NSPS Subpart IIII, Good combustion practices and limited operating hours for testing/maintenance, combust only ultra-low sulfur diesel	15 ppm Sulfur in fuel
Compressor Station	Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year	---

5.7 BACT for CO₂e

Table 15 lists the CO₂e emissions resulting from the following process/point sources.

1. CT-1, CT-2, AUX-1, DPH-1, DPH-2, CS Heaters-1, CS Heaters-2, EDG-1, CS-ENG, DFP-1, Circuit Breakers, Compressor Station

Table 15 - Potential CO₂e Emissions	
Equipment	Potential CO₂e Emissions (lb/hr)
CT-1	(No. 2 Fuel Oil) 776,543 (Natural Gas) 678,200
CT-2	(No. 2 Fuel Oil) 776,543 (Natural Gas) 678,200
AUX-1	14,443
DPH-1	1,194
DPH-2	1,194
CS Heaters-1	0.35 (each)
CS Heaters-2	8.43 (each)
EDG-1	3,370
CS-ENG	490.78
DFP-1	441.7
Circuit Breakers	8.41E-03 (total)
Compressor Station	(Flaring) 706.20 (Piping) 441.2

As stated in the regulatory definition, BACT is “an emissions limitation ... based on the maximum degree of reduction for each regulated NSR pollutant ... taking into account energy, environmental, and economic impacts” When BAQ determines that the imposition of an emissions limitation is not feasible, then “a design, equipment, work practice, operational standard, or combination thereof, may be prescribed” as BACT instead.

5.7.1 Step 1: Identify All Available Control Technologies

The BACT analysis identifies the following control technologies that could reduce CO₂e emissions:

CT-1, CT-2 – Energy efficient and inherently lower-emitting processes, combustion practices, work practices, and design and carbon capture and sequestration (CCS)

AUX-1 – Good combustion practices, carbon capture and sequestration (CCS)

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 – Good combustion practices, carbon capture and sequestration (CCS)

EDG-1, CS-ENG – Good combustion practices, carbon capture and sequestration (CCS)

DFP-1 – Good Combustion Practices, carbon capture and sequestration (CCS)

Circuit Breakers – SF₆ Leak Detectors, Non-GHG Dielectric

Compressor Station – Instrument Leak Detection and Repair (LDAR) programs, auditory, visual, and olfactory (AVO) monitoring, leakless piping technology, minimizing flaring events

5.7.2 Step 2: Technical Feasibility of Options

After the identification of control options, the second step in the BACT assessment is to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that would prohibit the implementation of the control or if the highest control efficiency of the option would result in an emission level that is higher than any applicable regulatory limits.

CT-1, CT-2 feasible options:

- Energy efficient and inherently lower-emitting processes, combustion practices, work practices, and design: These will be implemented as part of the combustion turbines; therefore, they are considered technically feasible for the CCCTs.
- Carbon capture and sequestration (CCS): Although CCS is not considered commercially available for use on CCCTs, and it should be noted that there is little to no research that has been completed on the implementation of CCS systems on CCCTs, it has been considered technically feasible for this evaluation.

AUX-1 feasible options:

- Good Combustion Practices: Good Combustion practices will be implemented as part of the auxiliary boiler; therefore, they are considered technically feasible for the auxiliary boiler.
- Carbon capture and sequestration (CCS): Although CCS is not considered commercially available for use on auxiliary boilers, and it should be noted that there is little to no research that has been completed on the implementation of CCS systems on auxiliary boilers, it has been considered technically feasible for this evaluation.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 feasible options:

- Good Combustion Practices: Good combustion practices will be implemented as part of the gas-fired heaters; therefore, they are considered technically feasible for the gas-fired heaters.
- Carbon capture and sequestration (CCS): Although CCS is not considered commercially available for use on auxiliary boilers, and it should be noted that there is little to no research that has been completed on the implementation of CCS systems on auxiliary boilers, it has been considered technically feasible for this evaluation.

EDG-1, CS-ENG feasible options:

- Good Combustion Practices: Good combustion practices will be implemented as part of the gas-fired heaters; therefore, they are considered technically feasible for the gas-fired heaters.
- Carbon capture and sequestration (CCS): Although CCS is not considered commercially available for use on gas-fired heaters, and it should be noted that there is little to no research that has been completed on the implementation of CCS systems on gas-fired heaters, it has been considered technically feasible, as required by U.S. EPA guidance, for this evaluation.

DFP-1 feasible options:

- Good Combustion Practices: Good combustion practices will be implemented as part of the fire water pump engine ; therefore, they are considered technically feasible for the fire water pump engine.
- Carbon capture and sequestration (CCS): Although CCS is not considered commercially available for use on fire water pump engines, and it should be noted that there is little to no research that has been completed on the implementation of CCS systems on fire water pump engines, it has been considered technically feasible, as required by U.S. EPA guidance, for this evaluation.

Circuit Breakers infeasible options:

- Non-GHG Dielectric: Alternative dielectrics currently on the market cannot be used with existing SF₆ circuit breakers, typically require mixtures of two or more single gas components, and are not widely in use. There are some non-GHG dielectric clean air (vacuum bottle) and mixed gas alternatives to SF₆ at 145 kV and below that are readily available, however these alternatives are not available for higher capacity breakers such as the 245 kV rated Project circuit breakers. Use of an alternate dielectric gas in the circuit breakers is considered technically infeasible.

Circuit Breakers feasible options:

- SF₆ Leak Detectors: SF₆ is still the preferred and best performing dielectric gas for high voltage circuit breakers, according to the NIST Technical Note 1425. SF₆ gas is preferred due to its dielectric strength, arc quenching capability, and thermal stability. SF₆ dielectric strength increases with pressure; therefore, smaller circuit breakers can be used at higher voltages allowing a reduced overall GHG footprint compared to other insulating mediums. Additionally, SF₆ is a non-toxic and self-healing gas, requiring an immense amount of heat to break the bonds between the molecules, and once the heat source is removed the atoms will recombine immediately. SF₆ leak detectors are considered technically feasible.

Compressor Station infeasible options:

- Leakless Piping Technology: Leakless valve technology is used when extremely toxic or hazardous materials have the potential to be emitted, natural gas is not considered highly toxic and will not be stored in the amount considered to be hazardous. Additionally, leakless valve technology has not been achieved in practice for natural gas piping components. Therefore, leakless valve technology is not considered available for natural gas piping components.

Compressor Station feasible options:

- Instrument Leak Detection and Repair (LDAR) programs: LDAR programs are a feasible option for controlling fugitive emissions from natural gas piping and components.
- Auditory, visual, and olfactory (AVO) monitoring: AVO monitoring is a feasible option for controlling fugitive emissions from natural gas piping and components.
- Minimizing flaring events: Minimizing flaring events is a technically feasible control for flaring operations at the compressor station.

5.7.3 Step 3: Ranking of Control Technologies by Control Effectiveness

CT-1, CT-2 ranking:

The third step in the top-down GHG BACT review process ranks the remaining control technologies by control effectiveness. The potential control technologies for the CCCTs were ranked for effectiveness based on readily available information obtained from the sources consulted for this BACT analysis. The percent reduction values are the estimated percent reductions of CO₂e from the baseline emissions rate.

The information provided by the facility regarding the efficiencies of the remaining control devices was obtained from U.S. EPA and Energy Star documents. The controls are ranked from the most to least effective based on their CO₂ emission reduction potential control efficiency in Table 16.

Table 16 - CO ₂ Control Option Efficiency	
Control Option	Efficiency (%)
CCS	80-90%
Energy efficient and inherently lower-emitting processes, combustion practices, work practices, and design	10-50%

AUX-1 ranking:

The control rankings for the CCCTs is also applicable for the auxiliary boiler – see CT-1, CT-2 ranking section above for discussion.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2 ranking:

The control rankings for the CCCTs is also applicable for the gas-fired heaters – see CT-1, CT-2 ranking section above for discussion.

EDG-1, CS-ENG ranking:

The control rankings for the CCCTs is also applicable for the emergency generator engines – see CT-1, CT-2 ranking section above for discussion.

DFP-1 ranking:

The control rankings for the CCCTs is also applicable for the fire water pump engine – see CT-1, CT-2 ranking section above for discussion.

Circuit Breakers ranking:

The use of SF₆ technology with leak detection is the only remaining technically feasible technology for controlling SF₆ emissions. Therefore, a ranking is not necessary to establish the top technology.

Compressor Station ranking:

Minimizing flaring events is the only control technology technically feasible for the flaring operations at the compressor station; therefore, a ranking was not established for the flaring operations.

LDAR programs and AVO monitoring are the two control options for fugitive emissions from natural gas piping and components.

LDAR programs and use of remote sensing devices (i.e., infrared camera) have been determined by U.S. EPA to be equivalent control methods for natural gas piping fugitive emissions. Quarterly instrument monitoring with a leak detection threshold of 10,000 ppmv (TCEQ 28M LDAR Program) is generally assigned a control efficiency of 75% for valves, relief valves, sampling connections, 75% for compressors, and 30% for flanges. Quarterly instrument monitoring with a leak detection threshold of 500 ppmv (TCEQ 28VHP LDAR Program) is generally assigned a control efficiency of 97% for valves, relief valves, and sampling connections, 85% for compressors, and 30% for flanges.

For components containing inorganic or odorous compounds, periodic AVO walk-through inspections provide predicted control efficiencies of 97% control for valves, flanges, relief valves, and sampling connections, and 95% for compressors. Because pipeline natural gas is odorized with very small quantities of mercaptan, as-observed AVO is a very effective method for identifying and correcting leaks in natural gas piping. Therefore, AVO is able to achieve equivalent or better control efficiencies compared to LDAR.

5.7.4 Step 4: Evaluation of Most Effective Controls

The top-down approach for determining BACT suggests that all available control technologies be ranked in descending order of control effectiveness. The most stringent or “top” control option is the default BACT emission limit unless the applicant demonstrates, and the permitting authority in its informed opinion agrees, that energy, environmental, and/or economic impacts justify the conclusion that the most stringent control option is not achievable in that case. Upon elimination of the most stringent control option based upon energy, environmental, and/or economic considerations, the next most stringent alternative is evaluated in the same manner. This process continues until BACT is selected.

CT1, CT2:

As previously mentioned, to provide effective reduction of CO₂ emissions via CCS, efficient methods of compression, transport, and storage are required. In addition, there are unresolved issues with respect to CO₂ sequestration including the legal process for closing and remediating sequestration sites and liability for accidental releases from these sites. Creating the infrastructure to allow for the compression, transport and storage of CO₂ emissions would far exceed the cost of the installation of CCS. While CCS may be theoretically feasible in reducing atmospheric emissions of CO₂ after formation, without this necessary transportation and sequestration infrastructure, CCS is deemed too difficult and costly to be practical at this time.

CCS requires a complex pipeline infrastructure. Because a pre-existing pipeline infrastructure for CO₂ is not in close proximity to the Project, installing a pipeline to accommodate an injection site near the Project is considered impractical. The effort required to construct miles of pipeline through regions in the U.S., in addition to uncertainties associated with acquiring land access needed for pipeline construction, is considered impractical for the Project. Also, pipeline transportation requires very high

pressures with high compressor energy requirements and requires H₂O to be removed from CO₂ pipelines. The CO₂ pipeline infrastructure requires routine monitoring for leaks, and protection from overpressure, especially in highly populated areas. Therefore, CCS is not practical for this Project at this time. Furthermore, the combined cycle power plant incremental capital costs associated with the CCS equipment needed for CO₂ capture, compression, and pipeline transportation would be excessive. This level of control cost would constitute an adverse economic impact and is not cost effective for the proposed Project.

Given project-wide GHG emissions, the cost of CCS would be above the range of cost effectiveness values considered to be reasonable and acceptable in BACT determinations. Contributing factors to cost ineffectiveness include proximity to a demonstrated and available CO₂ storage project, existing pipeline infrastructure, and post combustion capture and compression costs. For example:

- A 2012 report, “Analysis of the Costs and Benefits of CO₂ Sequestration on the U.S. Outer Continental Shelf” estimates that sequestration costs are in the \$10-30/ton range.
- A 2011 report entitled “Cost and Performance of Carbon Dioxide Capture from Power Generation” by the International Energy Agency (IEA) estimates where CCS has sufficient infrastructure to be developed, the cost for CO₂ capture would be between \$60 and \$128/ton, with an average of about \$80/ton CO₂ avoided.
- In making the GHG BACT determination for Copano Processing, U.S. EPA determined that control of GHG emissions at a cost of \$54/ton is not BACT because it is “economically prohibitive.”
- In making the GHG BACT determination for the City of Palmdale, U.S. EPA determined that control of GHG emissions at a cost of \$45/ton is not BACT because it is “economically infeasible.”
- In making the GHG BACT determination for Valero’s McKee Refinery, located in Texas, U.S. EPA determined that control of GHG emissions at a cost effectiveness of \$134/ton is not BACT.
- In making the GHG BACT determination for Freeport LNG Development, L.P.’s Freeport LNG Liquefaction Project, U.S. EPA determined that control of GHG emissions from the amine treatment units was cost prohibitive, where the cost effectiveness of the control option under consideration was estimated at approximately \$14/ton of CO₂ sequestered.

There is no reason to believe a site-specific economic analysis for CCS applied to the Anderson Project would result in a different outcome than the analyses cited above, which have cost effectiveness ranging from \$10-\$134/ton. In addition, in U.S. EPA’s recent proposal to repeal the 40 CFR Part 60 GHG standards for combustion turbines, they stated that cost-effective control measures are not reasonably available: “90 percent CCS is neither adequately demonstrated nor cost-reasonable for new base load combustion turbines.”

DEC proposes to purchase, install, and operate high-efficiency GE H Class combined cycle combustion turbines. DEC also proposes to implement processes and procedures that promote energy efficient

operation of the turbine, including performing periodic burner tune-ups, limiting bypass hours, employing a maintenance program, and using low-carbon fuels (i.e., natural gas). The use of energy efficient and inherently lower-emitting processes, work practices, and design are inherent to the equipment design and intended operation of the CCCTs. The emissions rates presented for the CCCTs reflect the use of these emissions control techniques, and therefore, there would be no additional quantifiable reductions beyond those imbedded in the calculated emissions from use of these techniques. Because the purchase and intended operation already considers the use of energy efficient and inherently lower-emitting processes, work practices, and design, there are also no quantifiable additional costs associated with these control techniques. The cost effectiveness for this option is \$0/ton and the incremental cost effectiveness between CCS and this option is between \$10-\$134/ton.

The use of energy efficient and inherently lower-emitting processes, work practices, and design will result in lower natural gas consumption and lower resulting emissions as compared to a less efficient model CCCT. These impacts are not quantifiable without redefining the Project and are imbedded in the calculated throughput and emissions for the Project CCCTs.

AUX-1:

The CCCT cost analysis is applicable for the auxiliary boiler – see the CT-1, CT-2 section above for discussion. Good combustion practices, including using low-carbon fuels, are considered inherent to the design and operation of the auxiliary boiler, and therefore, there would be no additional quantifiable emissions reductions.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

The CCCT cost analysis is applicable for the natural gas-fired heaters – see the CT-1, CT-2 section above for discussion. Good combustion practices, including using low-carbon fuels, are considered inherent to the design and operation of the natural gas-fired heaters, and therefore, there would be no additional quantifiable emissions reductions.

EDG-1, CS-ENG:

The CCCT cost analysis is applicable for the emergency generator engines – see the CT-1, CT-2 section above for discussion. Good combustion practices, including using low-carbon fuels, are considered inherent to the design and operation of the engines, and therefore, there would be no additional quantifiable emissions reductions.

DFP-1:

The CCS evaluation for the CCCTs is also applicable for the fire water pump engine – see CT-1, CT-2 section above for discussion.

Circuit Breakers:

Economic, environmental, and/or energy impacts were not addressed in this analysis because the use of alternative, non-GHG substance for SF6 as the dielectric material in the breakers is not technically feasible.

Compressor Station:

AVO will be implemented in the design and operation of the natural gas piping components. Because AVO is able to achieve equivalent or better control efficiencies compared to LDAR, there is no additional environmental benefit to implementing LDAR. Therefore, LDAR is not considered further.

5.7.5 Step 5: Select BACT Controls and Limits

Based on Steps 1 through 4 of the top-down BACT analysis presented in this narrative, DEC proposes the use of oxidation catalyst to minimize CH₄ emissions accompanied by energy efficient and inherently lower emitting processes, work practices, and design. These may include the following:

CT energy efficiency design, practices, and procedures:

- Efficient turbine design;
- Periodic turbine burner tuning;
- Reduction in heat loss (i.e., insulation of the CT); and
- Instrumentation and controls.

HRSG energy efficiency design, practices, and procedures:

- Efficient heat exchanger design;
- Reduction in heat loss (i.e., insulation of HRSG); and
- Minimizing steam venting and repair of steam leaks.

Plant-wide energy efficiency design, practices, and procedures:

- Fuel gas preheating;
- Drain operation;
- Maximizing HRSG design to allow for the most efficient combination of CT and steam turbine design;
- Monitoring flue gas in the design of the unit through tune-ups to minimize excess oxygen within safety limits in order to maximize thermal efficiency; and
- Addition of extra insulation of the CT combustion section and HRSG compared to older designs will minimize heat losses, thereby reducing fuel input and in turn reduce GHG emissions.

To determine the CO₂ emissions limits that represent BACT, DEC consulted with the vendor, GE, and performed a search of recently permitted facilities and the RBLC database. A summary of the RBLC search can be found in Appendix B of the application.

Equation G-4 of 40 CFR Part 75, Appendix G will be used to calculate expected CO₂ emissions based on vendor-provided data and to demonstrate ongoing compliance with numeric limits.

$$W_{CO_2} = \frac{F_c * H * U_f * MW_{CO_2}}{2,000}$$

Where: W_{CO_2} is CO₂ emissions in tph
 F_c is the Carbon-based F-factor
(1,040 scf/MMBtu for natural gas and 1,420 scf/MMBtu for No. 2 fuel oil)
 U_f is a conversion factor (1/385 scf CO₂/lbmol at 14.7 psia and 68°F)
 MW_{CO_2} is the molecular weight of carbon dioxide (44 lb/lbmol)
 H is measured heat input per 40 CFR Part 75 (MMBtu/hr)

Heat rate is a measure of thermal efficiency in terms of the fuel-based heat supplied to a power plant per unit of energy output, generally described in units of British thermal units per kilowatt hour (Btu/kWh). Lower heat rates indicate greater efficiency, and there is a lower-bound on heat rate at 3,412 Btu/kWh (i.e., 100% efficiency). U.S. EPA has acknowledged that heat rate improvements are BSER for some electric generating units in the various iterations of its 40 CFR Part 60 GHG standards. (See 90 Fed. Reg. 25766) U.S. EPA has also acknowledged that combustion of natural gas in a combustion turbine is more efficient than combustion of natural gas in a boiler. (See 90 Fed. Reg. 25774)

Natural gas has a CO₂ emissions factor of 117 lb CO₂/MMBtu (see 40 CFR Part 98, Subpart C, Table C-1). Carbon dioxide emissions from a combustion turbine are directly dependent on the amount of fuel combusted and the emissions rate (in lb/MMBtu) is constant during all levels of operation (low load through full load).

For the proposed Project, the turbine vendor provided heat rate data for a range of operations and different fuels. In developing the proposed BACT approach for the Project, heat rates were a key input.

BACT emissions limits must be achievable over all modes of operation and for the life of the emissions unit. As such, the vendor-supplied heat rates were discounted by 3% to reflect long-term operations, and normal wear of components between maintenance intervals. The relationship between mechanical conditions and thermal efficiency is complex. Even minor component degradation can substantially reduce efficiency. Some of the processes that can impact unit performance are:

- Compressor Fouling – Contaminants (particles and oils) in the inlet air accumulate on the compressor blades and internal surfaces. This buildup disrupts airflow patterns, affecting turbine compressor performance, specifically, the air mass flow through the compressor decreases. The contaminated surfaces create additional resistance which forces the compressor to work harder, raising operating temperatures throughout the system.
- Metallurgical Degradation - Turbine blade deterioration occurs naturally due to the extreme pressure and temperature operating conditions. High-temperature combustion gases erode blade materials. This erosion changes the blade's aerodynamic profile and reduces its

effectiveness. Hot gas path components beyond the turbine blade can also contribute to heat rate problems. This includes wear to combustion chamber liners, transition pieces, and turbine exhaust components. Deterioration in any of these areas disrupts the carefully engineered flow patterns through the turbine section.

- Vibration - Turbine bearings support the rotating assembly and maintain precise alignment between components. When bearing degradation occurs, it creates vibrations that can affect the entire mechanical system. These vibrations can damage other components like bearings and seals throughout the turbine.
- Fuel Variability - Fuel composition significantly affects combustion efficiency and emissions levels. Variations in heating value, hydrogen content, and contaminants can alter flame characteristics and exhaust temperatures. Poor fuel quality can lead to incomplete combustion, reduced thermal efficiency, and causes fouling of combustion system components.
- Cycling - Frequent cycling between different load levels creates added stress on turbine components. Temperature and pressure fluctuations during startup and shutdown cycles can accelerate component degradation.

The 3% degradation factor was established based on industry norms and operational data collected by Duke Energy from similar installations. Specifically, the analysis focused on efficiency, increased performance, and corrosion mitigation following water wash activities (both offline and online water washing is performed). Using operational data from similar ambient temperature conditions both before and after an offline water wash, the resulting conclusion was that the fleet average gain after performing an offline water wash was 2.9% of output. While units conduct daily online washing (dependent on ambient temperatures) and offline washing every 3,300 to 3,500 hours of operation, corrosion, pitting, and build-up continue to occur and impact overall unit performance (i.e., heat rate). The impacts of unit degradation reach steady state at this interval as detailed in the Figures 5-1 and 5-1 in the application detailing operational data from Buck Unit No. 11.

As detailed in the figures, heat rate decreases and efficiency increases at higher loads. Because this relationship changes significantly over the operating range of the turbine, from nearly 8,500 Btu/kWh at low loads to 7,000 Btu/kWh at higher loads, it is necessary to reflect this variability in efficiency when developing BACT emissions limits for GHG.

DEC proposes to use a methodology similar to that used for NO_x compliance within 40 CFR Part 60, Subpart KKKKa. Specifically, hourly values are selected based on the operating configuration for the hour, and where multiple values apply in a single hour, the higher value is selected. These hourly values are then averaged together on a 30-day rolling basis to determine the actual compliance limit. Subpart TTTTa “Standards of Performance for Greenhouse Gas Emissions for Modified Coal-Fired Steam Electric Generating Units and New Construction and Reconstruction and Stationary Combustion Turbine Electric Generating Units” informed the development of the proposed BACT methodology as required under 40 CFR 51.166(b)(12), which states the following:

Best available control technology means an emissions limitation (including a visible emissions standard) based on the maximum degree of reduction for each regulated NSR pollutant which

would be emitted from any proposed major stationary source or major modification which the reviewing authority, 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 through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combination techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR part 60, 61, or 63. If the reviewing authority determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

A 30-day average was selected to allow for multiple operating configurations and is more restrictive than an annual average (as currently promulgated under 40 CFR 60, Subpart TTTTa). This averaging period allows for a sufficient data set to be collected based on multiple operating configurations but is also short enough so operators can make real-time decisions to ensure compliance with the emissions limit.

The combustion turbine will achieve Minimum Emissions Compliant Load (MECL) at approximately 30% capacity when firing natural gas (50% when firing No. 2 fuel oil). Therefore, below 30% (or 50%) load, DEC proposes to implement work practice standards that would require that the turbine operator use best practices for start-up. Start-up is an automated sequence of operations to ensure that the turbine starts as expeditiously as possible while also factoring in safety considerations such as thermal stresses on the equipment during start-up and ramping.

Once the turbine achieves MECL, DEC proposes to utilize “buckets” of operation to determine the appropriate hourly CO₂ value to be applied.

The proposed hourly CO₂ emissions values are the result of the Part 75 CO₂ emissions factor discussed above, vendor-supplied heat rate information over the range of operations listed (with 3% degradation applied), and the resulting calculated heat input to the turbine. Figure 5-3 in the application details this relationship and the correlation curves that were used to calculate the proposed hourly emissions values.

DEC acknowledged that the regulatory environment surrounding the Subpart TTTTa standard is uncertain at this time. The regulation was originally promulgated on May 9, 2024, with an effective date of July 2, 2024. However, on June 17, 2025, U.S. EPA published a proposed revision that could significantly alter the regulation or repeal it in its entirety. Comments on the proposed revisions were due by August 7, 2025. Original equipment manufacturers, the regulated community, and others have commented that the standards are focused on an emissions limit that is only achievable near full load operation; however, as discussed above, BACT must represent all operating conditions over the life of the equipment. Conversion of the Subpart TTTTa emissions limit to a mass-based approach will ensure that the selected technology and determined emissions limits are achievable in practice and

can be maintained consistently under all expected scenarios the equipment will encounter throughout its operational life.

As required by the regulatory definition for BACT presented at 40 CFR 51.166(b)(12), the proposed approach factors in the emissions limits allowed by any applicable standard under 40 CFR Parts 60, 61, or 63. Specifically, the requirements of 40 CFR Part 60, Subpart TTTTa have been considered in the proposed approach and applied to the >90% operation “bucket,” where the technology can reasonably be expected to meet the emissions limits. The mass-based emissions rate at full load is calculated based on the CO₂ emissions limit presented in 40 CFR 60, Subpart TTTTa for simple-cycle combustion turbines (1,170 lb CO₂/MW-hr), combined cycle operations (800 or 1,250 lb CO₂/MW-hr) and the maximum rating of the proposed turbine including the 3% degradation factor that has been discussed. The proposed approach is also within the range of values in the RBLC, which are in various units of measure but are similar to the lb/MW-hr and lb/MMBtu values described above. (For example, most gas firing CO₂ limits in the RBLC range from 800 to 1,000 lb/MW-hr.)

In addition to the hourly values shown above, Duke Energy requested permit language that states in no case shall the calculated BACT emissions limitation, using the methodology described above, be any less stringent than applicable Part 60 regulations. Addition of this language will ensure that the units meet limits in place through the current Subpart TTTTa regulation (where operations would be constrained to the higher load buckets) and as required under 40 CFR 51.166(b)(12). However, should the underlying NSPS regulation be revised, the proposed methodology to be included in the permit, would not constrain the units to emissions limits that impact the flexibility to effectively operate these units.

In summary, similar to the 40 CFR 60, Subpart KKKKa approach, an hourly value will be applied to each hour with operating time above MECL. For those hours where multiple values could apply, the higher value will govern. Each of these hourly values will be averaged together to calculate an emissions limit on a 30-day rolling average (calculated for each day). Similarly, the hourly CO₂ emissions calculated per the provisions of 40 CFR Part 75 will be averaged on a 30-day basis for comparison to the calculated limit.

DEC also requested the following operational flexibility, given the stringency of the proposed numeric BACT limits and the challenges complying with the BACT for normal operation during tuning, no-load, and other transitory conditions:

- The CO₂ BACT limit does not apply during a burner tuning session, water injection system adjustments, and manufacturer-required full-speed, no-load (FSNL) tests (also referred to as green rotor run in), provided the tuning session, adjustments, and testing are performed in accordance with the manufacturer's specifications or determined best practices. DEC will provide SC DES with advance notification of planned tuning, adjustments, and FSNL testing events. Routine maintenance of the turbine and these resulting tests to ensure optimum operations are critical to the long-term operation of the turbine and to minimizing emissions.
- The CO₂ BACT limit does not apply during a fuel switch, for no more than two hours (120 minutes) per fuel switch, and up to four hours (240 minutes) per 24-hour period.

AUX-1:

A review was conducted of GHG BACT determinations for auxiliary boilers, including a search of the RBLC database and a review of recently permitted facilities with auxiliary boilers. The results of the search, which can be found in Appendix B of the application, confirmed that the proposed BACT for the auxiliary boiler is consistent with auxiliary boilers at recently permitted facilities.

The use of good combustion practices and limiting operation to a 10% capacity factor will be used to minimize GHG emissions. Because the unit will be a limited-use unit, stack testing is not proposed. Proper operation and maintenance and combustion of only natural gas will serve to ensure good combustion practices are being used.

DPH-1, DPH-2, CS Heaters-1, CS Heaters-2:

A review was conducted of GHG BACT determinations for gas-fired heaters, including a search of the RBLC database and a review recently permitted facilities with small gas-fired heaters. The results of the search, which can be found in Appendix B of the application, confirmed that the proposed GHG BACT for the gas-fired heaters is consistent with recently permitted similar sources.

The use of good combustion practices will be used to minimize GHG emissions. A numeric limit and stack testing are not proposed due to the small size of the heaters; combustion of natural gas only and proper operation and maintenance of the heaters will ensure compliance with BACT.

EDG-1, CS-ENG:

A review was conducted of GHG BACT determinations for emergency generator engines, including a search of the RBLC database and a review of information concerning recently permitted facilities with emergency generator engines. The results of the search, which can be found in Appendix B of the application, confirmed that the proposed GHG BACT for the emergency generator engines is consistent with emergency generator engines at recently permitted facilities and entries in the RBLC.

The use of energy efficient design and compliance with NSPS requirements will be used to minimize GHG emissions. DEC proposes a GHG limit of 163 lb/MMBtu for the diesel-fired emergency generator engine and 120 lb/MMBtu for the natural gas-fired emergency generator engine. Due to the expected limited operation of the engines, stack testing is not proposed.

DFP-1:

A review was conducted of GHG BACT determinations for fire water pump engines, including a search of the RBLC database and a review of recently permitted facilities with emergency generator engines and fire pump engines. The results of the search, which can be found in Appendix B of the application, confirmed that the proposed GHG emissions limits for the fire water pump engine are consistent with fire water pump engines at recently permitted facilities and entries in the RBLC.

The use of energy efficient design and NSPS compliance will minimize GHG emissions. DEC proposes a GHG limit of 163 lb/MMBtu for the fire water pump engine. Due to the expected limited operation of the engine, stack testing is not proposed. Use of only ULSD and NSPS compliance will ensure compliance with BACT.

Circuit Breakers:

DEC proposes the use of circuit breakers designed to meet American National Standards Institute (ANSI) C37.013 (generation breakers) and ANSI C37.04 (transmission breakers) standards for high voltage circuit breakers (or equivalent standards as updated). The circuit breakers will have a leak rate of no more than 0.5%. The circuit breakers will be equipped with low pressure alarms. A review of the RBLC database and recently permitted facilities indicated that the proposed leak rates are included in the observed range of limits compared to similar facilities and installations that have been recently permitted. A complete list of facilities with circuit breakers in the RBLC is included in Appendix B of the application.

Compressor Station:

To determine the appropriate proposed BACT, a review of the RBLC database and recently permitted facilities was conducted. DEC proposes to perform monthly AVO inspections of the fugitive emissions components of the natural gas piping as BACT. If a leak is detected, DEC will make a first attempt at repair within 15 days. Additionally, DEC proposes to minimize pigging and flaring events that result in GHG emissions to once per year. For natural gas piping, the standard industry work practice of periodic walk-through inspections is the only practical means of minimizing emissions and is therefore considered to be BACT for the proposed natural gas piping components.

GHG emissions during pigging and flaring operations will be limited to one event per year, and GHG emissions from the compressor station components will be limited by the AVO program. Due to the limited occurrence of flaring and the temporary nature of the flare, neither stack testing nor a numeric emissions limit is proposed. Compliance with BACT for fugitive emissions will be ensured by conducting the AVO inspection program and responding to detected leaks. Due to uncertainty around the exact composition of the natural gas and the number of components to be included at the Facility, DEC does not propose a numeric limit as BACT for piping fugitives.

Table 17 - Selection of CO₂e BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
CT-1, CT-2 Natural Gas – Normal Operation	Energy efficient and inherently lower-emitting processes, combustion practices, work practices, and design	30-day rolling average limit calculated using hourly values below: >90% Load: 521,156 lb/hr 70-90% Load: 442,262 lb/hr 50-70% Load: 347,797 lb/hr 30-50% Load: 256,438 lb/hr Any Load with Duct Burner: 588,815 lb/hr And

Table 17 - Selection of CO₂e BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
		Any applicable New Source Performance Standards for limiting CO ₂ emissions as codified at 40 CFR Part 60, including without limitation, as applicable, under Subpart TTTT and/or Subpart TTTTa.
CT-1, CT-2 No. 2 Fuel Oil – Normal Operation	Energy efficient and inherently lower-emitting processes, combustion practices, work practices, and design	30-day rolling average limit calculated using hourly values below: Combined-cycle, No. 2 fuel oil: >90% Load: 733,125 lb/hr 70-90% Load: 581,592 lb/hr 50-70% Load: 455,209 lb/hr And Any applicable New Source Performance Standards for limiting CO₂ emissions as codified at 40 CFR Part 60, including without limitation, as applicable, under Subpart TTTT and/or Subpart TTTTa.
CT-1, CT-2 (Natural gas – Simple-cycle)	Energy efficient and inherently lower-emitting processes, combustion practices, work practices, and design	30-day rolling average limit calculated using hourly values below: Simple-cycle, natural gas: >90% Load: 514,814 lb/hr 70-90% Load: 437,549 lb/hr 50-70% Load: 366,261 lb/hr 30-50% Load: 313,689 lb/hr And Any applicable New Source Performance Standards for limiting CO₂ emissions as codified at 40 CFR Part 60, including without limitation, as applicable, under

Table 17 - Selection of CO₂e BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
		Subpart TTTT and/or Subpart TTTTa.
CT-1, CT-2 Startup/Shutdown	Adhere to optimal operational practices to minimize emissions and time in SU/SD Limiting emissions per 12-month period from Cold Starts Warm Starts Hot Starts Shutdowns	Maximum emissions per 12-month period: 35,592 tons during startup and shutdown
CT-1, CT-2 Tuning, water injection system adjustments, and FSNL tests	Tuning, adjustments, and testing performed in accordance with the manufacturer's specifications or determined best practices	---
CT-1, CT-2 Fuel switches	Limiting the duration of fuel switches	Less than or equal to two hours (120 minutes) per fuel switch Less than or equal to four hours (240 minutes) per 24-hour period
AUX-1	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	Good combustion practices, combust only natural gas	---
EDG-1	Energy efficient design and work practices, combust only No. 2 Fuel Oil	163 lb/MMBtu
CS-ENG	Energy efficient design and work practices, combust only natural gas	120 lb/MMBtu
DFP-1	Installation of an engine certified to the emissions standards in Table 4 of NSPS Subpart IIII, Good combustion practices and limited operating hours for	163 lb/MMBtu

Table 17 - Selection of CO₂e BACT and Proposed Limits		
Process/Equipment	Control Method	Proposed BACT Limit
	testing/maintenance, combust only No. 2 Fuel Oil	
Circuit Breakers	Installation of circuit breakers certified with ANSI C37.013 standards for high voltage circuit breakers	Less than or equal to 0.5% leak rate 12-month rolling average
Compressor Station	Flaring: Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year Piping Leaks: Monthly leak detection and repair using AVO	---

6.0 Summary of BACT Limits

The BACT Determinations are summarized in Table 18.

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
CT-1, CT-2 Natural Gas – Normal Operation	CO	Catalytic oxidation and good combustion practices	2 ppmvd @ 15% O ₂ , 24- hr rolling average
CT-1, CT-2 No. 2 Fuel Oil – Normal Operation	CO	Catalytic oxidation and good combustion practices	1.7 ppmvd @ 15% O ₂ , 24-hr rolling average
CT-1, CT-2 Startup/Shutdown	CO	Adhere to optimal operational practices to minimize emissions and time in SU/SD Limiting emissions per 12-month period from Cold Starts Warm Starts Hot Starts Shutdowns	Maximum emissions per 12-month period: 401 tons during startup and shutdown
CT-1, CT-2 Natural gas – Simple- cycle	CO	Good combustion practices	9 ppmvd @ 15% O ₂ , 24- hr rolling average
CT-1, CT-2 burner tuning sessions, water injection system adjustments, and manufacturer-required FSNL tests	CO	Tuning, adjustments, and testing performed in accordance with the manufacturer's specifications or determined best practices	---
CT-1, CT-2 fuel switch	CO	Limiting the duration of fuel switches	Less than or equal to two hours (120 minutes) per fuel switch Less than or equal to four hours (240 minutes) per 24-hour period
AUX-1	CO	Good combustion practices, 10% capacity	---

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
		factor, combust only natural gas	
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	CO	Good combustion practices, combust only natural gas	---
EDG-1	CO	Installation of NSPS-compliant engine, good combustion practices, and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	2.6 g/hp-hr
CS-ENG	CO	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	4.0 g/hp-hr
DFP-1	CO	Installation of U.S. EPA Tier 2 certified engine, good combustion practices, and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	2.6 g/hp-hr
Compressor Station	CO	Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year	---
CT-1, CT-2 Natural Gas – Normal Operation	NO _x	SCR, DLN, LNB, and good combustion practices	2.5 ppmvd @ 15% O ₂ , 24-hour rolling average
CT-1, CT-2 No. 2 Fuel Oil – Normal Operation	NO _x	SCR, DLN, LNB, water injection, and good combustion practices	6.0 ppmvd @ 15% O ₂ , 24-hour rolling average
CT-1, CT-2 Startup/Shutdown	NO _x	Adhere to optimal operational practices to	Maximum emissions per 12-month period:

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
		minimize emissions and time in SU/SD Limiting emissions per 12-month period from Cold Starts Warm Starts Hot Starts Shutdowns	98.9 tons from startup and shutdown
CT-1, CT-2 (Natural gas, simple-cycle)	NO _x	Good combustion practices	15 ppmvd @ 15% O ₂ , 24-hour rolling average
CT-1, CT-2 burner tuning sessions, water injection system adjustments, and manufacturer-required FSNL tests	NO _x	Tuning, adjustments, and testing performed in accordance with the manufacturer's specifications or determined best practices	---
CT-1, CT-2 fuel switch	NO _x	Limiting the duration of fuel switches	Less than or equal to two hours (120 minutes) per fuel switch Less than or equal to four hours (240 minutes) per 24-hour period
AUX-1	NO _x	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	NO _x	Good combustion practices, combust only natural gas	---
EDG-1	NO _x	Installation of U.S. EPA Tier 2 certified engine, good combustion practices and limited operating hours for testing/maintenance,	4.8 g/hp-hr

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
		combust only No. 2 Fuel Oil	
CS-ENG	NO _x	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	2.0 g/hp-hr
DFP-1	NO _x	Installation of U.S. EPA Tier 2 certified engine, good combustion practices, and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	3.0 g/hp-hr
Compressor Station	NO _x	Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year.	---
CT-1, CT-2 Natural Gas – Normal Operation	VOC	Catalytic oxidation and good combustion practices	2.2 ppmvd @ 15% O ₂ (as CH ₄) Demonstrated by a 3-run stack test
CT-1, CT-2 No. 2 Fuel Oil – Normal Operation	VOC	Catalytic oxidation and good combustion practices	3.2 ppmvd @ 15% O ₂ (as CH ₄) Demonstrated by a 3-run stack test
CT-1, CT-2 Startup/Shutdown	VOC	Adhere to optimal operational practices to minimize emissions and time in SU/SD Limiting emissions per 12-month period from Cold Starts Warm Starts Hot Starts Shutdowns	Maximum emissions per 12-month period: 12.8 tons from startup and shutdown

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
CT-1, CT-2 (Natural gas – Simple-cycle)	VOC	Good combustion practices	1.5 ppmvd @ 15% O ₂ (as CH ₄)
CT-1, CT-2 burner tuning sessions, water injection system adjustments, and manufacturer-required FSNL tests	VOC	Tuning, adjustments, and testing performed in accordance with the manufacturer's specifications or determined best practices	---
CT-1, CT-2 fuel switch	VOC	Limiting the duration of fuel switches	Less than or equal to two hours (120 minutes) per fuel switch Less than or equal to four hours (240 minutes) per 24-hour period
AUX-1	VOC	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	VOC	Good combustion practices, combust only natural gas	---
EDG-1	VOC	Installation of U.S. EPA Tier 2 certified engine, good combustion practices and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	0.26 g/hp-hr
CS-ENG	VOC	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	1.0 g/hp-hr
DFP-1	VOC	Installation of U.S. EPA Tier 2 certified engine,	1.1 g/hp-hr

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
		good combustion practices, and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	
Compressor Station	VOC	Flaring: Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year Piping Leaks: Monthly Leak Detection and Repair using AVO	---
TK-1, TK-2	VOC	Submerged fill pipe, fixed roof, exterior surfaces painted white, good operating practices, and limit VOC emissions	1.56 tons VOC per 12-month rolling period calculated using U.S. EPA's TANKS software
CT-1, CT-2 Natural Gas	PM, PM ₁₀ , and PM _{2.5}	Good combustion practices, low sulfur fuels	Filterable PM: 5.9E-03 lb/MMBtu PM ₁₀ /PM _{2.5} : 8.0E-03 lb/MMBtu Demonstrated by a 3-run stack test
CT-1, CT-2 No. 2 Fuel Oil	PM, PM ₁₀ , and PM _{2.5}	Good combustion practices, low sulfur fuels	Filterable PM: 0.015 lb/MMBtu PM ₁₀ /PM _{2.5} : 0.028 lb/MMBtu Demonstrated by a 3-run stack test
AUX-1	PM, PM ₁₀ , and PM _{2.5}	Good combustion practices, 10% capacity factor, combust only natural gas	---

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	PM, PM ₁₀ , and PM _{2.5}	Good combustion practices, combust only natural gas	---
EDG-1	PM, PM ₁₀ , and PM _{2.5}	Installation of U.S. EPA Tier 2 certified engine, good combustion practices and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	Filterable PM: 0.15 g/hp-hr PM ₁₀ /PM _{2.5} : 0.17 g/hp-hr
CS-ENG	PM, PM ₁₀ , and PM _{2.5}	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	---
DFP-1	PM, PM ₁₀ , and PM _{2.5}	Installation of an engine certified to the emissions standards in Table 4 of NSPS Subpart IIII, good combustion practices and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	Filterable PM: 0.15 g/hp-hr PM ₁₀ /PM _{2.5} : 0.18 g/hp-hr
CT-1, CT-2 Natural Gas	SO ₂	Good combustion practices, low-sulfur fuels	0.00137 lb/MMBtu
CT-1, CT-2 No. 2 Fuel Oil	SO ₂	Good combustion practices, low-sulfur fuels	0.00152 lb/MMBtu
AUX-1	SO ₂	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	SO ₂	Good combustion practices, combust only natural gas	---

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
EDG-1	SO ₂	Installation of U.S. EPA Tier 2 certified engine, good combustion practices and limited operating hours for testing/maintenance, combust only No. 2 fuel oil	15 ppm Sulfur in fuel
CS-ENG	SO ₂	Good combustion practices and limited operating hours for testing/maintenance, combust only natural gas	---
DFP-1	SO ₂	Installation of an engine certified to the emissions standards in Table 4 of NSPS Subpart IIII, Good combustion practices and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	15 ppm Sulfur in fuel
Compressor Station	SO ₂	Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year	---
CT-1, CT-2 Natural Gas – Normal Operation	CO ₂ e	Energy efficient and inherently lower-emitting processes, combustion practices, work practices, and design	30-day rolling average limit calculated using hourly values below: >90% Load: 521,156 lb/hr 70-90% Load: 442,262 lb/hr 50-70% Load: 347,797 lb/hr

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
			30-50% Load: 256,438 lb/hr Any Load with Duct Burner: 588,815 lb/hr And Any applicable New Source Performance Standards for limiting CO ₂ emissions as codified at 40 CFR Part 60, including without limitation, as applicable, under Subpart TTTT and/or Subpart TTTTa
CT-1, CT-2 No. 2 Fuel Oil – Normal Operation	CO ₂ e	Energy efficient and inherently lower-emitting processes, combustion practices, work practices, and design	30-day rolling average limit calculated using hourly values below: Combined-cycle, No. 2 fuel oil: >90% Load: 733,125 lb/hr 70-90% Load: 581,592 lb/hr 50-70% Load: 455,209 lb/hr And Any applicable New Source Performance Standards for limiting CO ₂ emissions as codified at 40 CFR Part 60, including without limitation, as applicable, under

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
			Subpart TTTT and/or Subpart TTTTa.
CT-1, CT-2 (Natural gas – Simple-cycle)	CO ₂ e	Energy efficient and inherently lower-emitting processes, combustion practices, work practices, and design	30-day rolling average limit calculated using hourly values below: Simple-cycle, natural gas: >90% Load: 514,814 lb/hr 70-90% Load: 437,549 lb/hr 50-70% Load: 366,261 lb/hr 30-50% Load: 313,689 lb/hr And Any applicable New Source Performance Standards for limiting CO ₂ emissions as codified at 40 CFR Part 60, including without limitation, as applicable, under Subpart TTTT and/or Subpart TTTTa
CT-1, CT-2 Startup/Shutdown	CO ₂ e	Adhere to optimal operational practices to minimize emissions and time in SU/SD Limiting emissions per 12-month period from Cold Starts Warm Starts Hot Starts Shutdowns	Maximum emissions per 12-month period: 12.8 tons from startup and shutdown

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
CT-1, CT-2 Burner tuning sessions, water injection system adjustments, and manufacturer-required FSNL tests	CO ₂ e	Tuning, adjustments, and testing performed in accordance with the manufacturer's specifications or determined best practices	---
CT-1, CT-2 Fuel switches	CO ₂ e	Limiting the duration of fuel switches	Less than or equal to two hours (120 minutes) per fuel switch Less than or equal to four hours (240 minutes) per 24-hour period
AUX-1	CO ₂ e	Good combustion practices, 10% capacity factor, combust only natural gas	---
DPH-1, DPH-2, CS Heaters-1, CS Heaters-2	CO ₂ e	Good combustion practices, combust only natural gas	---
EDG-1	CO ₂ e	Energy efficient design and work practices, combust only No. 2 Fuel Oil	163 lb/MMBtu
CS-ENG	CO ₂ e	Energy efficient design and work practices, combust only natural gas	120 lb/MMBtu
DFP-1	CO ₂ e	Installation of an engine certified to the emissions standards in Table 4 of NSPS Subpart IIII, Good combustion practices and limited operating hours for testing/maintenance, combust only No. 2 Fuel Oil	163 lb/MMBtu

Table 18 - Summary of BACT			
Process	Pollutant	BACT Control Method	BACT Limit
Circuit Breakers	CO ₂ e	Installation of circuit breakers certified with ANSI C37.013 standards for high voltage circuit breakers	Less than or equal to 0.5% leak rate 12-month rolling average
Compressor Station	CO ₂ e	Flaring: Good operating practices, proper flare design, flare natural gas only, and limit flaring events to once per year Piping Leaks: Monthly leak detection and repair using AVO	---