February 4, 2026

Mr. Brian Wetzel
Air Quality Permitting
Department of Environmental Protection | Air Quality Program
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, PA 17110

RE: Crane Clean Energy Center Plan Approval #22-05062A Technical Deficiency Response

Dear Mr. Wetzel:

Constellation Energy Generation LLC (Constellation) is submitting this letter in response to the Technical Deficiency Letter received from the Pennsylvania Department of Environmental Protection (PADEP) on January 7th, 2026. This response letter is part of the technical review process for Constellation's Air Plan Approval Application for the Crane Clean Energy Center (Crane) located in Londonderry Township, Pennsylvania. Each Technical Deficiency is listed below along with the requested information provided in writing or in the Attachments:

- Attachment A: BAT Analysis
- Attachment B: Updated PTE Potential to Emit (PTE) calculations
- Attachment C: Updated PA DEP Plan Approval Forms
- Attachment D: Vendor Specs in order:
    - Engine nameplate pictures and manufacturer specifications
    - Cooling Tower A Technical Data Sheet
    - Boiler Tune Up Records
- Attachment E: Miscellaneous Source List
- Attachment F: BAT Supporting Documentation
    - RBLC Search Results
    - Cost Calculations
    - Vendor Quote Estimate

In addition to the updates to the application detailed in the technical deficiency responses below, Constellation is requesting an additional operating scenario for the two Auxiliary Boilers. As discussed in the original plan approval application, the Auxiliary Boilers will be limited to 100 hours per year. However, during the facility restart (scheduled to occur from summer of 2026 through summer of 2027), the Auxiliary Boilers are expected to have additional run hours to support the following operations associated with the startup and commissioning activities on-site:

- Commissioning the Auxiliary Boilers
- Hot Functional Testing of the Facility
- Commissioning of the Facility

Constellation requests a one-time alternative limit of 1,500 hours per year per boiler to address the operations needed for plant startup and commissioning activities. After plant startup and commissioning activities are complete, the Auxiliary Boilers will each be limited to 100 hours per year of operation.

Technical Deficiencies

1. Section 1. Executive Summary (page 3). The portion states "The Crane Facility is a nuclear power generating facility in Londonderry Township, Dauphin County, PA which was shutdown in 2019 primarily due to economic reasons." It further states "The Crane Facility is submitting this plan approval application in order to bring this facility back online and reactivate these sources without modification." Was a maintenance plan in accordance with 25 Pa Code §127.11a(a)(1) submitted to DEP within 1 year of the deactivation of the sources? DEP does not have a record of an approved maintenance plan. If the facility submitted a maintenance plan, as part of the reactivation of sources which have been out of operation or production for more than 5 years but less than 10 years and in accordance with 25 Pa Code §127.11a(b)(2), the owner or operator of the source is required that the emission of air contaminants from the source will be controlled to the maximum extent, consistent with the Best Available Technology (BAT) as determined by the Department as of the date of reactivation. However, if the facility did not submit a maintenance plan in accordance with 25 Pa Code §127.11a(a)(1), the equipment will be treated as new sources. Therefore, a BAT analysis is required whether or not a maintenance plan was approved by the Department. Please provide a Top-Down BAT analysis for the sources listed in the plan approval application, including the respective cost effectiveness analysis for technically feasible control devices/methods.

   Constellation Response: A maintenance plan was not submitted to the DEP after deactivation. As requested, Crane prepared the BAT analysis for the relevant emission sources using the Top-Down Methodology. The BAT Analysis and Supporting Documents are found in Attachments A and F. Crane completed this BAT analysis for the internal combustion engines (ICE), the two cooling towers and the two Auxiliary Boilers. The attached analysis demonstrates that additional controls are not required due to limited hours of operation of the emission units.

2. Section 1.1. Facility Description (page 3).
   a. Various ratings for the engines are different than those reported by the facility in past annual emission reports and operating permit renewal applications. The following engines have listed ratings different than those previously reported: FSP1, FSP3, Y1A, Y1B, Y4. Please confirm the correct horsepower of the engines.

      Constellation Response: The rating for each engine has been confirmed using either the vendor specification document or the unit nameplate. These files are in Attachment D:
      - Y1A/Y1B: 4,320 HP
      - Y4: 4,150 HP
      - FSP1/FSP3: 380 HP

   b. The section mentions an exempt propane-fired emergency generator. Although it may qualify for exemption from plan approval requirements, please address its applicability to 40 CFR 60, Subpart JJJJ—Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Also, please confirm the manufacture and installation date of the unit.

Constellation Response: The propane generator listed in the original Plan Approval application is exempt from Plan Approval requirements due to the emission levels provided in the application. However, Constellation agrees that this engine will still be regulated under NSPS Subpart JJJJ. The regulatory requirements are both emergency generator emission limits (Table 1 of NSPS JJJJ) and the restrictions on non-emergency operation. The vendor specification sheet for this unit is provided in Attachment D and certifies this unit as an NSPS compliant engine. The other regulatory requirements are laid out in 40 CFR 60.4243 including monitoring requirements and the definition of an emergency generator.

Constellation also confirms both the manufacture date and installation date of this generator is 2024. The manufacturer specification sheet is included in Attachment D.

3. Section 2.2.1. 40 CFR Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Are the engines subject to the regulation constant speed engines?

   Constellation Response: These engines, FX1A and FX1B, are confirmed as constant speed engines as shown in the vendor specification document in Attachment D. These engines will still be subject to the requirements of 60 CFR 60.4202(a)(2) which references the Tier 2 requirements in 40 CFR 1039 Appendix I and the smoke standards in 40 CFR 1039.105. As constant speed engines, the opacity requirements in 40 CFR 1039.105 are not applicable.

4. Section 2.3.2. 40 CFR Part 63, Subpart JJJJJJ - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources. The section indicates the two 168 mmBtu/hr boilers are subject to the federal subpart. Previous permitting defined the boilers as "seasonal boilers" under the regulation. Will Constellation still maintain the boilers as "seasonal boilers" under the subpart?

   Constellation Response: These boilers will not be operated as seasonal-boilers as their operation will not be dependent on the season. As discussed above, these boilers will be limited to 100 hours of operation and typically operate far less than this limit throughout the year. However, Constellation is requesting a one-time alternative limit of 1,500 hours per year per boiler to address the operation needed for plant startup and commissioning activities for the period between summer of 2026 and summer of 2027. Under 40 CFR Part 63, Subpart JJJJJJ, these boilers qualify as oil-fired boilers under the rule.

5. Plan Approval Application:
   a. Boilers
      i. Sections B.1 & B.3 (pages 14 & 15) indicate a fuel usage of 2,420 gal/hr for each boiler. Based on the boiler's rated capacity of 168 mmBtu/hr and a fuel heat content of 137,000 Btu/gal, the hourly fuel usage for the boiler would be 1,226 gal/hr. Please confirm the hourly throughput.

         Constellation Response: Constellation agrees with PADEP's comment and has updated the potential to emit (PTE) calculations and permit application forms as discussed below. First, the ratings of these boilers have been confirmed as 156.65 MMBtu/hr. Second, the revised PTE calculations provide a

re-calculated maximum fuel usage based on this rating and the fuel heat content. The hourly fuel usage for each boiler is revised to 1,114 gal/hr. This value was used in the updated PTE calculations in Attachment B and updated forms in Attachment C.

b. Cooling Towers
    i. Section B.1 (page 33) indicates a capacity of 136,108,800 gal/hr. What is the basis of this value as the throughput used in the PTE calculations was 272,000 gal/min for each tower (16,320,000 gal/hr)?

    Constellation Response: As discussed in the response to Item 6.b below, Constellation has updated the PTE calculations for the cooling to match the Technical Data Sheet for Cooling Tower A provided in Attachment D. The correct flow for each cooling tower is 215,000 gpm. The Plan Approval application forms in Attachment C have been updated to 215,000 gallons per minute to be consistent with PADEP's comment and this change.

    ii. Section B.6 (page 35) states "Cooling Tower B will be modified to match the process dimensions and flowrates of Cooling Tower A. As such, both boilers [sic] will have matching emissions specifications." What specific modifications will be performed on the tower.

    Constellation Response: The modifications to Cooling Tower B are being completed to make the specifications of Cooling Tower B match those of Cooling Tower A. Constellation is currently working with a vendor to finalize the design of Cooling Tower B. A drift eliminator will be added to Cooling Tower B which will match the design of the drift eliminator on Cooling Tower A. The only design difference between the cooling towers is that Cooling Tower B will be designed with a deicing ring. This will not affect the drift rate or emissions from the source. The Cooling Tower A Technical Data Sheet is provided in Attachment D. The Technical Data Sheet for Cooling Tower B is expected to be nearly identical. Constellation is able to confirm that the drift rate of both towers will be 0.001%. Constellation will provide the Technical Data Sheet for Cooling Tower B once it is available from the vendor.

c. Emergency Engines
    i. Sections B.6 & E for each engine indicate the engine will not exceed 100 hours per year. Please confirm if it is the facility's intent to limit the combined emergency and non-emergency use to 100 hours per year for each engine.

    Constellation Response: After review, Constellation has updated the emission calculations for the engines to be based on 250 hours per year of emergency and non-emergency use. Non-emergency use of these engines will be limited to 100 hours per year to comply with RICE MACT. Please see the updated PTE calculations in Attachment B.

6. Appendix E. PTE Calculation
    a. Please provide the emission factors used to calculate the emissions from the diesel engines and boilers.

       Constellation Response: The emission factors for each engine are documented in the Criteria Pollutant Emission Factors by Source table provided in Attachment B. Emission factors are generally from AP-42, except for engines FX1A and FX1B which are subject to NSPS Subpart IIII requirements.

    b. Cooling Towers (page 235). Please provide the manufacturer's guarantee for the drift rate. The design flow rate is claimed to be 272,000 gpm, combined; however, previous permitting indicated the flow rate was 215,000 gpm for each cooling tower. Additionally, the 2009 Request for Determination for the modification of Tower A indicated a flow rate for each tower at 272,000 gpm. Please address the discrepancy. Finally, please provide the basis/sampling results for the total dissolved solids (TDS) and the breakdown of PM10 and PM2.5.

       Constellation Response: After reviewing the manufacturer specifications for these units and discussing with the vendor, Constellation is confirming that the 215,000 gpm previously permitted is correct for each cooling tower. This is shown in the Technical Data Sheet for Cooling Tower A in Attachment D as the design flow rate.

       Thus, Constellation updated the emissions in the PTE calculations to be based on 215,000 gpm for each cooling tower. Constellation updated this value in the PTE calculations in Attachment B to include the maximum TDS concentration found in their past sampling. This value is 1,600 ppm from a sample taken on 8/13/2015. Constellation is also removing the particle size distribution provided in the original application from the PTE calculations provided in Attachment B. This conservatively estimates PM_{10} and $PM_{2.5}$ emissions from the cooling towers.

    c. Boilers (pages 236 – 240). The calculations utilize a fuel usage of 242,000 gal/yr for each boiler. Based on the boiler's rated capacity of 168 mmBtu/hr, a fuel heat content of 137,000 Btu/gal and operating 100 hr/yr, the annual fuel usage for each boiler would be 122,628 gal/yr. Please address the discrepancy.

       Constellation Response: Constellation confirmed the correct heat rating is 156.65 MMBtu/hr for each boiler This value and the fuel heat content of 137,000 Btu/gallon were used in the updated PTE calculations in Attachment B and forms in Attachment C.

    d. Emergency Engines (pages 236 – 240). The calculations use a 100 hours per year limit for each engine. Again, please confirm if it is the facility's intent to limit the combined emergency and non-emergency use to 100 hours per year for each engine.

       Constellation Response: As discussed above, Constellation has updated the emission calculations for the engines to be based on 250 hours per year of emergency and non-emergency use. Non-emergency use of these engines will be

limited to 100 hours per year to comply with RICE MACT. Please see the updated PTE calculations in Attachment B.

7. The previous operating permit for the facility listed various insignificant sources in Section H (i.e. portable generators, storage tanks, etc.). Will any of the same equipment be utilized/operated?

   Constellation Response: Constellation is providing Attachment E in response to this question, which lists the remaining miscellaneous sources and those that have been removed or will be replaced. As shown in the list, Y8 and FO-T-5 are being removed. Additionally, FO-T-1, a 30,000 underground diesel storage tank, is being replaced with a 35,000 underground diesel storage tank.

8. Regarding any changes made to your application based on the comments above, please provide updated emissions calculations, tables, and applicable application forms.

   Constellation Response: Mentioned previously in this document, Constellation confirms the ratings, throughputs, and emissions with this response letter and attachments. The emissions were updated from the initial plan approval due to both a change in the mechanical specification used to calculate potential fuel usage and correcting errors in our formulas from the initial submittal. The ICEs throughputs were updated based on the confirmed ratings provided earlier in this response. Additionally, an error in the formula used for the ICEs emission calculations was corrected to provide the accurate PTE for the facility. The HAP calculations were further updated to consolidate the PAH emissions into one column using a combination of the individual PAH emission rates either provided by AP-42 or calculated using the individual rates provided in AP-42. See the footnote on the HAPs calculations in Attachment B. Neither of these updates change the minor source determination as the Crane Facility is still below all major source thresholds.

   The updated PTE is found in Attachment B. The updated Plan Approval forms are found in Attachment C. All forms and calculations use the verified ratings and throughputs confirmed in the responses above.

Attachment A: BAT Top-Down Method

1. BEST AVAILABLE TECHNOLOGY (BAT) DISCUSSION

Under PADEP air permitting regulations in 25 Pa Code §127.11(a), "new sources" of air emissions must implement Best Available Technology (BAT). A new source is defined in 25 Pa Code §121.1 as, "a stationary air contamination source which was constructed and commenced operation on or after July 1, 1972, or was modified, irrespective of a change in the amount or kind of air contaminants emitted, so that the fixed capital cost of new components exceeds 50% of the fixed capital cost that would be required to construct a comparable entirely new source." Since the Crane facility has been shut down since 2019 and did not submit a maintenance plan, the sources at the facility upon reactivation of the site are considered new sources as defined in 25 Pa. Code 121.1 and BAT review is required per 25 Pa. Code 127.12(a)(5). This BAT analysis addresses the facility's cooling towers, large emergency generators, auxiliary boilers, and small emergency generators <800 HP.

BAT for the new units has been evaluated using a "top-down" approach for each pollutant of concern generally following U.S. EPA's guidance for conducting Best Available Control Technology (BACT) analyses for PSD evaluations. The BAT analysis is based on the following five (5) steps:

- Step 1: Identify all possible control technologies;
- Step 2: Eliminate technically infeasible options;
- Step 3: Rank the technically feasible control technologies based upon emission reduction potential;
- Step 4: Evaluate ranked controls based on energy, environmental, and/or economic considerations and;
- Step 5: Select BAT

In order to complete Step 1 for all pollutants, a review of the U.S. Environmental Protection Agency's (EPA's)
RACT/BACTLEAR Clearinghouse (RBLC) database was conducted to identify comparable sources that have implemented BACT for similar sources/source categories. The RBLC Search results are in Attachment F.

1.1 BAT for Particulate Matter (PM) - Cooling Towers

1.1.1 Step 1: Identify All Control Technologies for PM

Step 1 in a top-down analysis is to identify all available control technologies. Table 1-1 contains a list of the various technologies that have been identified for the control of PM emissions from cooling towers. Therefore, the control technologies were considered for the purpose of this analysis.

Table 1-1. Potentially Available PM Control Technologies for Cooling Towers

Potentially Applicable PM Control Technology
Drift Eliminators

The following section provides a discussion of each potentially available technology identified above as it might be applied to the cooling towers at the facility.

1.1.1.1 Drift Eliminators

Drift eliminators (or mist eliminators) are devices that are built to capture larger droplets of water from the exhaust air. Drift eliminators work by altering the direction of air flow as air passes through them and

capturing trapped water droplets in the cooling towers exhaust. Upon capture, drift eliminators return these water droplets to the system. This improves water and chemical conservation, minimizes mist formation that can potentially damage equipment, and reduces PM emissions.[1]

1.1.2 Step 2: Eliminate Technically Infeasible Options for PM Control

Step 2 in the top-down analysis is to eliminate the control options identified in Step 1 which are technically infeasible. The remaining technologies are then carried to Step 3. All the control options discussed in Step 2 that are considered technically feasible will be evaluated in Step 3 of this analysis.

1.1.2.1 Drift Eliminators Feasibility

Drift eliminators are regularly used on cooling towers, since they can be tailored to different designs of cooling towers and provide savings of hundreds of gallons of water that would otherwise be lost to the atmosphere. This type of control technology is standard for equipment like cooling towers. Therefore, drift eliminators are technically feasible for the cooling towers at the facility.[2]

1.1.3 Step 3: Rank Remaining Control Technologies by Control Effectiveness

Drift eliminators are the only identified PM emission control for cooling towers. Thus, this is the top ranked control.

1.1.4 Step 4: Evaluate Most Effective Controls and Document Results

The top and only available and technically feasible PM/PM_{10}/$PM_{2.5}$ control option will be applied to achieve compliance with the proposed BACT limit of 0.001% drift rate. Constellation will maintain the current drift eliminators in Cooling Tower A and install drift eliminator on Cooling Tower B as part of this project.

1.1.5 Step 5: Select BAT

Constellation will use drift eliminators as BAT for PM emissions from the cooling towers. The cooling towers will meet a drift rate of 0.001% based on vendor data provided in Attachment D.

1.2 BAT for NOx – Large Emergency Generators: 4,000 HP

Typically, the BAT for emergency generators is limited operation due to the emergency use designation of the units. In order to provide a complete response to the Department's request for a BAT evaluation, Constellation is providing a top-down BAT analysis for the 4,320 HP diesel emergency generators (Y1A and Y1B) and the 4,150 HP diesel emergency generator (Y4) at the facility.

1.2.1 Step 1: Identify All Control Technologies for NOx

Step 1 in a top-down analysis is to identify all available control technologies. Table 1-2 contains a list of the

[1] *Understanding Drift Eliminator in Cooling Tower and Their Function*, EAI Water, https://eaiwater.com/cooling-tower-drift-eliminators/.

[2] *Solving a Pipe Movement Problem in Seismic Applications*, R.L. Deppmann, August 2025, https://www.deppmann.com/wp-content/uploads/2025/08/Monday_Morning_Minutes_Cooling_Tower_Design_to_Save_the_Planet_Part_1_Drift_Eliminators.pdf.

various technologies that have been identified for the control of NOx emissions from internal combustion engines greater than 500 hp. The control technologies found in the RBLC search were considered for the purpose of this analysis.

Table 1-2. Potentially Available NOx Control Technologies for Large Emergency Generators

Potentially Applicable NOx Control Technology
Selective Catalytic Reduction (SCR)
Good Combustion Practices

The following section provides a discussion of each potentially available technology identified above as it might be applied to the emergency generators at the facility.

1.2.1.1 Selective Catalytic Reduction (SCR)

SCR is an exhaust gas treatment process in which NH_3 is injected into the exhaust gas upstream of a catalyst bed. On the catalyst surface, NH_3, NO, and NO_2 react to form water and N_2. The presence of the catalyst promotes this reaction at a much lower temperature than that required for SNCR.[3] The primary chemical reactions can be expressed as follows:

$$4\,NH_3 + 4NO + O_2 \rightarrow 4N_2 + 6H_2O$$
$$4\,NH_3 + 4NO_2 + 2O_2 \rightarrow 3N_2 + 6H_2O$$

1.2.1.2 Good Combustion Practices

Good combustion practices include minimizing losses to atmosphere and allowing the equipment to operate as efficiently as possible. These practices include operating the emergency generators at proper conditions and following work practice standards, and hourly restrictions based on emergency classification.

1.2.2 Step 2: Eliminate Technically Infeasible Options for NOx Control

Step 2 in the top-down analysis is to eliminate the control options identified in Step 1 which are technically infeasible. The remaining technologies are then carried to Step 3. All the control options discussed in Step 2 that are considered technically feasible will be evaluated in Step 3 of this analysis.

1.2.2.1 SCR Technical Feasibility

When operated within the optimum temperature range of 480 to 800°F, an SCR can achieve removal efficiencies between 70 and 90 percent. Operation outside the optimum temperature range can result in increased ammonia slip or increased NO_x emissions. The emergency generators at the Crane facility can operate in a temperature range in which SCR operates. However, there may be some technical challenges in retrofitting SCR on the emergency engines at the Crane facility given the units' age and operation typically only during short periods of time for testing, maintenance and emergency. While this BAT analysis conservatively considers this technology to be technically feasible, Constellation may update this analysis if it is determined that retrofitting these engines is not technically feasible.

[3] *Emission Control Technology for Stationary Internal Combustion Engines*, Manufacturers of Emission Controls Association, May 2015, https://www.meca.org/wp-content/uploads/resources/MECA_stationary_IC_engine_report_0515_final.pdf?utm.

1.2.2.2 Good Combustion Practices Feasibility

This is an inherent method of lowering emissions from internal combustion engines and, therefore, will be technically feasible for these units.

1.2.3 Step 3: Rank Remaining Control Technologies by Control Effectiveness

The remaining control technologies are presented in Table 1-3 in order of control effectiveness.

Table 1-3. Emergency Generator NO_X Control Technologies Ranking

Rank	Potentially Applicable PM Control Technology	Potential Control Efficiency (%)
1	SCR	90%[4]
2	Good Combustion Practices	N/a

1.2.4 Step 4: Evaluate Most Effective Controls and Document Results

The most efficient, control technology is SCR. A cost calculation was completed for SCR to determine if it is economically feasible. The cost calculations utilized a simplified formula found in Section E.2 Status Report on NO_X Controls: Technologies & Cost Effectiveness (December 2000 NESCAUM).[5] Detailed calculations are provided in Attachment F. This cost control methodology is consistent with the evaluation approved by the Department for Constellation's Limerick Facility RACT III analysis. The cost calculation estimate set the cost effectiveness for this project over $14,000 per ton of NO_X removed, not including retrofit costs or considerations of these engines as emergency generators. Therefore, SCR is not considered economically feasible.

1.2.5 Step 5: Select BAT

Constellation will operate the large engines as emergency generators as defined in 40 CFR 63 Subpart ZZZZ and will use good combustion practices as BAT.

1.3 BAT for CO – Large Emergency Generators: >4,000 HP

1.3.1 Step 1: Identify All Control Technologies for CO

Step 1 in a top-down analysis is to identify all available control technologies. Table 1-4 contains a list of the various technologies that have been identified for the control of CO emissions from internal combustion engines greater than 4,000 hp. The control technologies found in the RBLC search were considered for the purpose of this analysis.

[4] https://www.nescaum.org/documents/nox-2000.pdf.

[5] *Equations for Capital Cost and O&M found in Status Report on NOx Controls: Technologies & Cost Effectiveness*, NESCAUM, December 2000, https://www.nescaum.org/documents/nox-2000.pdf.

Table 1-4. Potentially Available CO Control Technologies for Emergency Generators

Potentially Applicable Control Technology
Oxidation Catalyst
Good Combustion Practices

The following section provides a discussion of each potentially available technology identified above as it might be applied to the new emergency generators at the facility.

1.3.1.1 Oxidation Catalyst

Oxidation catalysts for diesel fuel-fired engines allow the flow of exhaust through a housing made up of small channels coated in precious metal catalysts. The exhaust goes does these channels letting hydrocarbons and CO react with oxygen to form CO_2 and water vapor reducing emissions of CO to the atmosphere. These resulting gases then exit the housing of channels and go through the remaining parts of the exhaust system.[6]

1.3.1.2 Good Combustion Practices

Good combustion practices include minimizing losses to atmosphere and allowing the equipment to operate as efficiently as possible. These practices include operating the emergency generators at proper conditions and following work practice standards, and hourly restrictions based on emergency classification.

1.3.2 Step 2: Eliminate Technically Infeasible Options for CO Control

Step 2 in the top-down analysis is to eliminate the control options identified in Step 1 which are technically infeasible. The remaining technologies are then carried to Step 3. All the control options discussed in Step 2 that are considered technically feasible will be evaluated in Step 3 of this analysis.

1.3.2.1 Oxidation Catalyst Feasibility

Oxidation catalysts are widely used on large internal combustion engines, since they are effective at reducing emissions. This control equipment can reduce CO emissions by approximately 70-99%. Therefore, an oxidation catalyst is considered to be technically feasible for the large emergency generator at the facility. However, there may be some technical challenges in retrofitting oxidation catalysts on the emergency engines at the Crane facility given the units' age and operation typically only during short periods of time for testing, maintenance and emergency. While this BAT analysis conservatively considers this technology to be technically feasible, Constellation may update this analysis if it is determined that retrofitting these engines is not technically feasible.

1.3.2.2 Good Combustion Practices

As stated above, good combustion practices include minimizing losses to the atmosphere. The practices include operating the generators at proper conditions and following work practices standards.

[6] *Emission Control Technology for Stationary Internal Combustion Engines*, Manufacturers of Emission Controls Association, May 2015, https://www.meca.org/wp-content/uploads/resources/MECA_stationary_IC_engine_report_0515_final.pdf?utm.

1.3.3 Step 3: Rank Remaining Control Technologies by Control Effectiveness

The remaining control technologies are presented in Table 1-5 in order of control effectiveness.

Table 1-5. Emergency Generator CO Technologies Ranking

Rank	Potentially Applicable PM Control Technology	Potential Control Efficiency (%)
1	Oxidation Catalyst	95%
2	Good Combustion Practices	N/a

1.3.4 Step 4: Evaluate Most Effective Controls and Document Results

The most efficient, control technology is oxidation catalyst. This control technology was reviewed for cost effectiveness using the methods provided in both EPA's Cost Control Manual 6th edition and a 2010 memo to the EPA summarizing the cost of controls for stationary compression ignition ICEs.[7] Detailed calculations are provided in Attachment F. This cost control methodology is consistent with the evaluation approved by the Department for Constellation's Limerick Facility RACT III analysis. The cost calculation estimate set the cost effectiveness for installing oxidation catalysts on these engines at over $16,000 per ton of CO removed, not including retrofit costs or considerations of these engines as emergency generators. Based on the cost per ton removed, oxidation catalyst is not considered economically feasible.

1.3.5 Step 5: Select BAT

Constellation will operate the large engines as emergency generators as defined in 40 CFR 63 Subpart ZZZZ and will use good combustion practices as BAT.

1.4 BAT for PM, SO_2, VOC and HAP – Emergency Generators 4,000 HP

Emissions of PM, SO_2, VOC and HAP from the large emergency generators are less than 1 ton/yr. The engines will utilize only ultra low sulfur diesel fuel to reduce SO_2 emissions. Constellation will operate the large engines as emergency generators as defined in 40 CFR 63 Subpart ZZZZ and will use good combustion practices as BAT.

1.5 BAT for NO_X – Auxiliary Boilers

The BAT for the auxiliary boilers is limited operation due to low usage of the units. In order to provide a complete response to the Department's request for a BAT evaluation, Constellation is providing a top-down BAT analysis for NOx emissions from these units.

1.5.1 Step 1 – Identify All Control Technologies for NO_X

Step 1 in a top-down analysis is to identify all available control technologies. The evaluation of potential controls for NO_X emissions from the boiler units involves an investigation of end-of-pipe (post-combustion) and combustion modifications/optimization that reduce the formation of fuel NO_X.

[7] *Capital Cost and O&M Cost Equations found in EPA memo: Control Costs for Existing Stationary CI RICE*, ER/C, Inc., January 2010). https://www.epa.gov/sites/default/files/2014-02/documents/5_2011_ctrlcost_memo_exist_ci.pdf

The RBLC database was reviewed to identify potential add-on control technologies for industrial boilers. Results of the RBLC search for #2 Fuel oil-fired boilers with a heat input greater than 100 MMBtu/hr (Process Type 12.220) are provided in Attachment F. It should be noted that the RBLC search results presented include BAT determinations as well as any BACT, RACT and LAER determinations, which may be more stringent than BAT. Table 1-6 contains a list of the various technologies that have been identified for control of NO_X emissions for boiler units from either the RBLC search or known as standard NOx controls for combustion units.

Table 1-6 Potentially Available NO_X Control Technologies for Boilers

Potentially Applicable Control Technology
Selective Catalytic Reduction (SCR)
Selective Non-Catalytic Reduction (SNCR)
Low NO_X Burners (LNBs)
Good Combustion Practices

1.5.1.1 Selective Catalytic Reduction (SCR)

SCR is a post-combustion gas treatment process in which NH_3 is injected into the exhaust gas upstream of a catalyst bed. On the catalyst surface, ammonia and NO_X react to form elemental nitrogen and water. The primary chemical reactions can be expressed as follows:

$$4\,NH_3 + 4NO + O_2 \rightarrow 4N_2 + 6H_2O$$
$$4\,NH_3 + 4NO_2 + 2O_2 \rightarrow 3N_2 + 6H_2O$$

When operated within the optimum temperature range of 480 to 800°F, the reaction can result in removal efficiencies between 70 and 90 percent.[8] Operation outside the optimum temperature range can result in increased ammonia slips or increased NO_X emissions.

SCR units have the ability to function effectively under fluctuating temperature conditions (usually ±50°F), although fluctuation in exhaust gas temperature reduces removal efficiency slightly by disturbing the kinetics (speed) of the NO_X removal reaction.

1.5.1.2 Selective Non-Catalytic Reduction (SNCR)

SNCR is a post-combustion NO_X control technology based on the reaction of urea or ammonia with NO_X. In the SNCR chemical reaction, urea [$CO(NH_2)_2$] or ammonia (NH_3) is injected into the combustion gas path to reduce the NO_X to nitrogen and water. The overall reaction schemes for both urea and ammonia systems can be expressed as follows:

$$CO(NH_2)_2 + 2NO + \frac{1}{2}\,O_2 \rightarrow 2N_2 + CO_2 + 2H_2O$$
$$4\,NH_3 + 6NO_2 \rightarrow 5N_2 + 6H_2O$$

Typical removal efficiencies for SNCR range from 25 to 65 percent. An important consideration for implementing SNCR is the operating temperature range. The optimum temperature range is

[8] U.S. EPA, Office of Air Quality Planning and Standards. *OAQPS Control Cost Manual Section 4 Chapter 2, 7th edition*. Research Triangle Park, NC. May 2016.

approximately 1,550 to 1,950°F.[9] Operation at temperatures below this range results in ammonia slip. Operation above this range results in oxidation of ammonia, forming additional NO_X.

1.5.1.3 Low NO_X Burners (LNBs)

The principle of all LNBs is the same: stepwise or staged combustion and localized exhaust gas recirculation at the flame. LNBs are designed to control fuel and air mixing to create larger and more branched flames. Peak flame temperatures are reduced, resulting in less NO_X formation. LNBs eliminate the need for steam or water injection, which was formerly the traditional method of NO_X control. In addition to traditional LNB, regenerative burners are low NO_X design but also utilize a pair of burners which cycle to alternately heat the combustion air or recover and store the heat from the furnace exhaust gases to improve burner efficiency.

1.5.1.4 Good Combustion Practices

The formation of NO_X is minimized by proper furnace design and operation. Generally, emissions are minimized when the furnace temperature is kept at the lower end of the desired range and when the distribution of air at the air and fuel injection zones is controlled. Ideally, maintaining a low-oxygen condition near fuel injection points approaches an off-stoichiometric staged combustion process.

A certain amount of air is required to provide sufficient oxygen to burn all of the fuel. However, any excess air contributes to increased NO_X emissions in two ways: 1) Excess air effectively increases the amount of air that must be heated, resulting in decreased fuel efficiency and higher NO_X emissions, and 2) Excess air provides greater amounts of oxygen in the combustion zone that will lead to greater amounts of thermal NO_X formation. By minimizing the amount of air used in the combustion process while maintaining proper furnace operation, the formation of NO_X can be reduced.

1.5.2 Step 2 – Eliminate Technically Infeasible Options for NO_x Control

Step 2 in a BAT top-down analysis is to eliminate the control options identified in Step 1 which are technically infeasible. The remaining technologies are then carried into Step 3.

1.5.2.1 Selective Catalytic Reduction (SCR)

The SCR process is temperature sensitive. Any exhaust gas temperature fluctuations reduce removal efficiency and upsets the NH_3/NO_X molar ratio. SCR also requires an optimum temperature range of 480 to 800°F and fairly constant temperatures, or NO_X removal efficiency will decrease. Below this temperature range, the reaction rate drops sharply, and effective reduction of NO_X is no longer feasible. Above this temperature, conventional reduction catalysts break down and are unable to perform their desired functions. As the boilers will be operating in this range, SCR is technically feasible for these units.

1.5.2.2 Selective Non-Catalytic Reduction (SNCR)

SNCR requires a high but very specific temperature range (generally between 1,550 °F and 1,950 °F) and sufficient residence time at this temperature to be effective. The average operating temperature for the three boiler units at the Crane facility is below the 1,550°F SCNR threshold operating temperature. Therefore, SNCR is deemed infeasible for these boiler units and will not be discussed further in this section.

[9] U.S. EPA, Office of Air Quality Planning and Standards. *OAQPS Control Cost Manual Section 4 Chapter 1*, 7th edition. Research Triangle Park, NC. May 2016.

1.5.2.3 Low NO_X Burner (LNB)

The principle of all LNBs is the same: stepwise or staged combustion and localized exhaust gas recirculation at the flame. LNBs are designed to control fuel and air mixing to create larger and more branched flames. Peak flame temperatures are reduced, resulting in less NOx formation. Retrofitting a boiler with LNBs can be costly. While this option is technically feasible, a cost calculation will be provided in the next section.

1.5.2.4 Good Combustion Practices

Good combustion practices include minimizing losses to the atmosphere. The practices include operating the boiler and water heater at proper conditions and following work practices standards.

1.5.3 Step 3 – Rank Remaining Control Technologies by Control Effectiveness

In step 3, the remaining control technology options are ranked based on their control effectiveness, from highest to lowest control efficiency. There are three (3) control technologies that are considered technically feasible: SCR, LNBs, and good combustion practices.

Table 1-7. Ranked NO_X Controls for Boilers

Option No.	Control Technology	Control Efficiency (%)
1	Selective Catalytic Reduction	70-90%
2	Low NO_x Burners	~40%
3	Good Combustion Practices	-

1.5.4 Step 4 – Evaluate Most Cost Effective Controls and Document Results

The remaining control technologies which are technically feasible for this facility are SCR, low NOx burners and good combustion practices.

A cost calculation was completed on SCR to determine if it is economically feasible. These calculations can be seen in Attachment F. Given the limited hours of operation of the Auxiliary Boilers, the cost calculation estimate set the cost effectiveness for this project at $236,000 per ton of NO_X removed. Therefore, SCR is not considered economically feasible as BACT.

Low NO_x burners were also considered technically feasible for this facility. The cost calculations utilized a publicly available vendor quote for similar boilers. Detailed calculations are provided in Attachment F. This cost control methodology is consistent with the evaluation approved by the Department for Constellation's Limerick Facility RACT III analysis. The cost calculation estimate set the cost effectiveness for this project over $370,000 per ton of NO_X removed, not including retrofit costs. Therefore, LNBs are also economically infeasible for these boiler units.

1.5.5 Step 5 – Select BAT

Constellation found that both control technologies analyzed in the previous sections are economically infeasible for this facility and are removed from consideration. From the analysis, the remaining control technology for these units will be good combustion practices, which are already utilized at the Crane facility. Constellation will continue to adhere to these operational standards.

1.6 BAT for All Remaining Pollutants – Auxiliary Boilers >100 MMBtu/hr

The Crane facility reviewed the potential control devices for all remaining pollutants emitted from the boilers. Emissions of CO, PM, SO_2, VOC and HAP from the auxiliary boilers are less than 1 ton/yr. The RBLC search results provided in Attachment F demonstrates that no other control devices have been deemed both technically and economically feasible for large boilers with ratings greater than 100 MMBtu/hr. As such, Constellation is proposing to implement both the use of low sulfur fuels and good combustion practices on these units to these operational standards.

1.7 BAT for All Pollutants – Emergency Generators: <800 HP

The Crane facility operates five (5) smaller internal combustion engines, including 3 oil-fired emergency generators and 2 diesel fire pumps, ranging from 214 to 755 HP. These units are smaller engines than those evaluated above and, therefore, have lower potential emissions (less than 2 tons per year). As the BAT analyses for the larger ICEs deemed additional control technologies to be economically infeasible, these smaller units are also considered economically infeasible due to the decreased amount of emissions that the controls could mitigate. Constellation is proposing the use of low sulfur fuels and good combustion practices as BAT for the smaller emergency generators and fire pumps.

Attachment B: Updated Potential to Emit Calculations

Facility Potential to Emit

Crane Clean Energy Center Total Facility PTE

Source	NOx (tpy)	VOC (tpy)	CO (tpy)	PM (tpy)	SOx (tpy)	HAPs (tpy)
Auxiliary Boiler A	1.36	0.01	0.28	0.11	0.01	0.00
Auxiliary Boiler B	1.36	0.01	0.28	0.11	0.01	0.00
Y1A	12.18	0.34	3.24	0.38	0.01	0.01
Y1B	12.18	0.34	3.24	0.38	0.01	0.01
Y2	0.84	0.07	0.18	0.06	0.06	0.00
Y4	11.70	0.33	3.11	0.37	0.01	0.01
FSP1	1.48	0.12	0.32	0.10	0.10	0.00
FSP3	1.48	0.12	0.32	0.10	0.10	0.00
FX1A	0.87	0.12	0.54	0.03	0.00	0.00
FX1B	0.87	0.12	0.54	0.03	0.00	0.00
Cooling Towers (2x)	0.00	0.00	0.00	15.09	0.00	0.00
Propane Generator	0.01	0.00	0.00	0.00	0.00	0.00
Total	**44.33**	**1.59**	**12.05**	**16.77**	**0.29**	**0.03**

Potential to Emit

Crane Clean Energy Center Emission Inventory

Source Limits[1]

Sources	Hours of Operation	Fuel Usage (gal/yr)
Auxiliary Boiler A	100	113,514
Auxiliary Boiler B	100	113,514
Y1A	250	55,170
Y1B	250	55,170
Y2	250	2,750
Y4	250	53,000
FSP1	250	4,853
FSP3	250	4,853

Sources	Hours of Operation	Rating (kW)
FX1A	250	563
FX1B	250	563

1. PTE based on Total permitted usage

Potential to Emit by Source

Sources	VOC Emissions	
	lb/year	ton/year [3]
Auxiliary Boiler A	22.70	0.01
Auxiliary Boiler B	22.70	0.01
Y1A	685.22	0.34
Y1B	685.22	0.34
Y2	132.83	0.07
Y4	658.26	0.33
FSP1	234.40	0.12
FSP3	234.40	0.12
FX1A	248.24	0.12
FX1B	248.24	0.12
Total	3,172.20	1.59

1. Y1B, Y2, and FSP3 VOC Emissions (lb/year) = Hours of Operation (hr) * Capacity (hp) * Emission Factor (lb/hp-hr)
2. FX1A and FX1B VOC Emissions (lb/year) = Hours of Operation (hr/year) * Unit Rating (kW) * Emission Factor (g/kW-hr) * (lb/g)
3. 1 ton = 2,000 lb

Short Term Potential to Emit by Source

Sources	VOC Emissions	
	lb/hr[1]	lb/day[2]
Auxiliary Boiler A	0.23	5.45
Auxiliary Boiler B	0.23	5.45
Y1A	2.74	65.78
Y1B	2.74	65.78
Y2	0.53	12.75
Y4	2.63	63.19
FSP1	0.94	22.50
FSP3	0.94	22.50
FX1A	0.99	23.83
FX1B	0.99	23.83
Total	12.96	311.07

1. VOC Emissions (lb/hr) = VOC Emissions (lb/yr) / Hours of Operation (hr/year)
2. VOC Emissions (lb/day) = VOC Emissions (lb/hr) * 24 hr/day

Potential to Emit

Crane Clean Energy Center Emission Inventory

Source Limits[1]

Sources	Hours of Operation	Fuel Usage (gal/yr)
Auxiliary Boiler A	100	113,514
Auxiliary Boiler B	100	113,514
Y1A	250	55,170
Y1B	250	55,170
Y2	250	2,750
Y4	250	53,000
FSP1	250	4,853
FSP3	250	4,853

Sources	Hours of Operation	Rating (kW)
FX1A	250	563
FX1B	250	563

1. PTE based on Total permitted usage

Potential to Emit by Source

Sources	NOx Emissions	
	lb/year	ton/year [3]
Auxiliary Boiler A	2,724.35	1.36
Auxiliary Boiler B	2,724.35	1.36
Y1A	24,363.25	12.18
Y1B [1]	24,363.25	12.18
Y2 [1]	1,673.60	0.84
Y4	23,404.80	11.70
FSP1	2,953.41	1.48
FSP3 [1]	2,953.41	1.48
FX1A [2]	1,737.68	0.87
FX1B [2]	1,737.68	0.87
Total	88,635.77	44.32

1. Y1B, Y2, and FSP3 NOx Emissions (lb/year) = Hours of Operation (hr/year) * Capacity (hp) * Emission Factor (lb/hp-hr)
2. FX1A and FX1B NOx Emissions (lb/year) = Hours of Operation (hr/year) * Unit Rating (kW) * Emission Factor (g/kW-hr) * (lb/g)
3. 1 ton = 2,000 lb

Short Term Potential to Emit by Source

Sources	NOx Emissions	
	lb/hr[1]	lb/day[2]
Auxiliary Boiler A	27.24	653.84
Auxiliary Boiler B	27.24	653.84
Y1A	97.45	2,338.87
Y1B	97.45	2,338.87
Y2	6.69	160.67
Y4	93.62	2,246.86
FSP1	11.81	283.53
FSP3	11.81	283.53
FX1A	6.95	166.82
FX1B	6.95	166.82
Total	387.24	9,293.65

1. NOx Emissions (lb/hr) = NOx Emissions (lb/yr) / Hours of Operation (hr/year)
2. NOx Emissions (lb/day) = NOx Emissions (lb/hr) * 24 hr/day

Potential to Emit

Crane Clean Energy Center Emission Inventory

Source Limits[1]

Sources	Hours of Operation	Fuel Usage (gal/yr)
Auxiliary Boiler A	100	113,514
Auxiliary Boiler B	100	113,514
Y1A	250	55,170
Y1B	250	55,170
Y2	250	2,750
Y4	250	53,000
FSP1	250	4,853
FSP3	250	4,853

Sources	Hours of Operation	Rating (kW)
FX1A	250	563
FX1B	250	563

1. PTE based on Total permitted usage

Potential to Emit by Source

Sources	CO Emissions	
	lb/year	ton/year [3]
Auxiliary Boiler A	567.57	0.28
Auxiliary Boiler B	567.57	0.28
Y1A	6,471.49	3.24
Y1B [1]	6,471.49	3.24
Y2 [1]	360.53	0.18
Y4	6,216.90	3.11
FSP1	636.22	0.32
FSP3 [1]	636.22	0.32
FX1A [2]	1,086.05	0.54
FX1B [2]	1,086.05	0.54
Total	24,100.09	12.05

1. Y1B, Y2, and FSP3 CO Emissions (lb/year) = Hours of Operation (hr) * Capacity (hp) * Emission Factor (lb/hp-hr)
2. FX1A and FX1B CO Emissions (lb/year) = Hours of Operation (hr/year) * Unit Rating (kW) * Emission Factor (g/kW-hr) * (lb/g)
3. 1 ton = 2,000 lb

Short Term Potential to Emit by Source

Sources	CO Emissions	
	lb/hr[1]	lb/day[2]
Auxiliary Boiler A	5.68	136.22
Auxiliary Boiler B	5.68	136.22
Y1A	25.89	621.26
Y1B	25.89	621.26
Y2	1.44	34.61
Y4	24.87	596.82
FSP1	2.54	61.08
FSP3	2.54	61.08
FX1A	4.34	104.26
FX1B	4.34	104.26
Total	103.21	2,477.07

1. CO Emissions (lb/hr) = CO Emissions (lb/yr) / Hours of Operation (hr/year)
2. CO Emissions (lb/day) = CO Emissions (lb/hr) * 24 hr/day

Potential to Emit

Crane Clean Energy Center Emission Inventory

Source Limits[1]

Sources	Hours of Operation	Fuel Usage (gal/yr)
Auxiliary Boiler A	100	113,514
Auxiliary Boiler B	100	113,514
Y1A	250	55,170
Y1B	250	55,170
Y2	250	2,750
Y4	250	53,000
FSP1	250	4,853
FSP3	250	4,853

Sources	Hours of Operation	Fuel Usage (gal/yr)
FX1A	250	563
FX1B	250	563

1. PTE based on Total permitted usage

Potential to Emit by Source

Sources	PM Emissions	
	lb/year	ton/year [3]
Auxiliary Boiler A	227.03	0.11
Auxiliary Boiler B	227.03	0.11
Y1A	761.35	0.38
Y1B [1]	761.35	0.38
Y2 [1]	117.65	0.06
Y4	731.40	0.37
FSP1	207.61	0.10
FSP3 [1]	207.61	0.10
FX1A [2]	62.06	0.03
FX1B [2]	62.06	0.03
Total	3,365.14	1.68

1. Y1B, Y2, and FSP3 PM Emissions (lb/year) = Hours of Operation (hr) * Capacity (hp) * Emission Factor (lb/hp-hr)
2. FX1A and FX1B PM Emissions (lb/year) = Hours of Operation (hr/year) * Unit Rating (kW) * Emission Factor (g/kW-hr) * (lb/g)
3. 1 ton = 2,000 lb

Short Term Potential to Emit by Source

Sources	PM Emissions	
	lb/hr[1]	lb/day[2]
Auxiliary Boiler A	2.27	54.49
Auxiliary Boiler B	2.27	54.49
Y1A	3.05	73.09
Y1B	3.05	73.09
Y2	0.47	11.29
Y4	2.93	70.21
FSP1	0.83	19.93
FSP3	0.83	19.93
FX1A	0.25	5.96
FX1B	0.25	5.96
Total	16.18	388.44

1. PM Emissions (lb/hr) = PM Emissions (lb/yr) / Hours of Operation (hr/year)
2. PM Emissions (lb/day) = PM Emissions (lb/hr) * 24 hr/day

Potential to Emit

Crane Clean Energy Center Emission Inventory

Source Limits[1]

Sources	Hours of Operation	Fuel Usage (gal/year)
Auxiliary Boiler A	100	113,514
Auxiliary Boiler B	100	113,514
Y1A	250	55,170
Y1B	250	55,170
Y2	250	2,750
Y4	250	53,000
FSP1	250	4,853
FSP3	250	4,853

Sources	Hours of Operation	Rating (kW)
FX1A	250	563
FX1B	250	563

1. PTE based on Total permitted usage

Potential to Emit by Source

Sources	SOx Emissions	
	lb/year	ton/year [3]
Auxiliary Boiler A	24.18	0.01
Auxiliary Boiler B	24.18	0.01
Y1A	11.53	0.01
Y1B [1]	11.53	0.01
Y2 [1]	110.06	0.06
Y4	11.08	0.01
FSP1	194.22	0.10
FSP3 [1]	194.22	0.10
FX1A [2]	2.29	0.00
FX1B [2]	2.29	0.00
Total	585.57	0.29

1. Y1B, Y2, and FSP3 SOx Emissions (lb/year) = Hours of Operation (hr) * Capacity (hp) * Emission Factor (lb/hp-hr)
2. FX1A and FX1B SOx Emissions (lb/year) = Hours of Operation (hr/year) * Unit Rating (kW) * Emission Factor (g/kW-hr) * (lb/g)
3. 1 ton = 2,000 lb

Short Term Potential to Emit by Source

Sources	SOx Emissions	
	lb/hr[1]	lb/day[2]
Auxiliary Boiler A	0.24	5.80
Auxiliary Boiler B	0.24	5.80
Y1A	0.05	1.11
Y1B	0.05	1.11
Y2	0.44	10.57
Y4	0.04	1.06
FSP1	0.78	18.64
FSP3	0.78	18.64
FX1A	0.01	0.22
FX1B	0.01	0.22
Total	2.63	63.18

1. SOx Emissions (lb/hr) = SOx Emissions (lb/yr) / Hours of Operation (hr/year)
2. SOx Emissions (lb/day) = SOx Emissions (lb/hr) * 24 hr/day

Potential to Emit

Crane Clean Energy Center Emission Inventory

Source Limits[1]

Sources	Hours of Operation	Fuel Usage (gal/yr)
Auxiliary Boiler A	100	113,514
Auxiliary Boiler B	100	113,514
Y1A	250	55,170
Y1B	250	55,170
Y2	250	2,750
Y4	250	53,000
FSP1	250	4,853
FSP3	250	4,853
FX1A	250	8,750
FX1B	250	8,750

1. PTE based on Total permitted usage

HAP Emissions (lb/yr)

	Benzene	Ethylbenzene	Formaldehyde	Naphthalene	1,1,1-Trichloroethane	Toluene	Xylene	Acetaldehyde	1,3-Butadiene	Acrolein	PAH[1]
Auxiliary Boiler A	0.0243	0.0072	3.7460	0.1283	0.0268	0.7038	0.0124	0.0000	0.0000	0.0000	0.0007
Auxiliary Boiler B	0.0243	0.0072	3.7460	0.1283	0.0268	0.7038	0.0124	0.0000	0.0000	0.0000	0.0007
Y1A	5.9081	0.0000	0.6007	0.9898	0.0000	2.1394	1.4694	0.1919	0.0000	0.0600	0.0000
Y1B	5.9081	0.0000	0.6007	0.9898	0.0000	2.1394	1.4694	0.1919	0.0000	0.0600	0.0000
Y2	0.3541	0.0000	0.4478	0.0322	0.0000	0.1552	0.1082	0.2911	0.0148	0.0351	0.0000
Y4	5.6757	0.0000	0.5771	0.9508	0.0000	2.0552	1.4116	0.1843	0.0000	0.0576	0.0000
FSP1	0.6248	0.0000	0.7903	0.0568	0.0000	0.2739	0.1909	0.5137	0.0262	0.0619	0.0000
FSP3	0.6248	0.0000	0.7903	0.0568	0.0000	0.2739	0.1909	0.5137	0.0262	0.0619	0.0000
FX1A	1.1266	0.0000	1.4249	0.1024	0.0000	0.4939	0.3441	0.9262	0.0472	0.1117	0.0000
FX1B	1.1266	0.0000	1.4249	0.1024	0.0000	0.4939	0.3441	0.9262	0.0472	0.1117	0.0000

1. PAH Emission rates used in this calculation are the total emission rates for all PAHs produced during the specific type of combustion. This value is provided in AP-42, Chapters 3.3 and 3.4 for ICEs. This value was calculated for the relevant PAHs listed in Table 1.3-9 in AP-42 Chapter 1.3 for the Auxiliary Boilers.

HAP Emissions (tons/year)

	Benzene	Ethylbenzene	Formaldehyde	Naphthalene	1,1,1-Trichloroethane	Toluene	Xylene	Acetaldehyde	1,3-Butadiene	Acrolein	PAH[1]	Source Total
Auxiliary Boiler A	0.0000	0.0000	0.0019	0.0001	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0023
Auxiliary Boiler B	0.0000	0.0000	0.0019	0.0001	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0023
Y1A	0.0030	0.0000	0.0003	0.0005	0.0000	0.0011	0.0007	0.0001	0.0000	0.0000	0.0000	0.0057
Y1B	0.0030	0.0000	0.0003	0.0005	0.0000	0.0011	0.0007	0.0001	0.0000	0.0000	0.0000	0.0057
Y2	0.0002	0.0000	0.0002	0.0000	0.0000	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0007
Y4	0.0028	0.0000	0.0003	0.0005	0.0000	0.0010	0.0007	0.0001	0.0000	0.0000	0.0000	0.0055
FSP1	0.0003	0.0000	0.0004	0.0000	0.0000	0.0001	0.0001	0.0003	0.0000	0.0000	0.0000	0.0013
FSP3	0.0003	0.0000	0.0004	0.0000	0.0000	0.0001	0.0001	0.0003	0.0000	0.0000	0.0000	0.0013
FX1A	0.0006	0.0000	0.0007	0.0001	0.0000	0.0002	0.0002	0.0005	0.0000	0.0001	0.0000	0.0023
FX1B	0.0006	0.0000	0.0007	0.0001	0.0000	0.0002	0.0002	0.0005	0.0000	0.0001	0.0000	0.0023
Individual Totals	0.0107	0.0000	0.0071	0.0018	0.0000	0.0047	0.0028	0.0019	0.0001	0.0003	0.0000	0.0293

1. PAH Emission rates used in this calculation are the total emission rates for all PAHs produced during the specific type of combustion. This value is provided in AP-42, Chapters 3.3 and 3.4 for ICEs. This value was calculated for the relevant PAHs listed in Table 1.3-9 in AP-42 Chapter 1.3 for the Auxiliary Boilers.

Potential to Emit

Crane Clean Energy Center Emission Inventory

Source Limits[1]

Cooling Towers

	Specification Value	Unit
Number of units	2	--
Design Flow	215000	Gal/min
Drift Rate	0.0010%	%
Total Dissolved Solids	1,600	ppm (mg/L)
Total operational hours	8,760	hours

1. PTE based on Total permitted usage

Potential to Emit for Each Cooling Towers

Pollutants	Emission	
	lb/hr	tpy
PM[1]	1.72	7.544

1. PM Emissions (lb/hr) = Throughput (Gal/min) * Drift Rate * TSS (ppm) / 1,000,000 *60 min/hr * 8.345 lb/gal

Criteria Pollutant Emission Factors by Source

Crane Clean Energy Center Emission Inventory

Source	NOx Emission Factor		Source
Auxiliary Boiler A	24	lb/th.gal	AP-42 Table 1.3-1
Auxiliary Boiler A	24	lb/th.gal	AP-42 Table 1.3-1
Y1A	3.2	lb/MMBtu	AP-42 Table 3.4-1
Y1B	3.2	lb/MMBtu	AP-42 Table 3.4-1
Y2	4.41	lb/MMBtu	AP-42 Table 3.3-1
Y4	3.2	lb/MMBtu	AP-42 Table 3.4-1
FSP1	4.41	lb/MMBtu	AP-42 Table 3.3-1
FSP3	4.41	lb/MMBtu	AP-42 Table 3.3-1
FX1A	5.6	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)
FX1B	5.6	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)

Source	VOC Emission Factor		Source
Auxiliary Boiler A[1]	0.2	lb/th.gal	AP-42 Table 1.3-3
Auxiliary Boiler A[1]	0.2	lb/th.gal	AP-42 Table 1.3-3
Y1A	0.09	lb/MMBtu	AP-42 Table 3.4-1
Y1B	0.09	lb/MMBtu	AP-42 Table 3.4-1
Y2	0.35	lb/MMBtu	AP-42 Table 3.3-1
Y4	0.09	lb/MMBtu	AP-42 Table 3.4-1
FSP1	0.35	lb/MMBtu	AP-42 Table 3.3-1
FSP3	0.35	lb/MMBtu	AP-42 Table 3.3-1
FX1A	0.8	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)
FX1B	0.8	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)

1. VOC emission factors for the auxiliary boilers uses the NMTOC value or Non-Methane Total Organic Compounds.
2. VOC emissions for other combustion sources are the TOC emissions factors provided by AP-42.

Source	CO Emission Factor		Source
Auxiliary Boiler A	5	lb/th.gal	AP-42 Table 1.3-3
Auxiliary Boiler A	5	lb/th.gal	AP-42 Table 1.3-3
Y1A	0.85	lb/MMBtu	AP-42 Table 3.4-1
Y1B	0.85	lb/MMBtu	AP-42 Table 3.4-1
Y2	0.95	lb/MMBtu	AP-42 Table 3.3-1
Y4	0.85	lb/MMBtu	AP-42 Table 3.4-1
FSP1	0.95	lb/MMBtu	AP-42 Table 3.3-1
FSP3	0.95	lb/MMBtu	AP-42 Table 3.3-1
FX1A	3.5	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)
FX1B	3.5	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)

Source	PM Emission Factor		Source
Auxiliary Boiler A	2	lb/th.gal	AP-42 Table 1.3-1
Auxiliary Boiler A	2	lb/th.gal	AP-42 Table 1.3-1
Y1A	0.1	lb/MMBtu	AP-42 Table 3.4-1
Y1B	0.1	lb/MMBtu	AP-42 Table 3.4-1
Y2[1]	0.31	lb/MMBtu	AP-42 Table 3.3-1, PM10
Y4[1]	0.1	lb/MMBtu	AP-42 Table 3.4-1
FSP1[1]	0.31	lb/MMBtu	AP-42 Table 3.3-1, PM10
FSP3[1]	0.31	lb/MMBtu	AP-42 Table 3.3-1, PM10
FX1A[1]	0.2	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)
FX1B[1]	0.2	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)

1. PM emission factors for Diesel Industrial Engines from AP-42 Chapter 3.3 use PM10 in order to estimate total PM emissions.

Source	SOx Emission Factor		Source
Auxiliary Boiler A	0.213	lb/th.gal	AP-42 Table 1.3-1, 142S where S equals sulfur content in fuel or 0.5%
Auxiliary Boiler A	0.213	lb/th.gal	AP-42 Table 1.3-1, 142S where S equals sulfur content in fuel or 0.5%
Y1A	0.001515	lb/MMBtu	AP-42 Table 3.4-1, 1.01S where S equals sulfur content in fuel or 1.5%
Y1B	0.001515	lb/MMBtu	AP-42 Table 3.4-1, 1.01S where S equals sulfur content in fuel or 1.5%
Y2	0.29	lb/MMBtu	AP-42 Table 3.3-1
Y4	0.001515	lb/MMBtu	AP-42 Table 3.4-1, 1.01S where S equals sulfur content in fuel or 1.5%
FSP1	0.29	lb/MMBtu	AP-42 Table 3.3-1
FSP3	0.29	lb/MMBtu	AP-42 Table 3.3-1
FX1A	7.38E-03	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)
FX1B	7.38E-03	g/kW-hr	Tier 2 Emission Factors (grams/kW-Hr)

HAP Emission Factors by Source

Crane Clean Energy Center Emission Inventory

Boilers: A and B

Pollutant	Emission Factors		Source
Benzene	2.14E-04	lb/th.gal	AP-42 Table 1.3-9
Ethylbenzene	6.36E-05	lb/th.gal	AP-42 Table 1.3-9
Formaldehyde	3.30E-02	lb/th.gal	AP-42 Table 1.3-9
Naphthalene	1.13E-03	lb/th.gal	AP-42 Table 1.3-9
1,1,1-Trichloroethane	2.36E-04	lb/th.gal	AP-42 Table 1.3-9
Toluene	6.20E-03	lb/th.gal	AP-42 Table 1.3-9
Xylene	1.09E-04	lb/th.gal	AP-42 Table 1.3-9
Acenaphthene	2.11E-05	lb/th.gal	AP-42 Table 1.3-9
Acenaphthylene	2.53E-07	lb/th.gal	AP-42 Table 1.3-9
Anthracene	1.22E-06	lb/th.gal	AP-42 Table 1.3-9
Benz(a)anthracene	4.01E-06	lb/th.gal	AP-42 Table 1.3-9
Benzo(b,k)fluoranthene	1.48E-06	lb/th.gal	AP-42 Table 1.3-9
benzo(g,h,i)perylene	2.26E-06	lb/th.gal	AP-42 Table 1.3-9
Chrysene	2.38E-06	lb/th.gal	AP-42 Table 1.3-9
Dibenzo(a,h)anthracene	1.67E-06	lb/th.gal	AP-42 Table 1.3-9
Fluoranthene	4.84E-06	lb/th.gal	AP-42 Table 1.3-9
Fluorene	4.47E-06	lb/th.gal	AP-42 Table 1.3-9
Indo(1,2,3-cd)pyrene	2.14E-06	lb/th.gal	AP-42 Table 1.3-9
Phenanthrene	1.05E-05	lb/th.gal	AP-42 Table 1.3-9
Pyrene	4.25E-06	lb/th.gal	AP-42 Table 1.3-9
OCDD	3.10E-09	lb/th.gal	AP-42 Table 1.3-9

Large Stationary Diesel Engines: Y1A, Y1B, and Y4

Pollutant	Emission Factors		Source
Benzene	7.76E-04	lb/MMBtu	AP-42 Table 3.4-3
Formaldehyde	7.89E-05	lb/MMBtu	AP-42 Table 3.4-3
Naphthalene	1.30E-04	lb/MMBtu	AP-42 Table 3.4-4
Toluene	2.81E-04	lb/MMBtu	AP-42 Table 3.4-4
Xylene	1.93E-04	lb/MMBtu	AP-42 Table 3.4-3
Acenaphthene	4.68E-06	lb/MMBtu	AP-42 Table 3.4-4
Acenaphthylene	9.23E-06	lb/MMBtu	AP-42 Table 3.4-4
Anthracene	1.23E-06	lb/MMBtu	AP-42 Table 3.4-4
Benz(a)anthracene	6.22E-07	lb/MMBtu	AP-42 Table 3.4-4
Benzo(b)fluoranthene	1.11E-06	lb/MMBtu	AP-42 Table 3.4-4
Benzo(k)fluoranthene	2.18E-07	lb/MMBtu	AP-42 Table 3.4-4
benzo(g,h,i)perylene	5.56E-07	lb/MMBtu	AP-42 Table 3.4-4
Chrysene	1.53E-06	lb/MMBtu	AP-42 Table 3.4-4
Dibenzo(a,h)anthracene	3.46E-07	lb/MMBtu	AP-42 Table 3.4-4
Fluoranthene	4.03E-06	lb/MMBtu	AP-42 Table 3.4-4
Fluorene	1.28E-05	lb/MMBtu	AP-42 Table 3.4-4
Indo(1,2,3-cd)pyrene	4.14E-07	lb/MMBtu	AP-42 Table 3.4-4
Phenanthrene	4.08E-05	lb/MMBtu	AP-42 Table 3.4-4

Pyrene	3.71E-06	lb/MMBtu	AP-42 Table 3.4-4
PAH	2.12E-04	lb/MMBtu	AP-42 Table 3.4-4
Propylene	2.79E-03	lb/MMBtu	AP-42 Table 3.4-3
Acetaldehyde	2.52E-05	lb/MMBtu	AP-42 Table 3.4-3
Acrolein	7.88E-06	lb/MMBtu	AP-42 Table 3.4-3

Diesel Engines: Y2, FSP1, FSP3, FX1A, FX1B

Pollutant	Emission Factors		Source
Benzene	9.33E-04	lb/MMBtu	AP-42 Table 3.3-2
Formaldehyde	1.18E-03	lb/MMBtu	AP-42 Table 3.3-2
Naphthalene	8.48E-05	lb/MMBtu	AP-42 Table 3.3-2
Toluene	4.09E-04	lb/MMBtu	AP-42 Table 3.3-2
Xylene	2.85E-04	lb/MMBtu	AP-42 Table 3.3-2
Acenaphthene	1.42E-06	lb/MMBtu	AP-42 Table 3.3-2
Acenaphthylene	5.06E-06	lb/MMBtu	AP-42 Table 3.3-2
Anthracene	1.87E-06	lb/MMBtu	AP-42 Table 3.3-2
Benz(a)anthracene	1.68E-06	lb/MMBtu	AP-42 Table 3.3-2
Benzo(b)fluoranthene	9.91E-08	lb/MMBtu	AP-42 Table 3.3-2
Benzo(k)fluoranthene	1.55E-07	lb/MMBtu	AP-42 Table 3.3-2
benzo(g,h,i)perylene	4.89E-07	lb/MMBtu	AP-42 Table 3.3-2
benzo(a)pyrene	1.88E-07	lb/MMBtu	AP-42 Table 3.3-2
Chrysene	3.53E-07	lb/MMBtu	AP-42 Table 3.3-2
Dibenzo(a,h)anthracene	5.83E-07	lb/MMBtu	AP-42 Table 3.3-2
Fluoranthene	7.61E-06	lb/MMBtu	AP-42 Table 3.3-2
Fluorene	2.92E-05	lb/MMBtu	AP-42 Table 3.3-2
Indo(1,2,3-cd)pyrene	3.75E-07	lb/MMBtu	AP-42 Table 3.3-2
Phenanthrene	2.94E-05	lb/MMBtu	AP-42 Table 3.3-2
Pyrene	4.78E-06	lb/MMBtu	AP-42 Table 3.3-2
PAH	1.68E-04	lb/MMBtu	AP-42 Table 3.3-2
Propylene	2.58E-03	lb/MMBtu	AP-42 Table 3.3-2
Acetaldehyde	7.67E-04	lb/MMBtu	AP-42 Table 3.3-3
1,3-Butadiene	3.91E-05	lb/MMBtu	AP-42 Table 3.3-4
Acrolein	9.25E-05	lb/MMBtu	AP-42 Table 3.3-2

Source Specifications

Crane Clean Energy Center Emission Inventory

Source Specifications

Source	Rating	Units	Fuel
Auxiliary Boiler A	1135.14	gal/hr	Diesel
Auxiliary Boiler B	1135.14	gal/hr	Diesel
Y1A[1]	220.68	gal/hr	Diesel
Y1B[1]	220.68	gal/hr	Diesel
Y2	11	gal/hr	Diesel
Y4[1]	212.00	gal/hr	Diesel
FSP1[1]	19.41	gal/hr	Diesel
FSP3[1]	19.41	gal/hr	Diesel
FX1A	35	gal/hr	Diesel
FX1B	35	gal/hr	Diesel
Auxiliary Boiler A	156.65	MMBtu/hr	Diesel
Auxiliary Boiler B	156.65	MMBtu/hr	Diesel
Y1A	4320	HP	Diesel
Y1B	4320	HP	Diesel
Y2	214	HP	Diesel
Y4	4150	HP	Diesel
FSP1	380	HP	Diesel
FSP3	380	HP	Diesel
FX1A	563	kW	Diesel
FX1B	563	kW	Diesel

1 AP-42 Table 3.3-1, Footnote (c)

Constants	
138000	Btu/gallon HHV Diesel
0.00220462	lb/g

Crane Petroleum Generator Emissions

Rating	60	kW
Conversion factor	0.003414	
Rating	0.20484	MMBtu/hr
Max. Operating Hours	500	hours
Propane Heat Content	91.5	MMBTU/1000 gal

Energy Conversion			
1	kW	3414	Btu
1	MMBtu	1000000	Btu

Propane Heat content was provided in AP-42 Ch 1.5: Liquified Petroleum Gas Combustion
Limiting Max yearly operating hours to 100 hours
Rating taken from Vendor Spec Sheet

Ap-42 Ch 1.5 Emission Factors

NO_X Emission Factor	13	lb/1000 gal	0.142077	lb/MMBtu
SO_X Emission Factor	0.105S	lb/1000 gal	0.017213	lb/MMBtu
$PM_{filterable}$ Emission Factor	0.2	lb/1000 gal	0.002186	lb/MMBtu
$PM_{Condensable}$ Emission Factor	0.5	lb/1000 gal	0.005464	lb/MMBtu
PM_{Total} Emission Factor	0.7	lb/1000 gal	0.00765	lb/MMBtu
CO Emission Factor	7.5	lb/1000 gal	0.081967	lb/MMBtu
VOC Emission Factor	1	lb/1000 gal	0.010929	lb/MMBtu

	NO_X Emissions		SO_X Emissions		$PM_{filterable}$ Emissions		$PM_{Condensable}$ Emissions		PM_{Total} Emissions		CO Emissions		VOC Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Generator Emissions	2.91E-02	7.28E-03	3.53E-03	8.81E-04	4.48E-04	1.12E-04	1.12E-03	2.80E-04	1.57E-03	3.92E-04	1.68E-02	4.20E-03	2.24E-03	5.60E-04

Attachment C: Updated Plan Approval Forms

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

INSTRUCTIONS FOR COMPLETING A PLAN APPROVAL APPLICATION

- See the detailed instruction package available for plan approval applications.
- Use only the pages for the air cleaning devices that pertain to this project and remove the remaining pages.
- If there is more than one air cleaning device of the same type, copy the page for air cleaning devices and provide the appropriate information for each device.
- If the proposed source is connected to more than one stack and exhauster, copy the page for the stack and exhauster and provide the appropriate information for each stack and exhauster.
- Use additional sheets of paper, if the space provided is not sufficient to provide detailed information required for review and approval.
- Information may be grouped into a single attachment for each section or air cleaning device.
- Number all pages of the application (Sections A through G) accordingly.
- Attach any and all information for source and air cleaning device(s) for a thorough evaluation of the extent and nature of emissions.
- Identify, number and list all attachments made to this application (e.g., Attachment #1-Section A).
- Submit three (3) sets of the completed application with all attachments to the appropriate Regional Office.

2700-PM-AQ0021 Rev. 6/2004

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

Submit in Triplicate

COMBUSTION UNIT

Application for Plan Approval to Construct, Modify or Reactivate an Air Contamination Source and/or Install an Air Cleaning Device

This application and the General Information Form (GIF) must be included in the submittal

Before completing this form, read the instructions provided with this form.

Section A - Facility Name, Checklist And Certification

Organization Name or Registered Fictitious Name/Facility Name: Constellation Energy Generation LLC/Crane Clean Energy Center

DEP Client ID# (If Known): _____

Type of Review required and Fees:

Source which is not subject to NSPS, NESHAPs, MACT, NSR and PSD: ..... $_____
Source requiring approval under NSPS or NESHAPS or both: ..... $_____
Source requiring approval under NSR: ..... $_____
Source requiring the establishment of a MACT limitation: ..... $_____
Source requiring approval under PSD: ..... $_____

Applicant's Checklist

Check the following list to make sure that all the required documents are included.

General Information Form (GIF)

Combustion Unit Plan Approval Application

Compliance Review Form or provide reference of most recently submitted compliance review form for facilities submitting on a periodic basis: _____

Proof of County and Municipal Notifications

Permit Fees

Addendum A: Source Applicable Requirements (only applicable to existing Title V facility)

Certification of Truth, Accuracy and Completeness by a Responsible Official

I, **Trevor Orth** , certify under penalty of law in 18 Pa. C. S. A. §4904, and 35 P.S. §4009(b) (2) that based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate and complete.

(Signature): Trevor P. Orth Date: 2/5/26

Name (Print): Trevor Orth Title: Plant Manager

OFFICIAL USE ONLY

Application No. _____ Unit ID _____ Site ID _____
DEP Client ID #: _____ APS. ID _____ AUTH. ID _____
Date Received _____ Date Assigned _____ Reviewed By _____
Date of 1st Technical Deficiency _____ Date of 2nd Technical Deficiency _____
Comments: _____

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☒ Oil ☐ Natural Gas Other: _____

Description: Auxiliary Boiler A and B

Manufacturer	Model No.	Number of units
Babcock & Wilcox		2

Maximum heat input (Btu/hr)	Rated heat input (Btu/hr)	Typical heat input (Btu/hr)	Furnace Volume
156,650,000	156,650,000	156,650,000	

Grate Area (if applicable)	Method of firing

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown
ii. Steam Blown
iii. Brushed and Vacuumed
iv. Other _____
v. Frequency of Cleaning _____

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour	Per day	Per week	Per year
1135.14 gal per boiler			113,514 gal per boiler

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			100

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____ From _____ to _____
Operating using secondary fuel: _____ Form _____ to _____
Non-operating: From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
This source will only run on Diesel fuel.

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number 2	1135.14 GPH @ 60°F	113.514 X 10^3 Gal	0.0015% by wt		137 MMBtu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Coal					
Other*					

***** Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)

Number of Burners	Maximum fuel firing rate (all burners)	Normal fuel firing rate

If oil, temperature and viscosity.

Maximum theoretical air requirement

Percent excess air 100% rating

Turndown ratio

Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.

Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	Other. Limiting hours of operation
Over fire air (OFA)	Burner out of service	
Low-NO_x burner	Reburning	
Low NO_x burners with over fire air	Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation
N/a

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

Describe each proposed modification to an existing source.

N/a - Source is being reactivated without modification.

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

These units will be limited to 100 hours of operation for typical plant operations. Crane is requesting an alternative operating scenario for the period between summer of 2026 and summer of 2027 to operate these boilers for 1500 hours to support the operations necessary to restart the facility.

Describe in detail with a schematic diagram of the control options adopted for SO_2 (if applicable).
N/a

Anticipated milestones:

Expected commencement date of construction/reconstruction: _____
Expected completion date of construction/reconstruction: _____
Anticipated date(s) of start-up: _____

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		2.27	100	0.11	AP42 Ch1.3
SOx		0.24	100	0.01	AP42 Ch1.3
CO		5.68	100	0.28	AP42 Ch1.3
NO_x		27.24	100	1.36	AP42 Ch1.3
VOC		0.23	100	0.01	AP42 Ch1.3
Others: (e.g., HAPs)	-----	-----	-----		-----
See PTE Calcs					

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. See Attachment B

2. Gas Conditioning

Water quenching ☐ YES ☐ NO Water injection rate _____GPM

Radiation and convection cooling ☐ YES ☐ NO

Air dilution ☐ YES ☐ NO

If YES, _____ CFM

Forced draft ☐ YES ☐ NO

Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume

_____ ACFM@ _____ °F

Outlet volume

_____ ACFM@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors

Manufacturer	Type	Model No.

Pressure Drop (in. of water)	Inlet Volume	Outlet Volume
	_____ ACFM @ _____ °F	_____ ACFM @ _____°F _____% Moisture

Number of Individual Cyclone(s)	Outlet Straightening Vanes Used? ☐ Yes ☐ No

Length of Cyclone(s) Cylinder (ft)	Diameter of Cyclone(s) Cylinder	Length of cyclone(s) cone (ft)

Inlet Diameter (ft) or Duct Area (ft^2) of Cyclone(s)	Outlet Diameter (ft) or Duct area (ft^2) of cyclone(s)

If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?

Describe any exhaust gas recirculation loop to be employed.

Attach particle size efficiency curve

Emission data

Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

4. Fabric Collector

Equipment Specifications

Manufacturer	Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No

Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No

Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No

Dew point at maximum moisture _____ °F | Design inlet volume _____ SCFM

Type of Fabric

Material _____ ☐ Felted ☐ Membrane

Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____

Thickness _____ in ☐ Felted-Woven

Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.

Filter dimensions _____ Diameter/Width _____

Effective area per filter _____ | Maximum operating temperature (°F) _____

Effective air to cloth ratio Minimum _____ Maximum _____

Drawing of Fabric Filter

A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.

Operation and Cleaning

Volume of gases handled _____ ACFM _____ °F	Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.

Type of filter cleaning

☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets

☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____

☐ Pneumatic Shakers ☐ Reverse Air Flow

If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.

Cleaning Initiated By

☐ Timer Frequency if timer actuated _____

☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: _____

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)

Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).

Describe pH monitoring and pH adjustment systems, if applicable.

Describe mist eliminator or separator (type, configuration, backflush capability, frequency).

Attach particulate size efficiency curve.

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @_____°F	Outlet volume of gases handled _____ (ACFM) @_____ °F _____% Moisture

Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)

Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc).

State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator

Equipment specifications

Manufacturer	Model No.	☐ Wet ☐ Dry ☐ Single-Stage ☐ Two-Stage

Gas distribution grids ☐ YES ☐ NO

Design inlet volume (SCFM) _____

Maximum operating temperature (°F) _____

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.

Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____inches.

Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.

Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____

Describe in detail

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density	Corona power	Corona power density
_____ Micro amperes/ft^2	_____ Watts/1000 ACFM	_____ Watts/ft^2

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)
Packing type and size (if applicable)	Height of packing (ft) (if applicable)
Number of trays (if applicable)	Number of bubble caps (if applicable)

Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow

Describe pH and/or other monitoring and controls

Absorbent information

Absorbent type and concentration	Sorbent injection rate	Retention time (sec)

Attach equilibrium data for absorption (If applicable).

Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.

Operating parameters

Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.

State operating range for pH and/or absorbent concentration in scrubber liquid.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**

☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**

☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost
N/a				

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

N/a

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

N/a

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

N/a

Section D - Additional Information

Will the construction, modification, etc. of the sources covered by this application increase emissions from other sources at the facility? If so, describe and quantify.
See Narrative

If this project is subject to any one of the following, attach a demonstration to show compliance with applicable standards

a. Prevention of Significant Deterioration permit (PSD), 40 CFR Part 52? ☐ YES ☒ NO

b. New Source Review, 25 Pa. Code Chapter 127, Subchapter E? ☐ YES ☒ NO

c. New Source Performance Standards, 40 CFR Part 60? ☐ YES ☒ NO
(If Yes, which subpart) _____

d. National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61? ☐ YES ☒ NO
If Yes, which subpart) _____

e. Maximum Achievable Control Technology (MACT), 40 CFR Part 63? ☒ YES ☐ NO
(If Yes, which subpart) JJJJJJ

Attach a demonstration showing that the emissions from any new source will be the minimum attainable through the use of best available technology (BAT).

See Attachment A

Provide emission increases and decreases in allowable (or potential) and actual emissions within the last 5 years for applicable PSD pollutant(s) if the facility is an existing major facility (for PSD purposes)

N/a

Section D - Additional Information (Continued)

Indicate emission increases and decreases in tons per year (tpy), for volatile organic compounds (VOCs) and nitrogen oxides (NOx) for NSR applicability since January 1, 1991 or other applicable dates (See other applicable date in instructions). The emissions increases include all emissions including stack, fugitive, material transfer, other emission generating activities, quantifiable emissions from the exempted source(s), etc.

Permit number (if applicable)	Date issued	Indicate ***Yes*** or ***No*** if emission increases and decreases were used previously for netting	Source I.D. or Name	**VOC**s		**NOx**	
				Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)	Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)

If the source is subject to 25 Pa. Code Chapter 127, Subchapter E, New Source Review requirements,

a. Identify Emission Reduction Credits (ERCs) for emission offsets or demonstrate ability to obtain suitable ERCs for emission offsets. N/a

b. Provide a demonstration that the lowest achievable emission rate (LAER) control techniques will be implemented (if applicable). N/a

c. Provide an analysis of alternate sites, sizes, production processes and environmental control techniques demonstrating that the benefits of the proposed source outweigh the environmental and social costs (if applicable).
N/a

Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of 25 Pa. Code Article III and applicable requirements of the Clean Air Act and regulations adopted there under. The Department may request additional information to evaluate the application such as a stand by plan, a plan for air pollution emergencies, air quality modeling, etc.

See Attachment B

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a-Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☐ Monitoring ☐ Testing ☐ Reporting
☐ Recordkeeping ☒ Work Practice Standard

Monitoring:

a. Monitoring device type (stack test, CEM etc.):

b. Monitoring device location:

c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:

Testing:

a. Reference Test Method Citation:

b. Reference Test Method Description:

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency:

Reporting:

a. Describe the type of information to be reported and the reporting frequency:

b. Reporting start date:

Work Practice Standard: Describe each

Limiting hours of Operation to 100 hours per year.

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		2.27	0.11	AP42 Ch1.3
SO_x		0.24	0.01	AP42 Ch1.3
CO		5.68	0.28	AP42 Ch1.3
NO_x		27.24	1.36	AP42 Ch1.3
VOC		0.23	0.01	AP42 Ch1.3
Others: (e.g., HAPs)	-----	-----	-----	-----
See PTE Calcs				

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Stack and Exhauster

Stack Designation/Number

List Source(s) or source ID exhausted to this stack:	% of flow exhausted to stack:

Stack height above grade (ft.) Grade elevation (ft.)	Stack diameter (ft) or Outlet duct area (sq. ft.)	Weather Cap ☐ YES ☐ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

Does stack height meet Good Engineering Practice (GEP)?

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

Stack Exhaust

Volume _____ ACFM Temperature _____ °F Moisture _____%

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.

Section G - Attachments

Number and list all attachments submitted with this application below:

- Appendix A contains the required PADEP application;
- Appendix B contains the compliance review form;
- Appendix C contains the required county and municipal notifications;
- Appendix D contains the permit redline;
- Appendix E contains the potential to emit calculations, and;
- Appendix F contains the application fee documentation.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

INSTRUCTIONS FOR COMPLETING A PLAN APPROVAL APPLICATION

- See the detailed instruction package available for plan approval applications.
- Use only the pages for the air cleaning devices that pertain to this project and remove the remaining pages.
- If there is more than one air cleaning device of the same type, copy the page for air cleaning devices and provide the appropriate information for each device.
- If the proposed source is connected to more than one stack and exhauster, copy the page for the stack and exhauster and provide the appropriate information for each stack and exhauster.
- Use additional sheets of paper, if the space provided is not sufficient to provide detailed information required for review and approval.
- Information may be grouped into a single attachment for each section or air cleaning device.
- Number all pages of the application (Sections A through G) accordingly.
- Attach any and all information for source and air cleaning device(s) for a thorough evaluation of the extent and nature of emissions.
- Identify, number and list all attachments made to this application (e.g., Attachment #1-Section A).
- Submit three (3) sets of the completed application with all attachments to the appropriate Regional Office.

2700-PM-AQ0021 Rev. 6/2004

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

Submit in Triplicate

COMBUSTION UNIT

Application for Plan Approval to Construct, Modify or Reactivate an Air Contamination Source and/or Install an Air Cleaning Device

This application and the General Information Form (GIF) must be included in the submittal

Before completing this form, read the instructions provided with this form.

Section A - Facility Name, Checklist And Certification

Organization Name or Registered Fictitious Name/Facility Name: Constellation Energy Generation LLC/Crane Clean Energy Center

DEP Client ID# (If Known): _____

Type of Review required and Fees:

Source which is not subject to NSPS, NESHAPs, MACT, NSR and PSD: ..... $_____
Source requiring approval under NSPS or NESHAPS or both: ..... $_____
Source requiring approval under NSR: ..... $_____
Source requiring the establishment of a MACT limitation: ..... $_____
Source requiring approval under PSD: ..... $_____

Applicant's Checklist

Check the following list to make sure that all the required documents are included.

General Information Form (GIF)

Combustion Unit Plan Approval Application

Compliance Review Form or provide reference of most recently submitted compliance review form for facilities submitting on a periodic basis: _____

Proof of County and Municipal Notifications

Permit Fees

Addendum A: Source Applicable Requirements (only applicable to existing Title V facility)

Certification of Truth, Accuracy and Completeness by a Responsible Official

I, **Trevor Orth**, certify under penalty of law in 18 Pa. C. S. A. §4904, and 35 P.S. §4009(b) (2) that based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate and complete.

(Signature): Trevor R Orth Date: 2/5/26

Name (Print): Trevor Orth Title: Plant Manager

OFFICIAL USE ONLY

Application No. _____ Unit ID _____ Site ID _____
DEP Client ID #: _____ APS. ID _____ AUTH. ID _____
Date Received _____ Date Assigned _____ Reviewed By _____
Date of 1st Technical Deficiency _____ Date of 2nd Technical Deficiency _____
Comments: _____

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☒ Oil ☐ Natural Gas Other: _____

Description: Emergency Diesel Generator 1 and 2 - FX1A and FX1B

Manufacturer	Model No.	Number of units	
Cummins		2	
Maximum heat input (Btu/hr)	Rated heat input ~~(Btu/hr)~~ 755 HP	Typical heat input (Btu/hr)	Furnace Volume
Grate Area (if applicable)		Method of firing	

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown
ii. Steam Blown
iii. Brushed and Vacuumed
iv. Other _____
v. Frequency of Cleaning _____

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			250 per unit

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour	Per day	Per week	Per year
35 gal per unit			8,750 gal per unit

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			<250 per unit

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____ From _____ to _____
Operating using secondary fuel: _____ Form _____ to _____
Non-operating: From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
This source will only run on Diesel Fuel.

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number 2	35 GPH @ 60°F	8.75 X 10^3 Gal	0.0015% by wt		137 MMBtu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Coal					
Other*					

***** Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)

Number of Burners	Maximum fuel firing rate (all burners)	Normal fuel firing rate

If oil, temperature and viscosity.

Maximum theoretical air requirement

Percent excess air 100% rating

Turndown ratio

Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.

Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	Other.Hours of operation Limit
Over fire air (OFA)	Burner out of service	
Low-NO_x burner	Reburning	
Low NO_x burners with over fire air	Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation
N/a

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

Describe each proposed modification to an existing source.

N/a - These sources were deactivated and are now being reactivated without modification.

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

These sources will be limited to 250 hours of operation each.

Describe in detail with a schematic diagram of the control options adopted for SO_2 (if applicable).
N/a

Anticipated milestones:

Expected commencement date of construction/reconstruction: _____
Expected completion date of construction/reconstruction: _____
Anticipated date(s) of start-up: _____

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		0.25	250	0.03	Tier II Emission Factors
PM_{10}		0.25	250	0.03	Tier II Emission Factors
SOx		0.01	250	0.00	Tier II Emission Factors
CO		4.34	250	0.54	Tier II Emission Factors
NO_x		6.95	250	0.87	Tier II Emission Factors
VOC		0.99	250	0.12	Tier II Emission Factors
Others: (e.g., HAPs)	-----	-----	-----		-----
See PTE Calcs					

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. See Attachment B

2. Gas Conditioning

Water quenching ☐ YES ☐ NO Water injection rate _____GPM

Radiation and convection cooling ☐ YES ☐ NO	Air dilution ☐ YES ☐ NO If YES, _____ CFM
Forced draft ☐ YES ☐ NO	Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume _____ ACFM@ _____ °F	Outlet volume _____ ACFM@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors

Manufacturer	Type	Model No.

Pressure Drop (in. of water)	Inlet Volume	Outlet Volume
	_____ ACFM @ _____ °F	_____ ACFM @ _____°F _____% Moisture

Number of Individual Cyclone(s)	Outlet Straightening Vanes Used? ☐ Yes ☐ No

Length of Cyclone(s) Cylinder (ft)	Diameter of Cyclone(s) Cylinder	Length of cyclone(s) cone (ft)

Inlet Diameter (ft) or Duct Area (ft^2) of Cyclone(s)	Outlet Diameter (ft) or Duct area (ft^2) of cyclone(s)

If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?

Describe any exhaust gas recirculation loop to be employed.

Attach particle size efficiency curve

Emission data

Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

4. Fabric Collector

Equipment Specifications

Manufacturer	Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No

Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No

Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No

Dew point at maximum moisture _____ °F | Design inlet volume _____ SCFM

Type of Fabric

Material _____ ☐ Felted ☐ Membrane

Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____

Thickness _____ in ☐ Felted-Woven

Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.

Filter dimensions _____ Diameter/Width _____

Effective area per filter _____ | Maximum operating temperature (°F) _____

Effective air to cloth ratio Minimum _____ Maximum _____

Drawing of Fabric Filter

A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.

Operation and Cleaning

Volume of gases handled _____ ACFM _____ °F	Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.

Type of filter cleaning

☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets

☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____

☐ Pneumatic Shakers ☐ Reverse Air Flow

If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.

Cleaning Initiated By

☐ Timer Frequency if timer actuated _____

☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: _____

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)

Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).

Describe pH monitoring and pH adjustment systems, if applicable.

Describe mist eliminator or separator (type, configuration, backflush capability, frequency).

Attach particulate size efficiency curve.

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @_____°F	Outlet volume of gases handled _____ (ACFM) @_____ °F _____% Moisture

Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)

Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc).

State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator

Equipment specifications

Manufacturer	Model No.	☐ Wet ☐ Dry ☐ Single-Stage ☐ Two-Stage

Gas distribution grids ☐ YES ☐ NO

Design inlet volume (SCFM) _____

Maximum operating temperature (°F) _____

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.

Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____inches.

Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.

Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____

Describe in detail

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density	Corona power	Corona power density
_____ Micro amperes/ft^2	_____ Watts/1000 ACFM	_____ Watts/ft^2

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)
Packing type and size (if applicable)	Height of packing (ft) (if applicable)
Number of trays (if applicable)	Number of bubble caps (if applicable)

Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow

Describe pH and/or other monitoring and controls

Absorbent information

Absorbent type and concentration	Sorbent injection rate	Retention time (sec)

Attach equilibrium data for absorption (If applicable).

Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.

Operating parameters

Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.

State operating range for pH and/or absorbent concentration in scrubber liquid.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**

☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**

☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost
N/a				

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

N/a

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

N/a

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

N/a

Section D - Additional Information

Will the construction, modification, etc. of the sources covered by this application increase emissions from other sources at the facility? If so, describe and quantify.
See Narrative

If this project is subject to any one of the following, attach a demonstration to show compliance with applicable standards

a. Prevention of Significant Deterioration permit (PSD), 40 CFR Part 52? ☐ YES ☒ NO

b. New Source Review, 25 Pa. Code Chapter 127, Subchapter E? ☐ YES ☒ NO

c. New Source Performance Standards, 40 CFR Part 60? ☒ YES ☐ NO
(If Yes, which subpart) Subpart IIII

d. National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61? ☐ YES ☒ NO
If Yes, which subpart) _____

e. Maximum Achievable Control Technology (MACT), 40 CFR Part 63? ☐ YES ☒ NO
(If Yes, which subpart) _____

Attach a demonstration showing that the emissions from any new source will be the minimum attainable through the use of best available technology (BAT).

See Attachment A

Provide emission increases and decreases in allowable (or potential) and actual emissions within the last 5 years for applicable PSD pollutant(s) if the facility is an existing major facility (for PSD purposes)

N/a

Section D - Additional Information (Continued)

Indicate emission increases and decreases in tons per year (tpy), for volatile organic compounds (VOCs) and nitrogen oxides (NOx) for NSR applicability since January 1, 1991 or other applicable dates (See other applicable date in instructions). The emissions increases include all emissions including stack, fugitive, material transfer, other emission generating activities, quantifiable emissions from the exempted source(s), etc.

Permit number (if applicable)	Date issued	Indicate ***Yes*** or ***No*** if emission increases and decreases were used previously for netting	Source I.D. or Name	**VOC**s		**NOx**	
				Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)	Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)

If the source is subject to 25 Pa. Code Chapter 127, Subchapter E, New Source Review requirements,

a. Identify Emission Reduction Credits (ERCs) for emission offsets or demonstrate ability to obtain suitable ERCs for emission offsets.

b. Provide a demonstration that the lowest achievable emission rate (LAER) control techniques will be implemented (if applicable).

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

Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of 25 Pa. Code Article III and applicable requirements of the Clean Air Act and regulations adopted there under. The Department may request additional information to evaluate the application such as a stand by plan, a plan for air pollution emergencies, air quality modeling, etc.

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a-Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☐ Monitoring ☐ Testing ☐ Reporting
☐ Recordkeeping ☒ Work Practice Standard

Monitoring:

a. Monitoring device type (stack test, CEM etc.):

b. Monitoring device location:

c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:

Testing:

a. Reference Test Method Citation:

b. Reference Test Method Description:

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency:

Reporting:

a. Describe the type of information to be reported and the reporting frequency:

b. Reporting start date:

Work Practice Standard: Describe each

Limiting hours of Operation to 250 hours per year

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		0.25	0.03	Tier II Emission Factors
PM_{10}		0.25	0.03	Tier II Emission Factors
SO_x		0.01	0.00	Tier II Emission Factors
CO		4.34	0.54	Tier II Emission Factors
NO_x		6.95	0.87	Tier II Emission Factors
VOC		0.99	0.12	Tier II Emission Factors
Others: (e.g., HAPs)	-----	-----	-----	-----
See PTE Calcs				

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. See Attachment B for PTE calcs. The emissions rates above were calculated per each generator.

2. Stack and Exhauster

Stack Designation/Number S16 from SOOP 22-05029

List Source(s) or source ID exhausted to this stack:	% of flow exhausted to stack:
F1XA and FX1B to S16	

Stack height above grade (ft.) 35 ft Grade elevation (ft.) 302 ft	Stack diameter (ft) or Outlet duct area (sq. ft.) 0.7 ft	Weather Cap ☐ YES ☐ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

Stack Exhaust

Volume 3625 ACFM Temperature 901 °F Moisture 5 %

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.

Section G - Attachments

Number and list all attachments submitted with this application below:

- Appendix A contains the required PADEP application;
- Appendix B contains the compliance review form;
- Appendix C contains the required county and municipal notifications;
- Appendix D contains the permit redline;
- Appendix E contains the potential to emit calculations, and;
- Appendix F contains the application fee documentation.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

INSTRUCTIONS FOR COMPLETING A PLAN APPROVAL APPLICATION

- See the detailed instruction package available for plan approval applications.
- Use only the pages for the air cleaning devices that pertain to this project and remove the remaining pages.
- If there is more than one air cleaning device of the same type, copy the page for air cleaning devices and provide the appropriate information for each device.
- If the proposed source is connected to more than one stack and exhauster, copy the page for the stack and exhauster and provide the appropriate information for each stack and exhauster.
- Use additional sheets of paper, if the space provided is not sufficient to provide detailed information required for review and approval.
- Information may be grouped into a single attachment for each section or air cleaning device.
- Number all pages of the application (Sections A through G) accordingly.
- Attach any and all information for source and air cleaning device(s) for a thorough evaluation of the extent and nature of emissions.
- Identify, number and list all attachments made to this application (e.g., Attachment #1-Section A).
- Submit three (3) sets of the completed application with all attachments to the appropriate Regional Office.

2700-PM-AQ0021 Rev. 6/2004

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

Submit in Triplicate

COMBUSTION UNIT

Application for Plan Approval to Construct, Modify or Reactivate an Air Contamination Source and/or Install an Air Cleaning Device

This application and the General Information Form (GIF) must be included in the submittal

Before completing this form, read the instructions provided with this form.

Section A - Facility Name, Checklist And Certification

Organization Name or Registered Fictitious Name/Facility Name: Constellation Energy Generation LLC/Crane Clean Energy Center

DEP Client ID# (If Known): _____

Type of Review required and Fees:

Source which is not subject to NSPS, NESHAPs, MACT, NSR and PSD: ..... $_____
Source requiring approval under NSPS or NESHAPS or both: ..... $_____
Source requiring approval under NSR: ..... $_____
Source requiring the establishment of a MACT limitation: ..... $_____
Source requiring approval under PSD: ..... $_____

Applicant's Checklist

Check the following list to make sure that all the required documents are included.

General Information Form (GIF)

Combustion Unit Plan Approval Application

Compliance Review Form or provide reference of most recently submitted compliance review form for facilities submitting on a periodic basis: _____

Proof of County and Municipal Notifications

Permit Fees

Addendum A: Source Applicable Requirements (only applicable to existing Title V facility)

Certification of Truth, Accuracy and Completeness by a Responsible Official

I, **Trevor Orth**, certify under penalty of law in 18 Pa. C. S. A. §4904, and 35 P.S. §4009(b) (2) that based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate and complete.

(Signature): Trevor R. Orth Date: 2/5/26

Name (Print): Trevor Orth Title: Plant Manager

OFFICIAL USE ONLY

Application No. _____ Unit ID _____ Site ID _____
DEP Client ID #: _____ APS. ID _____ AUTH. ID _____
Date Received _____ Date Assigned _____ Reviewed By _____
Date of 1st Technical Deficiency _____ Date of 2nd Technical Deficiency _____
Comments: _____

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☒ Oil ☐ Natural Gas Other: _____

Description: Fire Pump Diesel 1 and 3 – FSP1 and FSP3

Manufacturer	Model No.	Number of units	
Cummins		2	
Maximum heat input (Btu/hr)	Rated heat input ~~(Btu/hr)~~ 380 HP each	Typical heat input (Btu/hr)	Furnace Volume
Grate Area (if applicable)		Method of firing	

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown
ii. Steam Blown
iii. Brushed and Vacuumed
iv. Other _____
v. Frequency of Cleaning _____

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			250 per unit

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour	Per day	Per week	Per year
19.41 gal per unit			4,853 gal per unit

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			<250 per unit

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____ From _____ to _____
Operating using secondary fuel: _____ Form _____ to _____
Non-operating: From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
This source will only run on Diesel Fuel.

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number 2	19.41 GPH @ 60°F	4.853 X 10^3 Gal	0.0015% by wt		137 MMBtu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Coal					
Other*					

***** Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)

Number of Burners	Maximum fuel firing rate (all burners)	Normal fuel firing rate

If oil, temperature and viscosity.

Maximum theoretical air requirement

Percent excess air 100% rating

Turndown ratio

Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.

Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	Other.Operational Limits
Over fire air (OFA)	Burner out of service	
Low-NO_x burner	Reburning	
Low NO_x burners with over fire air	Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation
N/a

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

These generators will be limited to 250 hours per year of operation each.

Describe each proposed modification to an existing source.

N/a - These sources were previously permitted. They were deactivated and are now being reactivated without modification.

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

Source limited to 250 hours of operation

Describe in detail with a schematic diagram of the control options adopted for SO_2 (if applicable).
N/a

Anticipated milestones:

Expected commencement date of construction/reconstruction: _____
Expected completion date of construction/reconstruction: _____
Anticipated date(s) of start-up: _____

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		0.83	250	0.10	AP 42 Table 3.3-1
PM_{10}		0.83	250	0.10	AP 42 Table 3.3-1
SOx		0.78	250	0.10	AP 42 Table 3.3-1
CO		2.54	250	0.32	AP 42 Table 3.3-1
NO_x		11.81	250	1.48	AP 42 Table 3.3-1
VOC		0.94	250	0.12	AP 42 Table 3.3-1
Others: (e.g., HAPs)	-----	-----	-----		-----
See PTE Calcs					

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. See Attachment B. The emission rates above were calculated per each generator.

2. Gas Conditioning

Water quenching ☐ YES ☐ NO Water injection rate _____GPM

Radiation and convection cooling ☐ YES ☐ NO

Air dilution ☐ YES ☐ NO
If YES, _____ CFM

Forced draft ☐ YES ☐ NO

Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume
_____ ACFM@ _____ °F

Outlet volume
_____ ACFM@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors

Manufacturer	Type	Model No.

Pressure Drop (in. of water)	Inlet Volume	Outlet Volume
	_____ ACFM @ _____ °F	_____ ACFM @ _____°F _____% Moisture

Number of Individual Cyclone(s)	Outlet Straightening Vanes Used? ☐ Yes ☐ No

Length of Cyclone(s) Cylinder (ft)	Diameter of Cyclone(s) Cylinder	Length of cyclone(s) cone (ft)

Inlet Diameter (ft) or Duct Area (ft^2) of Cyclone(s)	Outlet Diameter (ft) or Duct area (ft^2) of cyclone(s)

If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?

Describe any exhaust gas recirculation loop to be employed.

Attach particle size efficiency curve

Emission data

Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

4. Fabric Collector

Equipment Specifications

Manufacturer	Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No

Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No

Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No

Dew point at maximum moisture _____ °F | Design inlet volume _____ SCFM

Type of Fabric

Material _____ ☐ Felted ☐ Membrane

Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____

Thickness _____ in ☐ Felted-Woven

Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.

Filter dimensions _____ Diameter/Width _____

Effective area per filter _____ | Maximum operating temperature (°F) _____

Effective air to cloth ratio Minimum _____ Maximum _____

Drawing of Fabric Filter

A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.

Operation and Cleaning

Volume of gases handled _____ ACFM _____ °F	Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.

Type of filter cleaning

☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets

☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____

☐ Pneumatic Shakers ☐ Reverse Air Flow

If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.

Cleaning Initiated By

☐ Timer Frequency if timer actuated _____

☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: _____

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)

Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).

Describe pH monitoring and pH adjustment systems, if applicable.

Describe mist eliminator or separator (type, configuration, backflush capability, frequency).

Attach particulate size efficiency curve.

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @_____°F	Outlet volume of gases handled _____ (ACFM) @_____ °F _____% Moisture

Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)

Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc).

State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator

Equipment specifications

Manufacturer	Model No.	☐ Wet ☐ Dry ☐ Single-Stage ☐ Two-Stage

Gas distribution grids ☐ YES ☐ NO	Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____inches.
Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
Describe in detail

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density	Corona power	Corona power density
_____ Micro amperes/ft^2	_____ Watts/1000 ACFM	_____ Watts/ft^2

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)
Packing type and size (if applicable)	Height of packing (ft) (if applicable)
Number of trays (if applicable)	Number of bubble caps (if applicable)

Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow

Describe pH and/or other monitoring and controls

Absorbent information

Absorbent type and concentration	Sorbent injection rate	Retention time (sec)

Attach equilibrium data for absorption (If applicable).

Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.

Operating parameters

Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.

State operating range for pH and/or absorbent concentration in scrubber liquid.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**

☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**

☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost
N/a				

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

N/a

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

N/a

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

N/a

Section D - Additional Information

Will the construction, modification, etc. of the sources covered by this application increase emissions from other sources at the facility? If so, describe and quantify.
See Narrative

If this project is subject to any one of the following, attach a demonstration to show compliance with applicable standards

a. Prevention of Significant Deterioration permit (PSD), 40 CFR Part 52? ☐ YES ☒ NO

b. New Source Review, 25 Pa. Code Chapter 127, Subchapter E? ☐ YES ☒ NO

c. New Source Performance Standards, 40 CFR Part 60? ☐ YES ☒ NO
(If Yes, which subpart) _____

d. National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61? ☐ YES ☒ NO
If Yes, which subpart) _____

e. Maximum Achievable Control Technology (MACT), 40 CFR Part 63? ☒ YES ☐ NO
(If Yes, which subpart) Subpart ZZZZ

Attach a demonstration showing that the emissions from any new source will be the minimum attainable through the use of best available technology (BAT).

See Attachment A

Provide emission increases and decreases in allowable (or potential) and actual emissions within the last 5 years for applicable PSD pollutant(s) if the facility is an existing major facility (for PSD purposes)

N/a

Section D - Additional Information (Continued)

Indicate emission increases and decreases in tons per year (tpy), for volatile organic compounds (VOCs) and nitrogen oxides (NOx) for NSR applicability since January 1, 1991 or other applicable dates (See other applicable date in instructions). The emissions increases include all emissions including stack, fugitive, material transfer, other emission generating activities, quantifiable emissions from the exempted source(s), etc.

Permit number (if applicable)	Date issued	Indicate ***Yes*** or ***No*** if emission increases and decreases were used previously for netting	Source I.D. or Name	**VOC**s		**NOx**	
				Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)	Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)

If the source is subject to 25 Pa. Code Chapter 127, Subchapter E, New Source Review requirements,

a. Identify Emission Reduction Credits (ERCs) for emission offsets or demonstrate ability to obtain suitable ERCs for emission offsets. N/a

b. Provide a demonstration that the lowest achievable emission rate (LAER) control techniques will be implemented (if applicable). N/a

c. Provide an analysis of alternate sites, sizes, production processes and environmental control techniques demonstrating that the benefits of the proposed source outweigh the environmental and social costs (if applicable).
N/a

Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of 25 Pa. Code Article III and applicable requirements of the Clean Air Act and regulations adopted there under. The Department may request additional information to evaluate the application such as a stand by plan, a plan for air pollution emergencies, air quality modeling, etc.

See Attachment B

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a-Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☐ Monitoring ☐ Testing ☐ Reporting
☐ Recordkeeping ☒ Work Practice Standard

Monitoring:

a. Monitoring device type (stack test, CEM etc.):

b. Monitoring device location:

c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:

Testing:

a. Reference Test Method Citation:

b. Reference Test Method Description:

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency:

Reporting:

a. Describe the type of information to be reported and the reporting frequency:

b. Reporting start date:

Work Practice Standard: Describe each

Limiting hours of Operation to 250 hours per year

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		0.83	0.10	AP 42 Table 3.3-1
PM_{10}		0.83	0.10	AP 42 Table 3.3-1
SO_x		0.78	0.10	AP 42 Table 3.3-1
CO		2.54	0.32	AP 42 Table 3.3-1
NO_x		11.81	1.48	AP 42 Table 3.3-1
VOC		0.94	0.12	AP 42 Table 3.3-1
Others: (e.g., HAPs)	-----	-----	-----	-----
See PTE Calcs				

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Stack and Exhauster

Stack Designation/Number S14 and S15 from SOOP 22-05029

List Source(s) or source ID exhausted to this stack:
FSP1 to S14; FSP3 to S15

% of flow exhausted to stack:

Stack height above grade (ft.) 8 ft
Grade elevation (ft.) 302 ft

Stack diameter (ft) or Outlet duct area (sq. ft.)
Approximately 1 ft

Weather Cap
☐ YES ☐ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

Does stack height meet Good Engineering Practice (GEP)?
Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

Stack Exhaust

Volume 15 ACFM Temperature 250 °F Moisture _____%

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.

Section G - Attachments

Number and list all attachments submitted with this application below:

- Appendix A contains the required PADEP application;
- Appendix B contains the compliance review form;
- Appendix C contains the required county and municipal notifications;
- Appendix D contains the permit redline;
- Appendix E contains the potential to emit calculations, and;
- Appendix F contains the application fee documentation.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

INSTRUCTIONS FOR COMPLETING A PLAN APPROVAL APPLICATION

- See the detailed instruction package available for plan approval applications.
- Use only the pages for the air cleaning devices that pertain to this project and remove the remaining pages.
- If there is more than one air cleaning device of the same type, copy the page for air cleaning devices and provide the appropriate information for each device.
- If the proposed source is connected to more than one stack and exhauster, copy the page for the stack and exhauster and provide the appropriate information for each stack and exhauster.
- Use additional sheets of paper, if the space provided is not sufficient to provide detailed information required for review and approval.
- Information may be grouped into a single attachment for each section or air cleaning device.
- Number all pages of the application (Sections A through G) accordingly.
- Attach any and all information for source and air cleaning device(s) for a thorough evaluation of the extent and nature of emissions.
- Identify, number and list all attachments made to this application (e.g., Attachment #1-Section A).
- Submit three (3) sets of the completed application with all attachments to the appropriate Regional Office.

2700-PM-AQ0021 Rev. 6/2004

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

Submit in Triplicate

COMBUSTION UNIT

Application for Plan Approval to Construct, Modify or Reactivate an Air Contamination Source and/or Install an Air Cleaning Device

This application and the General Information Form (GIF) must be included in the submittal

Before completing this form, read the instructions provided with this form.

Section A - Facility Name, Checklist And Certification

Organization Name or Registered Fictitious Name/Facility Name: Constellation Energy Generation LLC/Crane Clean Energy Center

DEP Client ID# (If Known): _____

Type of Review required and Fees:

Source which is not subject to NSPS, NESHAPs, MACT, NSR and PSD: ..... $_____
Source requiring approval under NSPS or NESHAPS or both: ..... $_____
Source requiring approval under NSR: ..... $_____
Source requiring the establishment of a MACT limitation: ..... $_____
Source requiring approval under PSD: ..... $_____

Applicant's Checklist

Check the following list to make sure that all the required documents are included.

General Information Form (GIF)

Combustion Unit Plan Approval Application

Compliance Review Form or provide reference of most recently submitted compliance review form for facilities submitting on a periodic basis: _____

Proof of County and Municipal Notifications

Permit Fees

Addendum A: Source Applicable Requirements (only applicable to existing Title V facility)

Certification of Truth, Accuracy and Completeness by a Responsible Official

I, **Trevor Orth**, certify under penalty of law in 18 Pa. C. S. A. §4904, and 35 P.S. §4009(b) (2) that based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate and complete.

(Signature): Trevor L. Orth Date: 2/5/26

Name (Print): Trevor Orth Title: Plant Manager

OFFICIAL USE ONLY

Application No. _____ Unit ID _____ Site ID _____
DEP Client ID #: _____ APS. ID _____ AUTH. ID _____
Date Received _____ Date Assigned _____ Reviewed By _____
Date of 1st Technical Deficiency _____ Date of 2nd Technical Deficiency _____
Comments: _____

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☒ Oil ☐ Natural Gas Other: _____

Description: Emergency Fuel Oil Generator 1A and 1B - Y1A and Y1B

Manufacturer	Model No.	Number of units	
Fairbanks Morse	38TD8 1/8	2	
Maximum heat input (Btu/hr)	Rated heat input ~~(Btu/hr)~~ 4,320 HP	Typical heat input (Btu/hr)	Furnace Volume
Grate Area (if applicable)		Method of firing	

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown
ii. Steam Blown
iii. Brushed and Vacuumed
iv. Other _____
v. Frequency of Cleaning _____

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			250 per unit

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour	Per day	Per week	Per year
220.68 gal per unit			55,170 gal per unit

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			<250 per unit

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____ From _____ to _____
Operating using secondary fuel: _____ Form _____ to _____
Non-operating: From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
This source will only run on Diesel Fuel.

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number 2	220.68 GPH @ 60°F	55.170 X 10^3 Gal	0.0015% by wt		137 MMBtu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Coal					
Other*					

***** Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)

Number of Burners	Maximum fuel firing rate (all burners)	Normal fuel firing rate

If oil, temperature and viscosity.

Maximum theoretical air requirement

Percent excess air 100% rating

Turndown ratio

Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.

Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	Other.Limiting hours of operation
Over fire air (OFA)	Burner out of service	
Low-NO_x burner	Reburning	
Low NO_x burners with over fire air	Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation
N/a

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

Describe each proposed modification to an existing source.

N/a - These sources were deactivated and are now being reactivated without modification.

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

These sources will be limited to 250 hours of operation each.

Describe in detail with a schematic diagram of the control options adopted for SO_2 (if applicable).
N/a

Anticipated milestones:

Expected commencement date of construction/reconstruction: _____
Expected completion date of construction/reconstruction: _____
Anticipated date(s) of start-up: _____

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		3.05	250	0.38	AP-42 Table 3.4-1
PM_{10}		3.05	250	0.38	AP-42 Table 3.4-1
SOx		0.05	250	0.01	AP-42 Table 3.4-1
CO		25.89	250	3.24	AP-42 Table 3.4-1
NO_x		97.45	250	12.18	AP-42 Table 3.4-1
VOC		2.74	250	0.34	AP-42 Table 3.4-1
Others: (e.g., HAPs)	-----	-----	-----		-----
See PTE Calcs					

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. See Attachment B - The emission rates above were calculated per each generator.

2. Gas Conditioning

Water quenching ☐ YES ☐ NO Water injection rate _____GPM

Radiation and convection cooling ☐ YES ☐ NO

Air dilution ☐ YES ☐ NO

If YES, _____ CFM

Forced draft ☐ YES ☐ NO

Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume

_____ ACFM@ _____ °F

Outlet volume

_____ ACFM@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors

Manufacturer	Type	Model No.

Pressure Drop (in. of water)	Inlet Volume	Outlet Volume
	_____ ACFM @ _____ °F	_____ ACFM @ _____°F _____% Moisture

Number of Individual Cyclone(s)	Outlet Straightening Vanes Used? ☐ Yes ☐ No

Length of Cyclone(s) Cylinder (ft)	Diameter of Cyclone(s) Cylinder	Length of cyclone(s) cone (ft)

Inlet Diameter (ft) or Duct Area (ft^2) of Cyclone(s)	Outlet Diameter (ft) or Duct area (ft^2) of cyclone(s)

If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?

Describe any exhaust gas recirculation loop to be employed.

Attach particle size efficiency curve

Emission data

Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

4. Fabric Collector

Equipment Specifications

Manufacturer	Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No

Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No

Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No

Dew point at maximum moisture _____ °F | Design inlet volume _____ SCFM

Type of Fabric

Material _____ ☐ Felted ☐ Membrane

Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____

Thickness _____ in ☐ Felted-Woven

Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.

Filter dimensions _____ Diameter/Width _____

Effective area per filter _____ | Maximum operating temperature (°F) _____

Effective air to cloth ratio Minimum _____ Maximum _____

Drawing of Fabric Filter

A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.

Operation and Cleaning

Volume of gases handled _____ ACFM _____ °F	Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.

Type of filter cleaning

☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets

☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____

☐ Pneumatic Shakers ☐ Reverse Air Flow

If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.

Cleaning Initiated By

☐ Timer Frequency if timer actuated _____

☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: _____

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)

Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).

Describe pH monitoring and pH adjustment systems, if applicable.

Describe mist eliminator or separator (type, configuration, backflush capability, frequency).

Attach particulate size efficiency curve.

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @_____°F	Outlet volume of gases handled _____ (ACFM) @_____ °F _____% Moisture

Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)

Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc).

State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator

Equipment specifications

Manufacturer	Model No.	☐ Wet ☐ Dry ☐ Single-Stage ☐ Two-Stage

Gas distribution grids ☐ YES ☐ NO	Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____inches.
Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
Describe in detail

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density	Corona power	Corona power density
_____ Micro amperes/ft^2	_____ Watts/1000 ACFM	_____ Watts/ft^2

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)
Packing type and size (if applicable)	Height of packing (ft) (if applicable)
Number of trays (if applicable)	Number of bubble caps (if applicable)

Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow

Describe pH and/or other monitoring and controls

Absorbent information

Absorbent type and concentration	Sorbent injection rate	Retention time (sec)

Attach equilibrium data for absorption (If applicable).

Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.

Operating parameters

Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.

State operating range for pH and/or absorbent concentration in scrubber liquid.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**

☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**

☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost
N/a				

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

N/a

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

N/a

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

N/a

Section D - Additional Information

Will the construction, modification, etc. of the sources covered by this application increase emissions from other sources at the facility? If so, describe and quantify.
See Narrative

If this project is subject to any one of the following, attach a demonstration to show compliance with applicable standards

a. Prevention of Significant Deterioration permit (PSD), 40 CFR Part 52? ☐ YES ☒ NO

b. New Source Review, 25 Pa. Code Chapter 127, Subchapter E? ☐ YES ☒ NO

c. New Source Performance Standards, 40 CFR Part 60? ☐ YES ☒ NO
(If Yes, which subpart) _____

d. National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61? ☐ YES ☒ NO
If Yes, which subpart) _____

e. Maximum Achievable Control Technology (MACT), 40 CFR Part 63? ☒ YES ☐ NO
(If Yes, which subpart) Subpart ZZZZ

Attach a demonstration showing that the emissions from any new source will be the minimum attainable through the use of best available technology (BAT).

See Attachment A

Provide emission increases and decreases in allowable (or potential) and actual emissions within the last 5 years for applicable PSD pollutant(s) if the facility is an existing major facility (for PSD purposes)

N/a

Section D - Additional Information (Continued)

Indicate emission increases and decreases in tons per year (tpy), for volatile organic compounds (VOCs) and nitrogen oxides (NOx) for NSR applicability since January 1, 1991 or other applicable dates (See other applicable date in instructions). The emissions increases include all emissions including stack, fugitive, material transfer, other emission generating activities, quantifiable emissions from the exempted source(s), etc.

Permit number (if applicable)	Date issued	Indicate ***Yes*** or ***No*** if emission increases and decreases were used previously for netting	Source I.D. or Name	**VOC**s		**NOx**	
				Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)	Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)

If the source is subject to 25 Pa. Code Chapter 127, Subchapter E, New Source Review requirements,

a. Identify Emission Reduction Credits (ERCs) for emission offsets or demonstrate ability to obtain suitable ERCs for emission offsets.

b. Provide a demonstration that the lowest achievable emission rate (LAER) control techniques will be implemented (if applicable).

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

Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of 25 Pa. Code Article III and applicable requirements of the Clean Air Act and regulations adopted there under. The Department may request additional information to evaluate the application such as a stand by plan, a plan for air pollution emergencies, air quality modeling, etc.

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a-Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☐ Monitoring ☐ Testing ☐ Reporting
☐ Recordkeeping ☒ Work Practice Standard

Monitoring:

a. Monitoring device type (stack test, CEM etc.):

b. Monitoring device location:

c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:

Testing:

a. Reference Test Method Citation:

b. Reference Test Method Description:

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency:

Reporting:

a. Describe the type of information to be reported and the reporting frequency:

b. Reporting start date:

Work Practice Standard: Describe each

Limiting hours of Operation to 250 hours per year

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		3.05	0.38	AP-42 Table 3.4-1
PM_{10}		3.05	0.38	AP-42 Table 3.4-1
SO_x		0.05	0.01	AP-42 Table 3.4-1
CO		25.89	3.24	AP-42 Table 3.4-1
NO_x		97.45	12.18	AP-42 Table 3.4-1
VOC		2.74	0.34	AP-42 Table 3.4-1
Others: (e.g., HAPs)	-----	-----	-----	-----
See PTE Calcs				

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Stack and Exhauster

Stack Designation/Number S2 and S3 from SOOP 22-05029

List Source(s) or source ID exhausted to this stack:	% of flow exhausted to stack:
Y1A to S2; Y1B to S3	

Stack height above grade (ft.) 330 Grade elevation (ft.) 302	Stack diameter (ft) or Outlet duct area (sq. ft.) 1ft	Weather Cap ☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

590.98

Does stack height meet Good Engineering Practice (GEP)?

yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. Location listed below is for S2; S3 will be in a similar area with the same stack dimensions.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
	40	9	13.52	76	43	31.69

Stack Exhaust

Volume 1750 ACFM Temperature 350 °F Moisture 3 %

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.

Section G - Attachments

Number and list all attachments submitted with this application below:

- Appendix A contains the required PADEP application;
- Appendix B contains the compliance review form;
- Appendix C contains the required county and municipal notifications;
- Appendix D contains the permit redline;
- Appendix E contains the potential to emit calculations, and;
- Appendix F contains the application fee documentation.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

INSTRUCTIONS FOR COMPLETING A PLAN APPROVAL APPLICATION

- See the detailed instruction package available for plan approval applications.
- Use only the pages for the air cleaning devices that pertain to this project and remove the remaining pages.
- If there is more than one air cleaning device of the same type, copy the page for air cleaning devices and provide the appropriate information for each device.
- If the proposed source is connected to more than one stack and exhauster, copy the page for the stack and exhauster and provide the appropriate information for each stack and exhauster.
- Use additional sheets of paper, if the space provided is not sufficient to provide detailed information required for review and approval.
- Information may be grouped into a single attachment for each section or air cleaning device.
- Number all pages of the application (Sections A through G) accordingly.
- Attach any and all information for source and air cleaning device(s) for a thorough evaluation of the extent and nature of emissions.
- Identify, number and list all attachments made to this application (e.g., Attachment #1-Section A).
- Submit three (3) sets of the completed application with all attachments to the appropriate Regional Office.

2700-PM-AQ0021 Rev. 6/2004

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

Submit in Triplicate

COMBUSTION UNIT

Application for Plan Approval to Construct, Modify or Reactivate an Air Contamination Source and/or Install an Air Cleaning Device

This application and the General Information Form (GIF) must be included in the submittal

Before completing this form, read the instructions provided with this form.

Section A - Facility Name, Checklist And Certification

Organization Name or Registered Fictitious Name/Facility Name: Constellation Energy Generation LLC/Crane Clean Energy Center

DEP Client ID# (If Known): _____

Type of Review required and Fees:

Source which is not subject to NSPS, NESHAPs, MACT, NSR and PSD: ..... $_____
Source requiring approval under NSPS or NESHAPS or both: ..... $_____
Source requiring approval under NSR: ..... $_____
Source requiring the establishment of a MACT limitation: ..... $_____
Source requiring approval under PSD: ..... $_____

Applicant's Checklist

Check the following list to make sure that all the required documents are included.

General Information Form (GIF)

Combustion Unit Plan Approval Application

Compliance Review Form or provide reference of most recently submitted compliance review form for facilities submitting on a periodic basis: _____

Proof of County and Municipal Notifications

Permit Fees

Addendum A: Source Applicable Requirements (only applicable to existing Title V facility)

Certification of Truth, Accuracy and Completeness by a Responsible Official

I, **Trevor Orth**, certify under penalty of law in 18 Pa. C. S. A. §4904, and 35 P.S. §4009(b) (2) that based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate and complete.

(Signature): Trevor P. Orth Date: 2/5/26

Name (Print): Trevor Orth Title: Plant Manager

OFFICIAL USE ONLY

Application No. _____ Unit ID _____ Site ID _____
DEP Client ID #: _____ APS. ID _____ AUTH. ID _____
Date Received _____ Date Assigned _____ Reviewed By _____
Date of 1st Technical Deficiency _____ Date of 2nd Technical Deficiency _____
Comments: _____

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☒ Oil ☐ Natural Gas Other: _____

Description: Security Unit Power Generator – Y2

Manufacturer	Model No.	Number of units
John Deer Kohler		1

Maximum heat input (Btu/hr)	Rated heat input ~~(Btu/hr)~~	Typical heat input (Btu/hr)	Furnace Volume
	755 HP		

Grate Area (if applicable)	Method of firing

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown
ii. Steam Blown
iii. Brushed and Vacuumed
iv. Other _____
v. Frequency of Cleaning _____

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			250

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour	Per day	Per week	Per year
11 gal			2,750 gallons

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			<250 hours

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____ From _____ to _____
Operating using secondary fuel: _____ Form _____ to _____
Non-operating: From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
This unit only runs on Diesel Fuel.

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number 2	11 GPH @ 60°F	2.75 X 10^3 Gal	0.0015% by wt		137 MMBtu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Coal					
Other*					

***** Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)

Number of Burners	Maximum fuel firing rate (all burners)	Normal fuel firing rate

If oil, temperature and viscosity.

Maximum theoretical air requirement

Percent excess air 100% rating

Turndown ratio

Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.

Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	Other. Hours of Operation
Over fire air (OFA)	Burner out of service	
Low-NO_x burner	Reburning	
Low NO_x burners with over fire air	Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation
N/a

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

Describe each proposed modification to an existing source.

N/a - These sources were deactivated and are now being reactivated without modification.

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

These sources will be limited to 250 hours of operation each.

Describe in detail with a schematic diagram of the control options adopted for SO_2 (if applicable).
N/a

Anticipated milestones:

Expected commencement date of construction/reconstruction: _____
Expected completion date of construction/reconstruction: _____
Anticipated date(s) of start-up: _____

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		0.47	250	0.06	AP-42 Table 3.3-1
PM_{10}		0.47	250	0.06	AP-42 Table 3.3-1
SOx		0.44	250	0.06	AP-42 Table 3.3-1
CO		1.44	250	0.18	AP-42 Table 3.3-1
NO_x		6.69	250	0.84	AP-42 Table 3.3-1
VOC		0.53	250	0.07	AP-42 Table 3.3-1
Others: (e.g., HAPs)	-----	-----	-----		-----
See PTE Calcs					

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. See Attachment B.

2. Gas Conditioning

Water quenching ☐ YES ☐ NO Water injection rate _____GPM

Radiation and convection cooling ☐ YES ☐ NO

Air dilution ☐ YES ☐ NO
If YES, _____ CFM

Forced draft ☐ YES ☐ NO

Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume
_____ ACFM@ _____ °F

Outlet volume
_____ ACFM@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors

Manufacturer	Type	Model No.

Pressure Drop (in. of water)	Inlet Volume	Outlet Volume
	_____ ACFM @ _____ °F	_____ ACFM @ _____°F _____% Moisture

Number of Individual Cyclone(s)	Outlet Straightening Vanes Used? ☐ Yes ☐ No

Length of Cyclone(s) Cylinder (ft)	Diameter of Cyclone(s) Cylinder	Length of cyclone(s) cone (ft)

Inlet Diameter (ft) or Duct Area (ft^2) of Cyclone(s)	Outlet Diameter (ft) or Duct area (ft^2) of cyclone(s)

If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?

Describe any exhaust gas recirculation loop to be employed.

Attach particle size efficiency curve

Emission data

Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

4. Fabric Collector

Equipment Specifications

Manufacturer	Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No

Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No

Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No

Dew point at maximum moisture _____ °F | Design inlet volume _____ SCFM

Type of Fabric

Material _____ ☐ Felted ☐ Membrane

Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____

Thickness _____ in ☐ Felted-Woven

Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.

Filter dimensions _____ Diameter/Width _____

Effective area per filter _____ | Maximum operating temperature (°F) _____

Effective air to cloth ratio Minimum _____ Maximum _____

Drawing of Fabric Filter

A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.

Operation and Cleaning

Volume of gases handled _____ ACFM _____ °F	Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.

Type of filter cleaning

☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets

☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____

☐ Pneumatic Shakers ☐ Reverse Air Flow

If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.

Cleaning Initiated By

☐ Timer Frequency if timer actuated _____

☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: _____

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)

Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).

Describe pH monitoring and pH adjustment systems, if applicable.

Describe mist eliminator or separator (type, configuration, backflush capability, frequency).

Attach particulate size efficiency curve.

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @_____°F	Outlet volume of gases handled _____ (ACFM) @_____ °F _____% Moisture

Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)

Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc).

State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator

Equipment specifications

Manufacturer	Model No.	☐ Wet ☐ Dry ☐ Single-Stage ☐ Two-Stage

Gas distribution grids ☐ YES ☐ NO	Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____inches.
Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
Describe in detail

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density	Corona power	Corona power density
_____ Micro amperes/ft^2	_____ Watts/1000 ACFM	_____ Watts/ft^2

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)
Packing type and size (if applicable)	Height of packing (ft) (if applicable)
Number of trays (if applicable)	Number of bubble caps (if applicable)

Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow

Describe pH and/or other monitoring and controls

Absorbent information

Absorbent type and concentration	Sorbent injection rate	Retention time (sec)

Attach equilibrium data for absorption (If applicable).

Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.

Operating parameters

Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.

State operating range for pH and/or absorbent concentration in scrubber liquid.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**

☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**

☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost
N/a				

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

N/a

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

N/a

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

N/a

Section D - Additional Information

Will the construction, modification, etc. of the sources covered by this application increase emissions from other sources at the facility? If so, describe and quantify.
See Narrative

If this project is subject to any one of the following, attach a demonstration to show compliance with applicable standards

a. Prevention of Significant Deterioration permit (PSD), 40 CFR Part 52? ☐ YES ☒ NO

b. New Source Review, 25 Pa. Code Chapter 127, Subchapter E? ☐ YES ☒ NO

c. New Source Performance Standards, 40 CFR Part 60? ☐ YES ☒ NO
(If Yes, which subpart) _____

d. National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61? ☐ YES ☒ NO
If Yes, which subpart) _____

e. Maximum Achievable Control Technology (MACT), 40 CFR Part 63? ☒ YES ☐ NO
(If Yes, which subpart) Subpart ZZZZ

Attach a demonstration showing that the emissions from any new source will be the minimum attainable through the use of best available technology (BAT).

See Attachment A

Provide emission increases and decreases in allowable (or potential) and actual emissions within the last 5 years for applicable PSD pollutant(s) if the facility is an existing major facility (for PSD purposes)

N/a

Section D - Additional Information (Continued)

Indicate emission increases and decreases in tons per year (tpy), for volatile organic compounds (VOCs) and nitrogen oxides (NOx) for NSR applicability since January 1, 1991 or other applicable dates (See other applicable date in instructions). The emissions increases include all emissions including stack, fugitive, material transfer, other emission generating activities, quantifiable emissions from the exempted source(s), etc.

Permit number (if applicable)	Date issued	Indicate ***Yes*** or ***No*** if emission increases and decreases were used previously for netting	Source I.D. or Name	**VOC**s		**NOx**	
				Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)	Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)

If the source is subject to 25 Pa. Code Chapter 127, Subchapter E, New Source Review requirements,

a. Identify Emission Reduction Credits (ERCs) for emission offsets or demonstrate ability to obtain suitable ERCs for emission offsets.

b. Provide a demonstration that the lowest achievable emission rate (LAER) control techniques will be implemented (if applicable).

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

Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of 25 Pa. Code Article III and applicable requirements of the Clean Air Act and regulations adopted there under. The Department may request additional information to evaluate the application such as a stand by plan, a plan for air pollution emergencies, air quality modeling, etc.

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a-Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☐ Monitoring ☐ Testing ☐ Reporting
☐ Recordkeeping ☒ Work Practice Standard

Monitoring:

a. Monitoring device type (stack test, CEM etc.):

b. Monitoring device location:

c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:

Testing:

a. Reference Test Method Citation:

b. Reference Test Method Description:

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency:

Reporting:

a. Describe the type of information to be reported and the reporting frequency:

b. Reporting start date:

Work Practice Standard: Describe each

Limiting hours of Operation to 250 hours per year

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		0.47	0.06	AP-42 Table 3.3-1
PM_{10}		0.47	0.06	AP-42 Table 3.3-1
SO_x		0.44	0.06	AP-42 Table 3.3-1
CO		1.44	0.18	AP-42 Table 3.3-1
NO_x		6.69	0.84	AP-42 Table 3.3-1
VOC		0.53	0.07	AP-42 Table 3.3-1
Others: (e.g., HAPs)	-----	-----	-----	-----
See PTE Calcs				

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations. See Attachment B for PTE calcs. The emissions rates above were calculated per each generator.

2. Stack and Exhauster

Stack Designation/Number S11 from SOOP 22-05029

List Source(s) or source ID exhausted to this stack:	% of flow exhausted to stack:
Y2 to S11	

Stack height above grade (ft.) Grade elevation (ft.)	Stack diameter (ft) or Outlet duct area (sq. ft.)	Weather Cap ☐ YES ☐ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

Does stack height meet Good Engineering Practice (GEP)?

Yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
	40	9	12.21	-76	43	33.25

Stack Exhaust

Volume 164 ACFM Temperature 300 °F Moisture 3 %

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____ RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.

Section G - Attachments

Number and list all attachments submitted with this application below:

- Appendix A contains the required PADEP application;
- Appendix B contains the compliance review form;
- Appendix C contains the required county and municipal notifications;
- Appendix D contains the permit redline;
- Appendix E contains the potential to emit calculations, and;
- Appendix F contains the application fee documentation.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

INSTRUCTIONS FOR COMPLETING A PLAN APPROVAL APPLICATION

- See the detailed instruction package available for plan approval applications.
- Use only the pages for the air cleaning devices that pertain to this project and remove the remaining pages.
- If there is more than one air cleaning device of the same type, copy the page for air cleaning devices and provide the appropriate information for each device.
- If the proposed source is connected to more than one stack and exhauster, copy the page for the stack and exhauster and provide the appropriate information for each stack and exhauster.
- Use additional sheets of paper, if the space provided is not sufficient to provide detailed information required for review and approval.
- Information may be grouped into a single attachment for each section or air cleaning device.
- Number all pages of the application (Sections A through G) accordingly.
- Attach any and all information for source and air cleaning device(s) for a thorough evaluation of the extent and nature of emissions.
- Identify, number and list all attachments made to this application (e.g., Attachment #1-Section A).
- Submit three (3) sets of the completed application with all attachments to the appropriate Regional Office.

2700-PM-AQ0021 Rev. 6/2004

Submit in Triplicate

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

COMBUSTION UNIT

Application for Plan Approval to Construct, Modify or Reactivate an Air Contamination Source and/or Install an Air Cleaning Device

This application and the General Information Form (GIF) must be included in the submittal

Before completing this form, read the instructions provided with this form.

Section A - Facility Name, Checklist And Certification

Organization Name or Registered Fictitious Name/Facility Name: Constellation Energy Generation LLC/Crane Clean Energy Center

DEP Client ID# (If Known): _____

Type of Review required and Fees:

Source which is not subject to NSPS, NESHAPs, MACT, NSR and PSD: ..... $_____
Source requiring approval under NSPS or NESHAPS or both: ..... $_____
Source requiring approval under NSR: ..... $_____
Source requiring the establishment of a MACT limitation: ..... $_____
Source requiring approval under PSD: ..... $_____

Applicant's Checklist

Check the following list to make sure that all the required documents are included.

General Information Form (GIF)

Combustion Unit Plan Approval Application

Compliance Review Form or provide reference of most recently submitted compliance review form for facilities submitting on a periodic basis: _____

Proof of County and Municipal Notifications

Permit Fees

Addendum A: Source Applicable Requirements (only applicable to existing Title V facility)

Certification of Truth, Accuracy and Completeness by a Responsible Official

I, **Trevor Orth**, certify under penalty of law in 18 Pa. C. S. A. §4904, and 35 P.S. §4009(b) (2) that based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate and complete.

(Signature): Trevor R Orth Date: 2/5/26

Name (Print): Trevor Orth Title: Plant Manager

OFFICIAL USE ONLY

Application No. _____ Unit ID _____ Site ID _____
DEP Client ID #: _____ APS. ID _____ AUTH. ID _____
Date Received _____ Date Assigned _____ Reviewed By _____
Date of 1st Technical Deficiency _____ Date of 2nd Technical Deficiency _____
Comments: _____

Section B - Combustion Unit Information

1. Combustion Units: ☐ Coal ☒ Oil ☐ Natural Gas Other: _____

Description: Station Blackout Fuel Oil Generator - Y4

Manufacturer	Model No.	Number of units
Fairbanks Morse	38TD8 1/8	1

Maximum heat input (Btu/hr)	Rated heat input ~~(Btu/hr)~~	Typical heat input (Btu/hr)	Furnace Volume
	4150 HP		

Grate Area (if applicable)	Method of firing

Indicate how combustion air is supplied to boiler

Indicate the Steam Usage:

Mark and describe soot Cleaning Method:

i. Air Blown
ii. Steam Blown
iii. Brushed and Vacuumed
iv. Other _____
v. Frequency of Cleaning _____

Maximum Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			250

Operational restrictions taken or requested, if any (e.g., bottlenecks or voluntary restrictions to limit potential to emit)

Capacity (specify units)

Per hour	Per day	Per week	Per year
212 gal			53,000 gal

Typical Operating schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			<250

Seasonal variations (Months): If variations exist, describe them.

Operating using primary fuel: _____ From _____ to _____
Operating using secondary fuel: _____ Form _____ to _____
Non-operating: From _____ to _____

2. Specify the primary, secondary and startup fuel. Furnish the details in item 3.
This source will only run on Diesel Fuel.

Section B - Combustion Unit Information (Continued)

3. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number 2	212 GPH @ 60°F	53.0 X 10^3 Gal	0.0015% by wt		137 MMBtu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Gas (other)	SCFH	X 10^6 Gal	gr/100 SCF		Btu/SCF
Coal					
Other*					

***** Note: Describe and furnish information separately for other fuels in Addendum B.

4. Burner

Manufacturer	Model Number	Type of Atomization (Steam, air, press, mech., rotary cup)

Number of Burners	Maximum fuel firing rate (all burners)	Normal fuel firing rate

If oil, temperature and viscosity.

Maximum theoretical air requirement

Percent excess air 100% rating

Turndown ratio

Combustion modulation control (on/off, low-high fire, full automatic, manual). Describe.

Main burner flame ignition method (electric spark, auto gas pilot, hand-held torch, other). Describe.

5. Nitrogen Oxides (NO_x) control Options

Mark and describe the NO_x control options adopted

Low excess air (LEA)	Flue gas recirculation	Other.Limiting hours of operation
Over fire air (OFA)	Burner out of service	
Low-NO_x burner	Reburning	
Low NO_x burners with over fire air	Flue gas treatment (SCR / SNCR)	

Section B - Combustion Unit Information (Continued)

6. Miscellaneous Information

Describe fly ash reinjection operation
N/a

Describe, in detail, the equipment provided to monitor and to record the source(s) operating conditions, which may affect emissions of air contaminants. Show that they are reasonable and adequate.

Describe each proposed modification to an existing source.

N/a - These sources were deactivated and are now being reactivated without modification.

Describe how emissions will be minimized especially during start up, shut down, combustion upsets and/or disruptions. Provide emission estimates for start up, shut down and upset conditions. Provide duration of start up and shut down.

These sources will be limited to 250 hours of operation each.

Describe in detail with a schematic diagram of the control options adopted for SO_2 (if applicable).
N/a

Anticipated milestones:

Expected commencement date of construction/reconstruction: _____
Expected completion date of construction/reconstruction: _____
Anticipated date(s) of start-up: _____

Section C - Air Cleaning Device

1. Precontrol Emissions*

Emission Rate

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		2.93	250	0.37	AP-42 Table 3.4-1
PM_{10}		2.93	250	0.37	AP-42 Table 3.4-1
SOx		0.04	250	0.01	AP-42 Table 3.4-1
CO		24.87	250	3.11	AP-42 Table 3.4-1
NO_x		93.62	250	11.70	AP-42 Table 3.4-1
VOC		2.63	250	0.33	AP-42 Table 3.4-1
Others: (e.g., HAPs)	-----	-----	-----		-----
See PTE Calcs					

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations. See Attachment B - The emission rates above were calculated per each generator.

2. Gas Conditioning

Water quenching ☐ YES ☐ NO Water injection rate _____GPM

Radiation and convection cooling ☐ YES ☐ NO

Air dilution ☐ YES ☐ NO

If YES, _____ CFM

Forced draft ☐ YES ☐ NO

Water cooled duct work ☐ YES ☐ NO

Other _____

Inlet volume

_____ ACFM@ _____ °F

Outlet volume

_____ ACFM@ _____ °F _____ % Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Inertial and Cyclone Collectors

Manufacturer	Type	Model No.

Pressure Drop (in. of water)	Inlet Volume	Outlet Volume
	_____ ACFM @ _____ °F	_____ ACFM @ _____°F _____% Moisture

Number of Individual Cyclone(s)	Outlet Straightening Vanes Used? ☐ Yes ☐ No

Length of Cyclone(s) Cylinder (ft)	Diameter of Cyclone(s) Cylinder	Length of cyclone(s) cone (ft)

Inlet Diameter (ft) or Duct Area (ft^2) of Cyclone(s)	Outlet Diameter (ft) or Duct area (ft^2) of cyclone(s)

If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?

Describe any exhaust gas recirculation loop to be employed.

Attach particle size efficiency curve

Emission data

Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

4. Fabric Collector

Equipment Specifications

Manufacturer	Model No. ☐ Pressurized Design ☐ Suction Design	
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No

Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No

Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No

Dew point at maximum moisture _____ °F | Design inlet volume _____ SCFM

Type of Fabric

Material _____ ☐ Felted ☐ Membrane

Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____

Thickness _____ in ☐ Felted-Woven

Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.

Filter dimensions _____ Diameter/Width _____

Effective area per filter _____ | Maximum operating temperature (°F) _____

Effective air to cloth ratio Minimum _____ Maximum _____

Drawing of Fabric Filter

A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.

Operation and Cleaning

Volume of gases handled _____ ACFM _____ °F	Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.

Type of filter cleaning

☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets

☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____

☐ Pneumatic Shakers ☐ Reverse Air Flow

If compressed air is required for collector operation, describe the equipment with the compressor to provide dry air free from oil.

Cleaning Initiated By

☐ Timer Frequency if timer actuated _____

☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Wet Collection Equipment: _____

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)

Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).

Describe pH monitoring and pH adjustment systems, if applicable.

Describe mist eliminator or separator (type, configuration, backflush capability, frequency).

Attach particulate size efficiency curve.

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @_____°F	Outlet volume of gases handled _____ (ACFM) @_____ °F _____% Moisture

Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)

Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc).

State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Electrostatic Precipitator

Equipment specifications

Manufacturer	Model No.	☐ Wet ☐ Dry ☐ Single-Stage ☐ Two-Stage

Gas distribution grids ☐ YES ☐ NO	Design inlet volume (SCFM) _____ Maximum operating temperature (°F) _____

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.
Number of fields _____ Number of collector plates/field _____. Spacing between collector plates _____inches.
Maximum gas velocity _____ ft/sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.
Number of discharge electrodes _____ Number collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____
Describe in detail

Operating parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (water gauge) across collector only. Describe the equipment.
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier	
			KV Ave./Peak	MaDC

Current density	Corona power	Corona power density
_____ Micro amperes/ft^2	_____ Watts/1000 ACFM	_____ Watts/ft^2

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Absorption Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Tower height (ft) and inside diameter (ft)
Packing type and size (if applicable)	Height of packing (ft) (if applicable)
Number of trays (if applicable)	Number of bubble caps (if applicable)

Configuration: ☐ Counter-current ☐ Cross flow ☐ Cocurrent flow

Describe pH and/or other monitoring and controls

Absorbent information

Absorbent type and concentration	Sorbent injection rate	Retention time (sec)

Attach equilibrium data for absorption (If applicable).

Attach any additional information regarding auxiliary equipment, reagent (slurry mix) supply system (once through or recirculating, system capacity, etc) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.

Operating parameters

Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in of water) and liquid flow rate. Describe the equipment.

State operating range for pH and/or absorbent concentration in scrubber liquid.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. ☐ **SELECTIVE CATALYTIC REDUCTION (SCR)**

☐ **SELECTIVE NON-CATALYTIC REDUCTION (SNCR)**

☐ **NON-SELECTIVE CATALYTIC REDUCTION (NSCR)**

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., Ammonia, urea slip).

Operating parameters

Volume of gases handled (ACFM) _____ @ _____ (°F)

Operating temperature range for the SCR/SNCR/NSCR system (°F) From To

Reducing agent used, if any.	Oxidation catalyst used, if any.

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls system, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Other Control Equipment: _____

Equipment specifications

Manufacturer	Type	Model No

Design inlet volume (SCFM)	Capacity

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/ or other efficiency information.

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operating parameters

Volume of gas handled

_____ @ _____ °F _____ % Moisture

Describe, in detail, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

Device	Direct Cost	Indirect Cost	Total Cost	Operating Cost
N/a				

11 MISCELLANEOUS

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

N/a

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

N/a

Attach the maintenance schedule for the control equipment and any part of the process equipment that, if in disrepair, would increase air contaminant emissions.

N/a

Section D - Additional Information

Will the construction, modification, etc. of the sources covered by this application increase emissions from other sources at the facility? If so, describe and quantify.
See Narrative

If this project is subject to any one of the following, attach a demonstration to show compliance with applicable standards

a. Prevention of Significant Deterioration permit (PSD), 40 CFR Part 52? ☐ YES ☒ NO

b. New Source Review, 25 Pa. Code Chapter 127, Subchapter E? ☐ YES ☒ NO

c. New Source Performance Standards, 40 CFR Part 60? ☐ YES ☒ NO
(If Yes, which subpart) _____

d. National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61? ☐ YES ☒ NO
If Yes, which subpart) _____

e. Maximum Achievable Control Technology (MACT), 40 CFR Part 63? ☒ YES ☐ NO
(If Yes, which subpart) Subpart ZZZZ

Attach a demonstration showing that the emissions from any new source will be the minimum attainable through the use of best available technology (BAT).

See Attachment A

Provide emission increases and decreases in allowable (or potential) and actual emissions within the last 5 years for applicable PSD pollutant(s) if the facility is an existing major facility (for PSD purposes)

N/a

Section D - Additional Information (Continued)

Indicate emission increases and decreases in tons per year (tpy), for volatile organic compounds (VOCs) and nitrogen oxides (NOx) for NSR applicability since January 1, 1991 or other applicable dates (See other applicable date in instructions). The emissions increases include all emissions including stack, fugitive, material transfer, other emission generating activities, quantifiable emissions from the exempted source(s), etc.

Permit number (if applicable)	Date issued	Indicate ***Yes*** or ***No*** if emission increases and decreases were used previously for netting	Source I.D. or Name	**VOC**s		**NOx**	
				Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)	Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)

If the source is subject to 25 Pa. Code Chapter 127, Subchapter E, New Source Review requirements,

a. Identify Emission Reduction Credits (ERCs) for emission offsets or demonstrate ability to obtain suitable ERCs for emission offsets.

b. Provide a demonstration that the lowest achievable emission rate (LAER) control techniques will be implemented (if applicable).

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

Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of 25 Pa. Code Article III and applicable requirements of the Clean Air Act and regulations adopted there under. The Department may request additional information to evaluate the application such as a stand by plan, a plan for air pollution emergencies, air quality modeling, etc.

Section E - Compliance Demonstration

Note: Complete this section if the facility is not a-Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below.

☐ Monitoring ☐ Testing ☐ Reporting
☐ Recordkeeping ☒ Work Practice Standard

Monitoring:

a. Monitoring device type (stack test, CEM etc.):

b. Monitoring device location:

c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:

Testing:

a. Reference Test Method Citation:

b. Reference Test Method Description:

Recordkeeping:

Describe the parameters that will be recorded and the recording frequency:

Reporting:

a. Describe the type of information to be reported and the reporting frequency:

b. Reporting start date:

Work Practice Standard: Describe each

Limiting hours of Operation to 250 hours per year

Section F - Flue and Air Contaminant Emission

1. Estimated Maximum Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		2.93	0.37	AP-42 Table 3.4-1
PM_{10}		2.93	0.37	AP-42 Table 3.4-1
SO_x		0.04	0.01	AP-42 Table 3.4-1
CO		24.87	3.11	AP-42 Table 3.4-1
NO_x		93.62	11.70	AP-42 Table 3.4-1
VOC		2.63	0.33	AP-42 Table 3.4-1
Others: (e.g., HAPs)	-----	-----	-----	-----
See PTE Calcs				

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Stack and Exhauster

Stack Designation/Number S4 from SOOP 22-05029

List Source(s) or source ID exhausted to this stack:	% of flow exhausted to stack:
Y4	

Stack height above grade (ft.) 28 Grade elevation (ft.) 302	Stack diameter (ft) or Outlet duct area (sq. ft.) 1ft	Weather Cap ☐ YES ☒ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

590.98

Does stack height meet Good Engineering Practice (GEP)?

yes

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions. Location listed below is for S2; S3 will be in a similar area with the same stack dimensions.

Location of Stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
	40	9	13.52	76	43	31.69

Stack Exhaust

Volume 1750 ACFM Temperature 350 °F Moisture 3 %

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____RPM.

** If the datum and collection method information and codes differ from those provided on the General Information Form - Authorization Application, provide the additional required by that form on a separate sheet.

Section G - Attachments

Number and list all attachments submitted with this application below:

- Appendix A contains the required PADEP application;
- Appendix B contains the compliance review form;
- Appendix C contains the required county and municipal notifications;
- Appendix D contains the permit redline;
- Appendix E contains the potential to emit calculations, and;
- Appendix F contains the application fee documentation.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

Instructions for Completing a Plan Approval Application

- See the detailed instruction package available for plan approval applications.
- Use only the pages for the air cleaning devices that pertain to this project and remove the remaining pages.
- If there is more than one air cleaning device of the same type, copy the page for air cleaning devices and provide the appropriate information for each device.
- If the proposed source is connected to more than one stack and exhauster, copy the page for the stack and exhauster and provide the appropriate information for each stack and exhauster.
- Use additional sheets of paper, if the space provided is not sufficient to provide detailed information required for review and approval.
- Information may be grouped into a single attachment for each section or air cleaning device.
- Number all pages of the application (Sections A through G) accordingly.
- Attach any and all information for source and air cleaning device(s) for a thorough evaluation of the extent and nature of emissions.
- Identify, number and list all attachments made to this application (e.g., Attachment #1-Section A).
- Submit three (3) sets of the completed application with all attachments to the appropriate Regional Office.

2700-PM-AQ0007 Rev. 7/2004

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

Submit in Triplicate

PROCESSES

Application for Plan Approval to Construct, Modify or Reactivate an Air Contamination Source and/or Install an Air Cleaning Device

This application must be submitted with the General Information Form (GIF).

Before completing this form, read the instructions provided for the form.

Section A - Facility Name, Checklist And Certification

Organization Name or Registered Fictitious Name/Facility Name: Constellation Energy Generation LLC/Crane Clean Energy Center

DEP Client ID# (if known): _____

Type of Review required and Fees:

- ☐ Source which is not subject to NSPS, NESHAPs, MACT, NSR and PSD: ..... $_____
- ☐ Source requiring approval under NSPS or NESHAPS or both: ..... $_____
- ☐ Source requiring approval under NSR regulations: ..... $_____
- ☐ Source requiring the establishment of a MACT limitation: ..... $_____
- ☐ Source requiring approval under PSD: ..... $_____

Applicant's Checklist

Check the following list to make sure that all the required documents are included.

- ☒ **General Information Form (GIF)**
- ☒ **Processes Plan Approval Application**
- ☒ **Compliance Review Form** or provide reference of most recently submitted compliance review form for facilities submitting on a periodic basis: _____
- ☒ **Copy and Proof of County and Municipal Notifications**
- ☒ **Permit Fees**
- ☐ **Addendum A:** Source Applicable Requirements (only applicable to existing Title V facility)

Certification of Truth, Accuracy and Completeness by a Responsible Official

I, **Trevor Orth**, certify under penalty of law in 18 Pa. C. S. A. §4904, and 35 P.S. §4009(b) (2) that based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate and complete.

(Signature): Trevor L. Orth Date: 2/5/26

Name (Print): Trevor Orth Title: Plant Manager

OFFICIAL USE ONLY

Application No. _____ Unit ID _____ Site ID _____

DEP Client ID #: _____ APS. ID _____ AUTH. ID _____

Date Received _____ Date Assigned _____ Reviewed By _____

Date of 1st Technical Deficiency _____ Date of 2nd Technical Deficiency _____

Comments: _____

Section B - Processes Information

1. Source Information

Source Description (give type, use, raw materials, product, etc). Attach additional sheets as necessary.
Cooling Tower A and B

Manufacturer	Model No.	Number of Sources
Custom Builds	N/a	2
Source Designation	Maximum Capacity	Rated Capacity

Type of Material Processed

Maximum Operating Schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
24	7	365	8,760

Operational restrictions existing or requested, if any (e.g., bottlenecks or voluntary restrictions to limit PTE)

Capacity (specify units)

Per Minute	Per Day	Per Week	Per Year
215,000 gallons			

Operating Schedule

Hours/Day	Days/Week	Days/Year	Hours/Year
			8,760

Seasonal variations (Months) From to

If variations exist, describe them

2. Fuel

Type	Quantity Hourly	Annually	Sulfur	% Ash (Weight)	BTU Content
Oil Number _____	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Oil Number _____	GPH @ 60°F	X 10^3 Gal	% by wt		Btu/Gal. & Lbs./Gal. @ 60 °F
Natural Gas	SCFH	X 10^6 SCF	grain/100 SCF		Btu/SCF
Gas (other) _____	SCFH	X 10^6 SCF	grain/100 SCF		Btu/SCF
Coal _____	TPH	Tons	% by wt		Btu/lb
Other * _____					
_____					
_____					

*Note: Describe and furnish information separately for other fuels in Addendum B.

Section B - Processes Information (Continued)

3. Burner

Manufacturer	Type and Model No.	Number of Burners
Description:		
Rated Capacity	Maximum Capacity	

4. Process Storage Vessels

A. For Liquids:

Name of material stored		
Tank I.D. No.	Manufacturer	Date Installed
Maximum Pressure	Capacity (gallons/Meter^3)	
Type of relief device (pressure set vent/conservation vent/emergency vent/open vent)		
Relief valve/vent set pressure (psig)	Vapor press. of liquid at storage temp. (psia/kPa)	
Type of Roof: Describe:		
Total Throughput Per Year	Number of fills per day (fill/day): Filling Rate (gal./min.): Duration of fill hr./fill):	

B. For Solids

Type: ☐ Silo ☐ Storage Bin ☐Other, Describe	Name of Material Stored	
Silo/Storage Bin I.D. No.	Manufacturer	Date Installed
State whether the material will be stored in loose or bags in silos	Capacity (Tons)	
Turn over per year in tons	Turn over per day in tons	
Describe fugitive dust control system for loading and handling operations		
Describe material handling system		

5. Request for Confidentiality

Do you request any information on this application to be treated as "Confidential"? ☐ Yes ☒ No
If yes, include justification for confidentiality. Place such information on separate pages marked **"confidential"**.

Section B - Processes Information (Continued)

6. Miscellaneous Information

Attach flow diagram of process giving all (gaseous, liquid and solid) flow rates. Also, list all raw materials charged to process equipment, and the amounts charged (tons/hour, etc.) at rated capacity (give maximum, minimum and average charges describing fully expected variations in production rates). Indicate (on diagram) all points where contaminants are controlled (location of water sprays, collection hoods, or other pickup points, etc.). Describe collection hoods location, design, airflow and capture efficiency. Describe any restriction requested and how it will be monitored.

Describe fully the facilities provided to monitor and to record process operating conditions, which may affect the emission of air contaminants. Show that they are reasonable and adequate.

Describe each proposed modification to an existing source.
Cooling Tower B will be modified to match the process dimensions and flowrates of Cooling Tower A. As such, both boilers will have matching emissions specifications.

Identify and describe all fugitive emission points, all relief and emergency valves and any by-pass stacks.

Describe how emissions will be minimized especially during start up, shut down, process upsets and/or disruptions.
N/a - continuously operational

Anticipated Milestones:

i. Expected commencement date of construction/reconstruction/installation: _____
ii. Expected completion date of construction/reconstruction/installation: _____
iii. Anticipated date of start-up: _____

Section C - Air Cleaning Device

1. Precontrol Emissions*

Pollutant	Maximum Emission Rate				Calculation/ Estimation Method
	Specify Units	Pounds/Hour	Hours/Year	Tons/Year	
PM		1.72	8760	7.544	AP-42: Section 13.4
SO_x					
CO					
NO_x					
VOC					
Others: (e.g., HAPs)	-----	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate, e.g., operating schedule for maximum limits or restricted hours of operation and/or restricted throughput. Describe how the emission values were determined. Attach calculations.

These emissions are per each Cooling Tower. PTE Calculations attached.

2. Gas Cooling

Water quenching ☐ Yes ☐ No Water injection rate _____ GPM

Radiation and convection cooling ☐ Yes ☐ No	Air dilution ☐ Yes ☐ No If yes, _____CFM
Forced Draft ☐ Yes ☐ No	Water cooled duct work ☐ Yes ☐ No
Other	
Inlet Volume _____ACFM @ _____°F _____% Moisture	Outlet Volume _____ACFM @ _____°F _____% Moisture

Describe the system in detail.

Section C - Air Cleaning Device (Continued)

3. Settling Chambers

Manufacturer	Volume of gas handled _____ACFM @ _____°F	Gas velocity (ft/sec.)

Length of chamber (ft.)	Width of chamber (ft.)	Height of chamber (ft.)	Number of trays

Water injection ☐ Yes ☐ No	Water injection rate (GPM)

Emissions Data

Inlet	Outlet	Removal Efficiency (%)

4. Inertial and Cyclone Collectors

Manufacturer	Type	Model No.
Pressure drop (in. of water)	Inlet volume _____ACFM @ _____°F	Outlet volume _____ACFM @ _____°F

Number of individual cyclone(s)	Outlet straightening vanes used? ☐ Yes ☐ No

Length of Cyclone(s) Cylinder (ft.)	Diameter of Cyclone(s) Cylinder (ft.)	Length of Cyclone(s) cone (ft.)

Inlet Diameter (ft.) or duct area ($ft.^2$) of cyclone(s)	Outlet Diameter (ft.) or duct area ($ft.^2$) of cyclone(s)

If a multi-clone or multi-tube unit is installed, will any of the individual cyclones or cyclone tubes be blanked or blocked off?

Describe any exhaust gas recirculation loop to be employed.

Attach particle size efficiency curve

Emissions Data

Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

5. Fabric Collector

Equipment Specifications

Manufacturer	Model No.	☐ Pressurized Design ☐ Suction Design
Number of Compartments	Number of Filters Per Compartment	Is Baghouse Insulated? ☐ Yes ☐ No

Can each compartment be isolated for repairs and/or filter replacement? ☐ Yes ☐ No

Are temperature controls provided? (Describe in detail) ☐ Yes ☐ No

Dew point at maximum moisture _____ °F | Design inlet volume _____ SCFM

Type of Fabric

Material _____ ☐ Felted ☐ Membrane

Weight _____ oz/sq.yd ☐ Woven ☐ Others: List: _____

Thickness _____ in ☐ Felted-Woven

Fabric permeability (clean) @ ½" water-Δ P _____ CFM/sq.ft.

Filter dimensions Length _____ Diameter/Width _____

Effective area per filter _____ | Maximum operating temperature (°F) _____

Effective air to cloth ratio Minimum _____ Maximum _____

Drawing of Fabric Filter

A sketch of the fabric filter showing all access doors, catwalks, ladders and exhaust ductwork, location of each pressure and temperature indicator should be attached.

Operation and Cleaning

Volume of gases handled _____ ACFM @ _____ °F	Pressure drop across collector (in. of water). Describe the equipment to be used to monitor the pressure drop.

Type of filter cleaning

☐ Manual Cleaning ☐ Bag Collapse ☐ Reverse Air Jets

☐ Mechanical Shakers ☐ Sonic Cleaning ☐ Other: _____

☐ Pneumatic Shakers ☐ Reverse Air Flow

Describe the equipment provided if dry oil free air is required for collector operation

Cleaning Initiated By

☐ Timer Frequency if timer actuated _____

☐ Expected pressure drop range _____ in. of water ☐ Other Specify _____

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when the unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

6. Wet Collection Equipment

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Relative Particulate/Gas Velocity (ejector scrubbers only)

Describe the internal features (e.g., variable throat, gas/liquid diffusion plates, spray nozzles, liquid redistributors, bed limiters, etc.).

Describe pH monitoring and pH adjustment systems, if applicable.

Describe mist eliminator or separator (type, configuration, backflush capability, frequency).

Attach particulate size efficiency curve.

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____°F	Outlet volume of gases handled _____ (ACFM) @ _____ °F _____% Moisture

Liquid flow rates. Describe equipment provided to measure liquid flow rates to scrubber (e.g., quenching section, recirculating solution, makeup water, bleed flow, etc.)

Describe scrubber liquid supply system (amount of make-up and recirculating liquid, capacity of recirculating liquid system, etc.)

State pressure drop range (in water) across scrubber (e.g., venturi throat, packed bed, etc.) only. Describe the equipment provide to measure the pressure drop. Do not include duct or de-mister losses.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

7. Electrostatic Precipitator

Equipment Specifications

Manufacturer	Model No.	☐ Wet ☐ Dry ☐ Single-Stage ☐ Two-Stage

Gas distribution grids ☐ Yes ☐ No

Design Inlet Volume (SCFM) _____

Maximum operating temperature (°F) _____

Total collecting surface area _____ sq. ft. Collector plates size length _____ ft. x width _____ ft.

Number of fields _____ Number of collector plates/field _____

Spacing between collector plates _____ inches.

Maximum gas velocity _____ ft./sec. Minimum gas treatment time: _____ sec.

Total discharge electrode length _____ ft.

Number of discharge electrodes _____ Number of collecting electrode rappers _____

Rapper control ☐ Magnetic ☐ Pneumatic ☐ Other _____ Describe in detail

Operating Parameters

Inlet gas temperature (°F) _____ Outlet gas temperature (°F) _____	State pressure drop range (inches water gauge) across collector only _____ Describe the equipment
Volume of gas handled (ACFM) _____	Dust resistivity (ohm-cm). Will resistivity vary?

Power requirements

Number and size of Transformer Rectifier sets by electrical field

Field No.	No. of Sets	Each Transformer KVA	Each Rectifier KV Ave./Peak	Each Rectifier Ma DC

Current Density	Corona Power	Corona Power Density
_____ Micro amperes/ft^2.	_____ Watts/1000 ACFM	_____ Watts/ft^2.

Will a flue gas conditioning system be employed? If yes, describe it.

Does air cleaning device employ hopper heaters, hopper vibrators or hopper level detectors? If yes, describe.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

8. Adsorption Equipment

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Adsorbent charge per adsorber vessel and number of adsorber vessels

Length of Mass Transfer Zone (MTZ), supplied by the manufacturer based upon laboratory data.

Adsorber diameter (ft.) and area ft^2.)	Adsorption bed depth (ft.)

Adsorbent information

Adsorbent type and physical properties.

Working capacity of adsorbent (%)	Heel percent or unrecoverable solvent weight % in the adsorbent after regeneration.

Operating Parameters

Inlet volume of gases handled _____ (ACFM) @ _____ °F

Adsorption time per adsorption bed	Breakthrough capacity: Lbs. of solvent / 100 lbs. of adsorbent = _____
Vapor pressure of solvents at the inlet temperature	Available steam in pounds to regenerate carbon adsorber (if applicable)

Percent relative saturation of each solvent at the inlet temperature

Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

9. Absorption Equipment

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Tower height (ft.) and inside diameter (ft.)
Packing type and size (if applicable)	Height of packing (ft.) (if applicable)
Number of trays (if applicable)	Number of bubble caps (if applicable)

Configuration

☐ Counter-current ☐ Cross flow ☐ Cocurrent flow

Describe pH and/or other monitoring and controls.

Absorbent information

Absorbent type and concentration.	Retention time (sec.)

Attach equilibrium data for absorption (if applicable)

Attach any additional information regarding auxiliary equipment, absorption solution supply system (once through or recirculating, system capacity, etc.) to thoroughly evaluate the control equipment. Indicate the flow rates for makeup, bleed and recirculation.

Operating Parameters

Volume of gas handled (ACFM)	Inlet temperature (°F)	Pressure drop (in. of water) and liquid flow rate. Describe the monitoring equipment.

State operating range for pH and/or absorbent concentration in scrubber liquid.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

10. ☐ **Selective Catalytic Reduction (SCR)**
☐ **Selective Non-Catalytic Reduction (SNCR)**
☐ **Non-Selective Catalytic Reduction (NSCR)**

Equipment Specifications

Manufacturer	Type	Model No.

Design Inlet Volume (SCFM)	Design operating temperature (°F)

Is the system equipped with process controls for proper mixing/control of the reducing agent in gas stream? If yes, give details.

Attach efficiency and other pertinent information (e.g., ammonia slip)

Operating Parameters

Volume of gases handled _____ (ACFM) @ _____ °F

Operating temperature range for the SCR/SNCR/NSCR system (°F) From _____°F To _____°F

Reducing agent used, if any	Oxidation catalyst used, if any

State expected range of usage rate and concentration.

Service life of catalyst	Ammonia slip (ppm)

Describe fully with a sketch giving locations of equipment, controls systems, important parameters and method of operation.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

11. Oxidizer/Afterburners

Equipment Specifications

Manufacturer	Type ☐ Thermal ☐ Catalytic	Model No.
Design Inlet Volume (SCFM)	Combustion chamber dimensions (length, cross-sectional area, effective chamber volume, etc.)	

Describe design features, which will ensure mixing in combustion chamber.

Describe method of preheating incoming gases (if applicable).	Describe heat exchanger system used for heat recovery (if applicable).

Catalyst used	Life of catalyst	Expected temperature rise across catalyst (°F)	Dimensions of bed (in inches). Height: _____ Diameter or Width: _____ Depth: _____

Are temperature sensing devices being provided to measure the temperature rise across the catalyst? ☐ Yes ☐ No
If yes, describe.

Describe any temperature sensing and/or recording devices (including specific location of temperature probe in a drawing or sketch.

Burner Information

Burner Manufacturer	Model No.	Fuel Used
Number and capacity of burners	Rated capacity (each)	Maximum capacity (each)

Describe the operation of the burner	Attach dimensioned diagram of afterburner

Operating Parameters

Inlet flow rate (ACFM) _____ @ _____°F	Outlet flow rate (ACFM) _____@ _____°F
State pressure drop range across catalytic bed (in. of water).	Describe the method adopted for regeneration or disposal of the used catalyst.

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

12. Flares

Equipment Specifications

Manufacturer	Type ☐ Elevated flare ☐ Ground flare ☐ Other _____ Describe	Model No.
Design Volume (SCFM)	Dimensions of stack (ft.) Diameter _____ Height _____	
Residence time (sec.) and outlet temperature (°F)	Turn down ratio	Burner details

Describe the flare design (air/steam-assisted or nonassisted), essential auxiliaries including pilot flame monitor of proposed flare with a sketch.

Describe the operation of the flare's ignition system.

Describe the provisions to introduce auxiliary fuel to the flare.

Operation Parameters

Detailed composition of the waste gas	Heat content	Exit velocity
Maximum and average gas flow burned (ACFM)	Operating temperature (°F)	

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

13. Other Control Equipment – Drift Eliminator

Equipment Specifications

Manufacturer	Type	Model No.
Marley	Drift Eliminator	TU12C

Design Drift Rate	Capacity
0.001%	

Describe pH monitoring and pH adjustment, if any.

Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.

Attach efficiency curve and/or other efficiency information.

Attach any additional date including auxiliary equipment and operation details to thoroughly evaluate the control equipment.

Operation Parameters

Volume of gas handled

_____ ACFM @ _____ °F _____ % Moisture

Describe fully giving important parameters and method of operation.

This control device is an inherent device to the design and operation of the Cooling tower. Drift eliminators lower the drift rate, allowing for the capturing of PM through the water flow. The drift eliminator used in these cooling towers guarantees a drift rate of 0.001%

Describe the warning/alarm system that protects against operation when unit is not meeting design requirements.

Emissions Data

Pollutant	Inlet	Outlet	Removal Efficiency (%)

Section C - Air Cleaning Device (Continued)

14. Costs

Indicate cost associated with air cleaning device and its operating cost (attach documentation if necessary)

N/a

Device	Direct Cost	Indirect Cost	Total Cost	Annual Operating Cost

15. Miscellaneous

Describe in detail the removal, handling and disposal of dust, effluent, etc. from the air cleaning device including proposed methods of controlling fugitive emissions.

N/a

Attach manufacturer's performance guarantees and/or warranties for each of the major components of the control system (or complete system).

N/a

Attach the maintenance schedule for the control equipment and any part of the process equipment that if in disrepair would increase air contaminant emissions.

N/a

Section D - Additional Information

Will the construction, modification, etc. of the sources covered by this application increase emissions from other sources at the facility? If so, describe and quantify.

N/a

If this project is subject to any one of the following, attach a demonstration to show compliance with applicable standards.

a. Prevention of Significant Deterioration permit (PSD), 40 CFR 52? ☐ YES ☒ NO

b. New Source Review (NSR), 25 Pa. Code Chapter 127, Subchapter E? ☐ YES ☒ NO

c. New Source Performance Standards (NSPS), 40 CFR Part 60? ☐ YES ☒ NO
(If Yes, which subpart) _____

d. National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61? (If Yes, which subpart) _____ ☐ YES ☒ NO

e. Maximum Achievable Control Technology (MACT) 40 CFR Part 63? ☐ YES ☒ NO
(If Yes, which part) _____

Attach a demonstration showing that the emissions from any new sources will be the minimum attainable through the use of best available technology (BAT).

See Attachment A

Provide emission increases and decreases in allowable (or potential) and actual emissions within the last five (5) years for applicable PSD pollutant(s) if the facility is an existing major facility (PSD purposes).

N/a

Section D - Additional Information (Continued)

Indicate emission increases and decreases in tons per year (tpy), for volatile organic compounds (VOCs) and nitrogen oxides (NOx) for NSR applicability since January 1, 1991 or other applicable dates (see other applicable dates in instructions). The emissions increases include all emissions including stack, fugitive, material transfer, other emission generating activities, quantifiable emissions from exempted source(s), etc.

Permit number (if applicable)	Date issued	Indicate ***Yes*** or ***No*** if emission increases and decreases were used previously for netting	Source I. D. or Name	VOCs		NOx	
				Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)	Emission increases in potential to emit (tpy)	Creditable emission decreases in actual emissions (tpy)

If the source is subject to 25 Pa. Code Chapter 127, Subchapter E, New Source Review requirements,

a. Identify Emission Reduction Credits (ERCs) for emission offsets or demonstrate ability to obtain suitable ERCs for emission offsets. N/a

b. Provide a demonstration that the lowest achievable emission rate (LAER) control techniques will be employed (if applicable). N/a

c. Provide an analysis of alternate sites, sizes, production processes and environmental control techniques demonstrating that the benefits of the proposed source outweigh the environmental and social costs (if applicable). N/a

Attach calculations and any additional information necessary to thoroughly evaluate compliance with all the applicable requirements of Article III and applicable requirements of the Clean Air Act adopted thereunder The Department may request additional information to evaluate the application such as a standby plan, a plan for air pollution emergencies, air quality modeling, etc. See PTE Calculations

Section E - Compliance Demonstration

Note: Complete this section if source is not a Title V facility. Title V facilities must complete Addendum A.

Method of Compliance Type: Check all that apply and complete all appropriate sections below

☐ Monitoring ☐ Testing ☐ Reporting

☐ Recordkeeping ☐ Work Practice Standard

Monitoring:

a. Monitoring device type (Parameter, CEM, etc):

b. Monitoring device location:

c. Describe all parameters being monitored along with the frequency and duration of monitoring each parameter:

Testing:

a. Reference Test Method: Citation

b. Reference Test Method: Description

Recordkeeping:

Describe what parameters will be recorded and the recording frequency:

Reporting:

a. Describe what is to be reported and frequency of reporting:

b. Reporting start date: _____

Work Practice Standard:

Describe each:

Section F - Flue and Air Contaminant Emission

1. Estimated Atmospheric Emissions*

Pollutant	Maximum emission rate			Calculation/ Estimation Method
	specify units	lbs/hr	tons/yr.	
PM		1.72	7.55	AP-42: Section 13.4
SO_x				
CO				
NO_x				
VOC				
Others: (e.g., HAPs)	-----	-----	-----	-----

* These emissions must be calculated based on the requested operating schedule and/or process rate e.g., operating schedule for maximum limits or restricted hours of operation and /or restricted throughput. Describe how the emission values were determined. Attach calculations.

2. Stack and Exhauster

Stack Designation/Number

List Source(s) or source ID exhausted to this stack:	% of flow exhausted to stack:

Stack height above grade (ft.) Grade elevation (ft.)	Stack diameter (ft) or Outlet duct area (sq. ft.)	f. Weather Cap ☐ YES ☐ NO

Distance of discharge to nearest property line (ft.). Locate on topographic map.

Does stack height meet Good Engineering Practice (GEP)?

If modeling (estimating) of ambient air quality impacts is needed, attach a site plan with buildings and their dimensions and other obstructions.

Location of stack** Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

Stack exhaust
Volume _____ ACFM Temperature _____ °F Moisture _____ %

Indicate on an attached sheet the location of sampling ports with respect to exhaust fan, breeching, etc. Give all necessary dimensions.

Exhauster (attach fan curves) _____ in. of water _____ HP @ _____RPM.

** If the data and collection method codes differ from those provided on the General Information Form-Authorization Application, provide the additional detail required by that form on a separate form.

Section G - Attachments

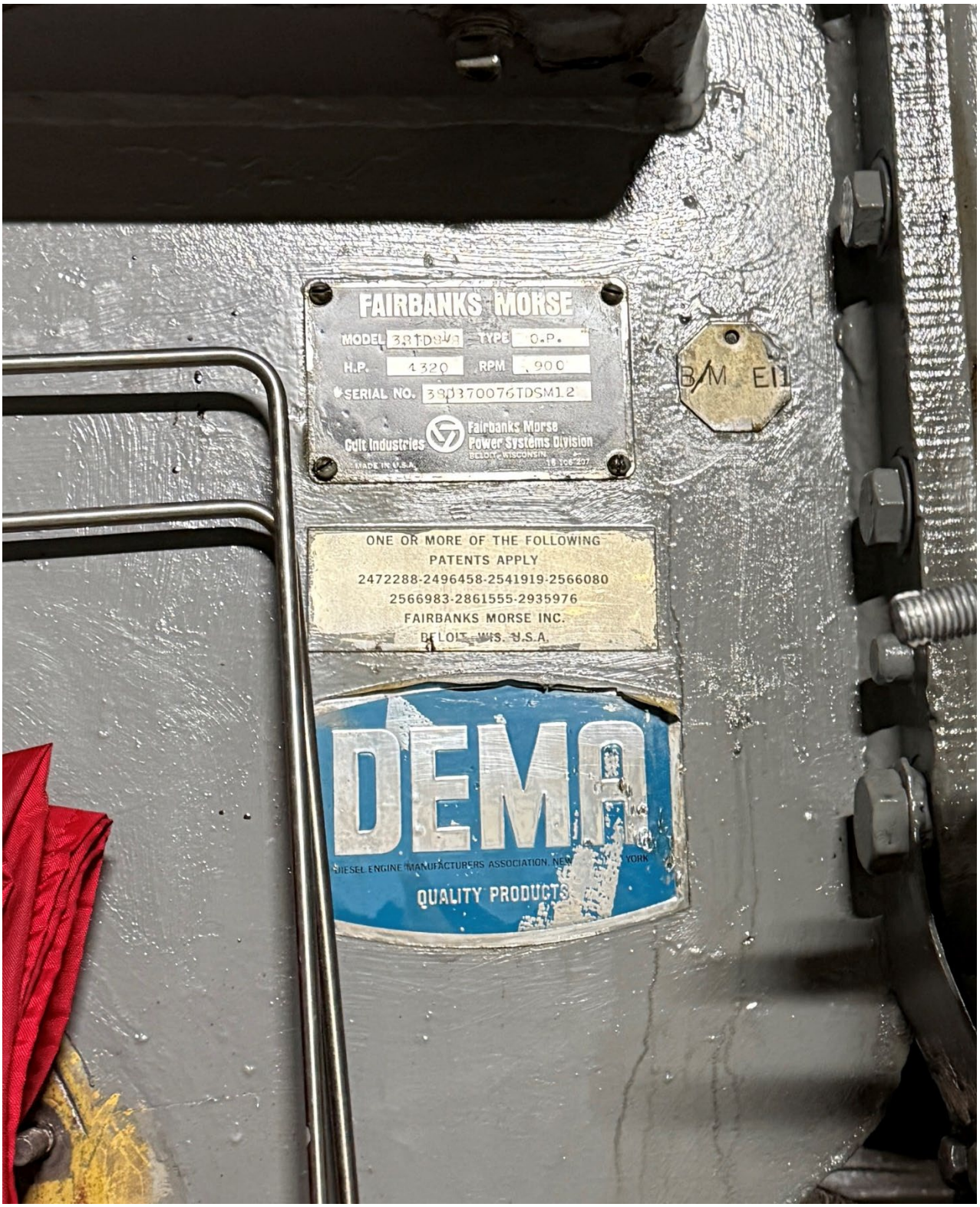
Number and list all attachments submitted with this application below:

- Appendix A contains the required PADEP application;
- Appendix B contains the compliance review form;
- Appendix C contains the required county and municipal notifications;
- Appendix D contains the permit redline;
- Appendix E contains the potential to emit calculations, and;
- Appendix F contains the application fee documentation.

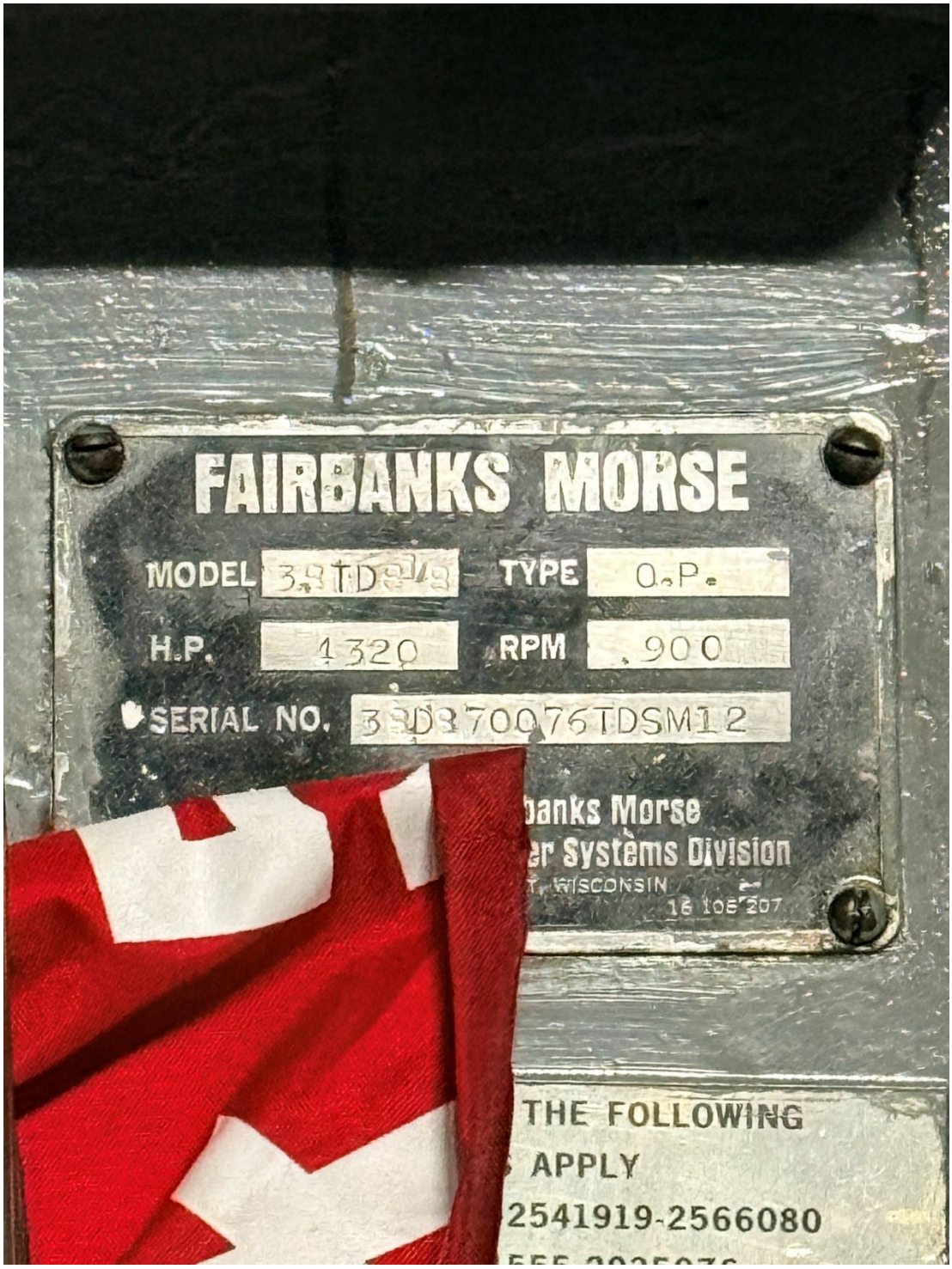
Attachment D: Equipment Specifications

FSP1 Name Plate

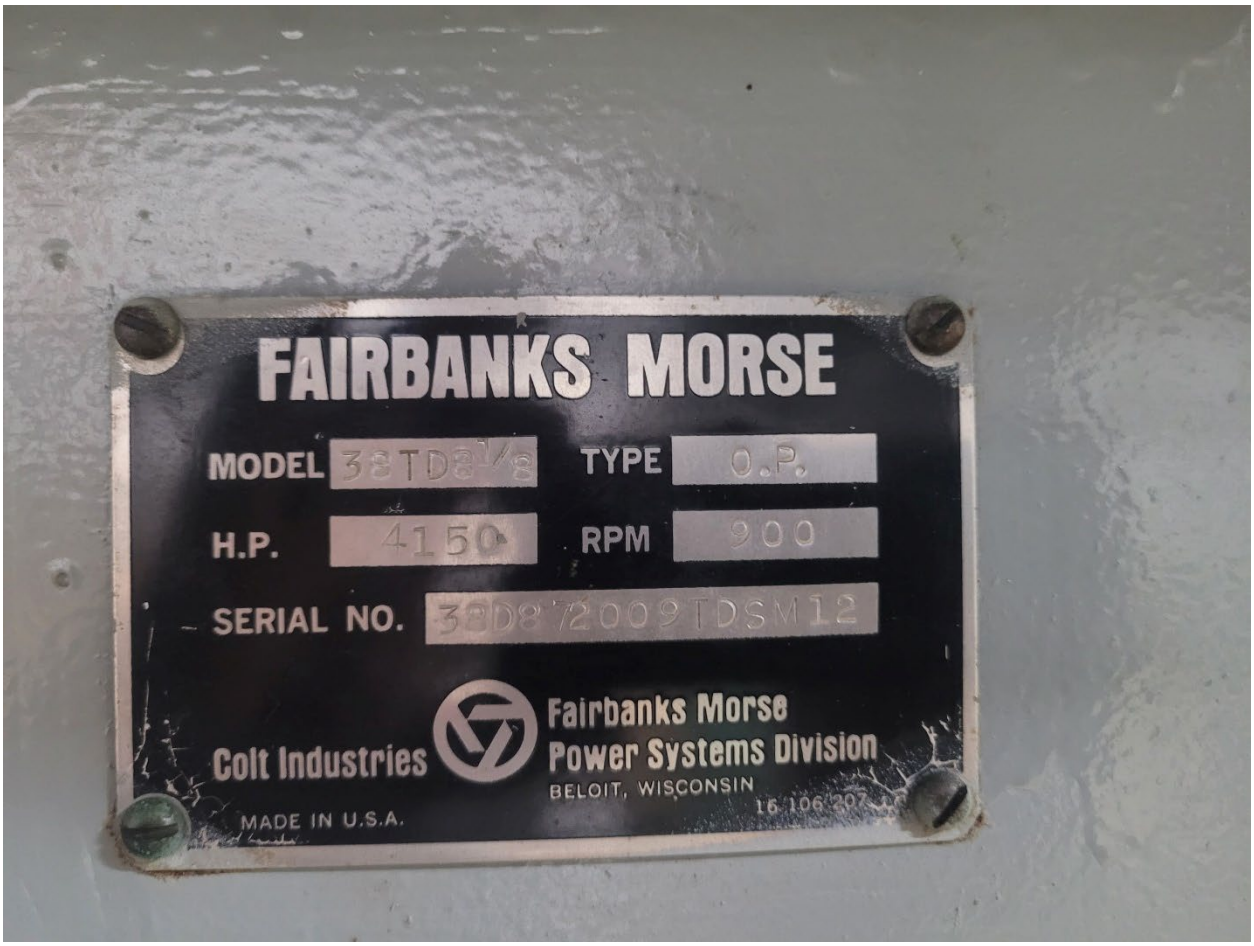
Y1A Name Plate



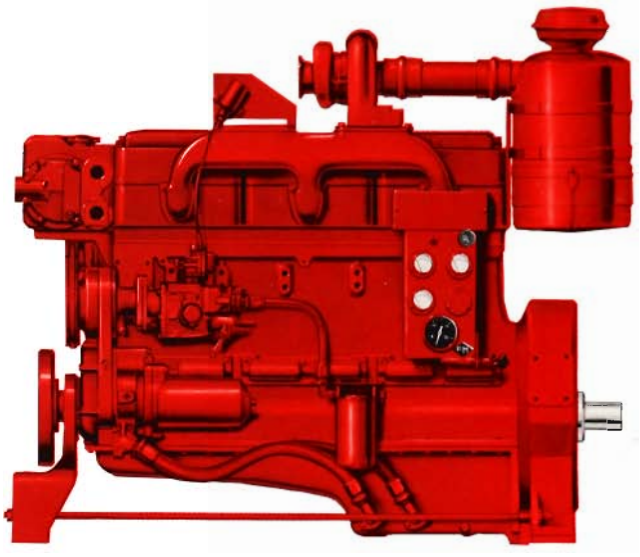
Y1B Name Plate



Y4 Name Plate



Cummins Diesel NT-380-IF



Specifications

Number of Cylinders	**6**
Bore and Stroke	**5½″ x 6″**
Piston Displacement—cu. in.	**855**
Operating Cycles	**4**
Crankcase Oil Capacity—gals.	**7**
Engine Coolant Capacity—gals.	**5**
Net Weight with Standard Accessories (lbs.)	**3200**

Specific ratings are shown on rear page.

Listed under Underwriters' Laboratories, Inc., reexamination service for fire protection applications.

Listed by Associated Factory Mutual Fire Insurance Companies for fire protection applications.

Listed under Underwriters' Laboratories of Canada reexamination service for fire protection applications.

Design Features

Bearings: Precision type, steel backed inserts. 7 main bearings, 4½″ diameter. Connecting Rod — 3⅛″ diameter.

Camshaft: Single camshaft controls all valve and injector movement. Induction hardened alloy steel with gear drive.

Camshaft Followers: Roller type for long cam and follower life.

Connecting Rods: Drop forged, 12″ center to center length. Rifle drilled for pressure lubrication of piston pin. Taper piston pin end reduces unit pressures.

Cooler, Lubricating Oil: Tubular type, jacket water cooled.

Crankshaft: High tensile strength steel forging. Bearing journals are induction hardened. Fully counterweighted.

Cylinder Block: Alloy cast iron with removable, wet liners.

Cylinder Heads: Each head serves two cylinders. Drilled fuel supply and return lines. Corrosion resistant inserts on intake and exhaust valve seats.

Fuel System: Cummins PTR Fuel system with integral, fly-ball type, mechanical variable speed governor. Camshaft actuated injectors.

Gear Train: Heavy duty, located at front of cylinder block.

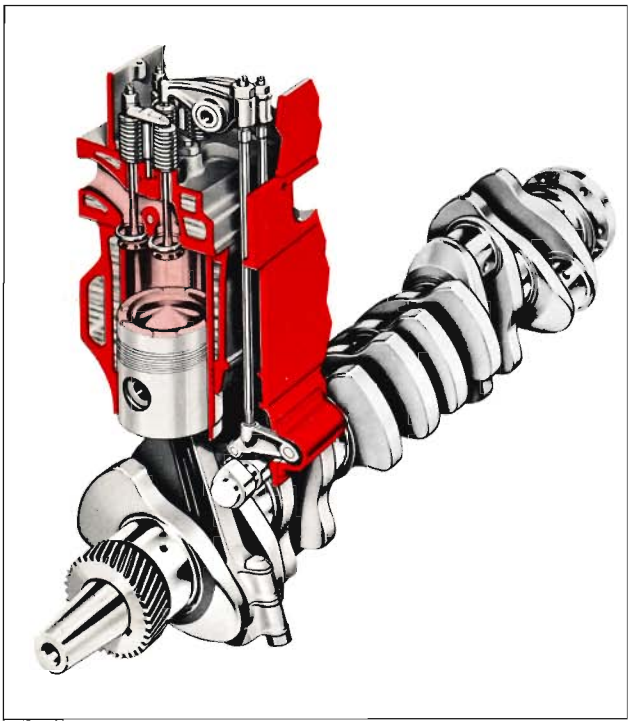
Lubrication: Force feed to all bearings, gear type pump. All lubrication lines are drilled passages, except pan to pump suction line.

Pistons: Aluminum, cam ground, with three compression and one oil ring. Oil cooled.

Piston Pins: 2″ diameter, full floating.

Turbocharger: Cummins, T-50, top mounted.

Valves: Dual intake and exhaust each cylinder. Each valve 1⅞″ diameter. Heat and corrosion resistant face on exhaust valve.



Engines for fire pump service should only be applied at the listed ratings of any one of the following: Underwriters' Laboratories, Inc.; Factory Mutual Fire Insurance Companies; Underwriters' Laboratories of Canada. These ratings are as follows:

Underwriters' Laboratories Ratings:
285 HP @ 1750 RPM
303 HP @ 1900 RPM
325 HP @ 2100 RPM
340 HP @ 2300 RPM

Factory Mutual Ratings:
274 HP @ 1750 RPM
304 HP @ 2000 RPM
330 HP @ 2300 RPM

Underwriters' Laboratories of Canada Ratings:
285 HP @ 1750 RPM
303 HP @ 1900 RPM
325 HP @ 2100 RPM
340 HP @ 2300 RPM

Big Displacement Design Features

1 **Internal Fuel Lines:** Drilled passages in cylinder heads eliminate threaded fuel line connectors and external lines.

2 **Large Intake and Exhaust Passages:** Minimize restriction of air and exhaust flow. Allows maximum air charge for clean burning, top economy.

3 **Overhead Valves:** Precision machined from high strength alloy steel. Intake valves are of silichrome steel. Exhaust valves of big displacement models are nitrogen steel for high temperature strength and faced with corrosion resistant material.

4 **Open Type Combustion Chamber:** Gives most efficient combustion . . . most power from each gallon of fuel.

5 **Replaceable Wet-type Cylinder Liners:** Dissipate heat faster. Liners are easily replaced without reboring block.

6 **Conventional Push Rod and Rocker Lever Arrangement:** Activates valves and injectors from a single camshaft. Roller type camshaft followers are used for long life.

7 **Cam-ground Pistons:** Assure perfect fit at operating temperatures.

8 **Alloy Cast Iron Cylinder Block:** Follows proven design and material specification to achieve maximum durability.

9 **Large Volume Water Passages:** Give even flow of coolant around cylinder liners, valves, and injectors to draw excess heat from combustion chamber. Centrifugal pump circulates large volumes of water.

10 **Connecting Rods:** Forged from high tensile strength alloy steel. I-beam section gives maximum strength. Large diameter piston pins are full-floating. Tapered piston pin end used for superior load distribution and maximum crown material on piston.

11 **Counterweighted Crankshafts:** Precision machined from high tensile strength steel forgings. Bearing journals are induction hardened for long life.

Performance

The horsepower ratings listed above represent performance at sea level altitude (29.92 inches of mercury) and 60°F. intake air temperature. Ratings represent performance of the engine with all standardly fitted parasitic losses deducted, including fuel system, lubricating oil pump, water pump, air cleaner and battery charging generator.

Curves represent performance on No. 2 diesel or furnace oil. Equivalent results can be obtained with fuels ranging from heavy furnace oils to light jet and military type fuels without recalibration. The net horsepower ratings are to be derated 5% for each 1000 feet above sea level, in accordance with National Board of Fire Underwriters Standard No. 20.

Cummins Engine Company, Inc., Columbus, Indiana 47201
Cummins Americas, Inc., Columbus, Indiana, U.S.A.
Cummins Diesel Australia, Ringwood, Australia
Cummins Diesel International Ltd.
Cummins Engine Company Ltd., London, England

Bulletin No. 950640 Litho in USA 12-68

MODEL NT-380-IF CUMMINS TURBODIESEL®

FIRE PUMP ENGINE

Listed under Underwriters' Laboratories, Inc., reexamination service for fire protection applications.

Listed by Associated Factory Mutual Fire Insurance Companies for fire protection applications.

Bore and Stroke	5½" x 6"
Number of Cylinders	6
Piston Displacement (cu. in.)	855
Horsepower	See Curve
Crankcase Oil Capacity (gals.)	5
Cooling System Capacity (gals.)	5
Air Flow — cfm	830
Net Weight with Standard Accessories (lbs.) Approx.	3200

BEARINGS:

Camshaft: 7 bearings, 2" diameter.

Crank Pin: 3⅛" diameter by 2⅛" length. Removable, copper-lead, steel back precision type shells. Projected area per rod 5.4 sq. in.

Main: 7 bearings, 4½" diameter. Removable, shells held in place by "I" beam section caps. Total projected area 61.15 sq. in.

Piston Pin: 3 bearings, 2 in piston and 1 in rod, 2" diameter.

BREATHER, Crankcase: Sealed type element.

CLEANER, Air: Oil bath type (mounted)

COOLER, Oil: Tubular type, jacket water cooled.

CRANKSHAFT: High tensile strength steel forging. All bearing journals induction hardened. Fully counterbalanced, wide web type.

CYLINDERS: Cast enbloc, with removable, heavy-wall, wet type liners.

DAMPER, Vibration: Viscous type.

ELECTRICAL EQUIPMENT: 24-volt system. 24-volt starting motor; 20-ampere generator; voltage regulator and toggle type starting switch.

EXCHANGER, Heat: Tubular type.

FILTERS:

Fuel Oil, Dual Depth Type (mounted).
Lubricating Oil, full flow, horizontally mounted on lube oil pump.
Lubricating Oil, by-pass, mounted on engine.

FLYWHEEL: Machined to fit drive flange.

GOVERNOR: Mechanical variable speed type.

HEADS, Cylinder: Cast in pairs. Stellite inserts on valve seats. Drilled passages for fuel lines to injectors.

HOURMETER: Electrical type.

HOUSING, Flywheel: S. A. E. No.1 with pedestal mounting supports.

LUBRICATION: Internal oil line design. All lubrication lines are drilled passages, except pan to pump suction line. Full pressure to all bearings. Gear type pump.

MANIFOLD, Exhaust: Water cooled connected to Turbocharger.

PAN, Oil: Rear sump type.

PANEL, Instrument: With ammeter; fuel oil pressure gauge (preheater); lubricating oil pressure gauge; lubricating oil temperature gauge; throttle control; toggle starting switch. Priming pump (preheater).

PISTONS: Aluminum. Cam ground. Oil cooled.

PUMPS:

Fuel—Exclusive Cummins PT pump.
Lubricating Oil—Gear type, located on outside of engine gear case housing.
Water—Circulating, centrifugal type, belt driven. 105 gpm @ 2300 rpm.
Piston Cooling.

RINGS, Piston: 4 compression rings, 1 oil ring.

RODS, Connecting: High strength, drop-forged, 12" center to center. Rifle drilled for pressure lubrication to piston pin.

STARTING AID: Pre-heater in intake manifold.

THERMOSTAT: Single unit type.

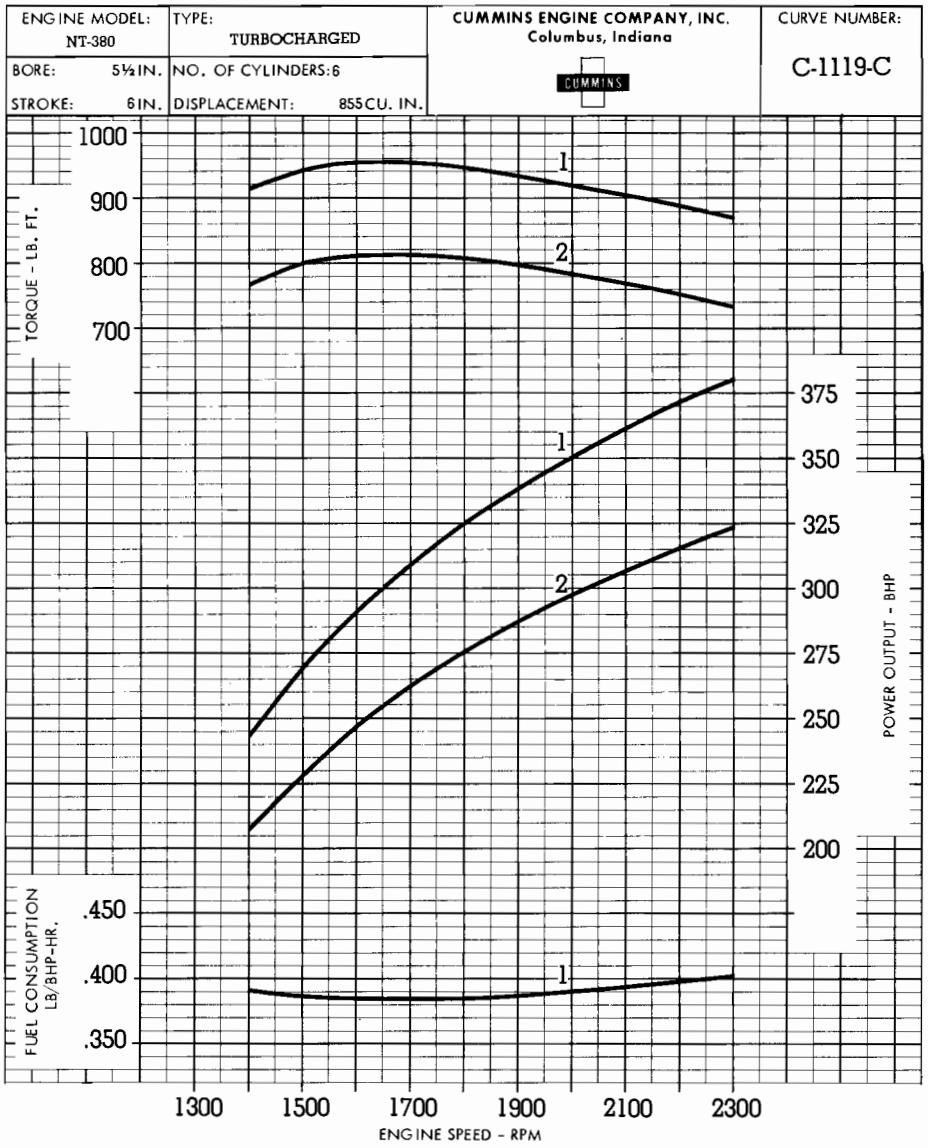
THROTTLE, Hand Control: On panel.

TURBOCHARGER: Cummins T-590, top mounted.

VALVES, Dual Intake and Exhaust: Heat resisting alloy steel. diameter, 1⅞". Stellite face on intake and exhaust valves.

CEX 157
VOL 2
FIG 12

CUMMINS FIRE PUMP ENGINE PERFORMANCE



For fire pump applications, the engines are to be applied on the No. 2 performance curve. This is the net torque and horsepower available for fire pump service with all auxiliary equipment connected. The engines are capable of operating on the No. 1 curve at sea level, 60° F. conditions, which is 15% above the stated net ratings.

The net horsepower ratings are to be derated 5% for each 1000 ft. above sea level, in accordance with National Board of Fire Underwriters Standard No. 20.

Refer to the listing of either Factory Mutual or Underwriters Laboratories for determination of the specific approved rating points.

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

CUMMINS

Standard Equipment

Breather, Crankcase: Sealed type element.

Cleaner, Air: 16″ diameter, oil bath type, mounted.

Cooler, Lubricating Oil: Tubular type, jacket water cooled.

Damper, Vibration: Viscous type.

Electrical Equipment: 24 volt positive ground system. 24 volt starting motor; 24 volt, 20 ampere generator; voltage regulator; toggle switch and magnetic switch.

Exchanger, Heat: Tubular type, mounted.

Filters: Fleetguard. Lubricating oil, full flow replaceable paper element, mounted. Fuel, paper element replaceable type, mounted.

Flywheel: Machined to fit drive flange.

Governor: Mechanical flyball, mechanical variable speed type.

Housing, Flywheel: SAE No. 1 with industrial supports.

Manifold, Air Intake: Connected to turbocharger.

Manifold, Exhaust: Water cooled, connected to turbocharger.

Pan, Oil: Cast aluminum, rear sump type, 7 U.S. gallon capacity.

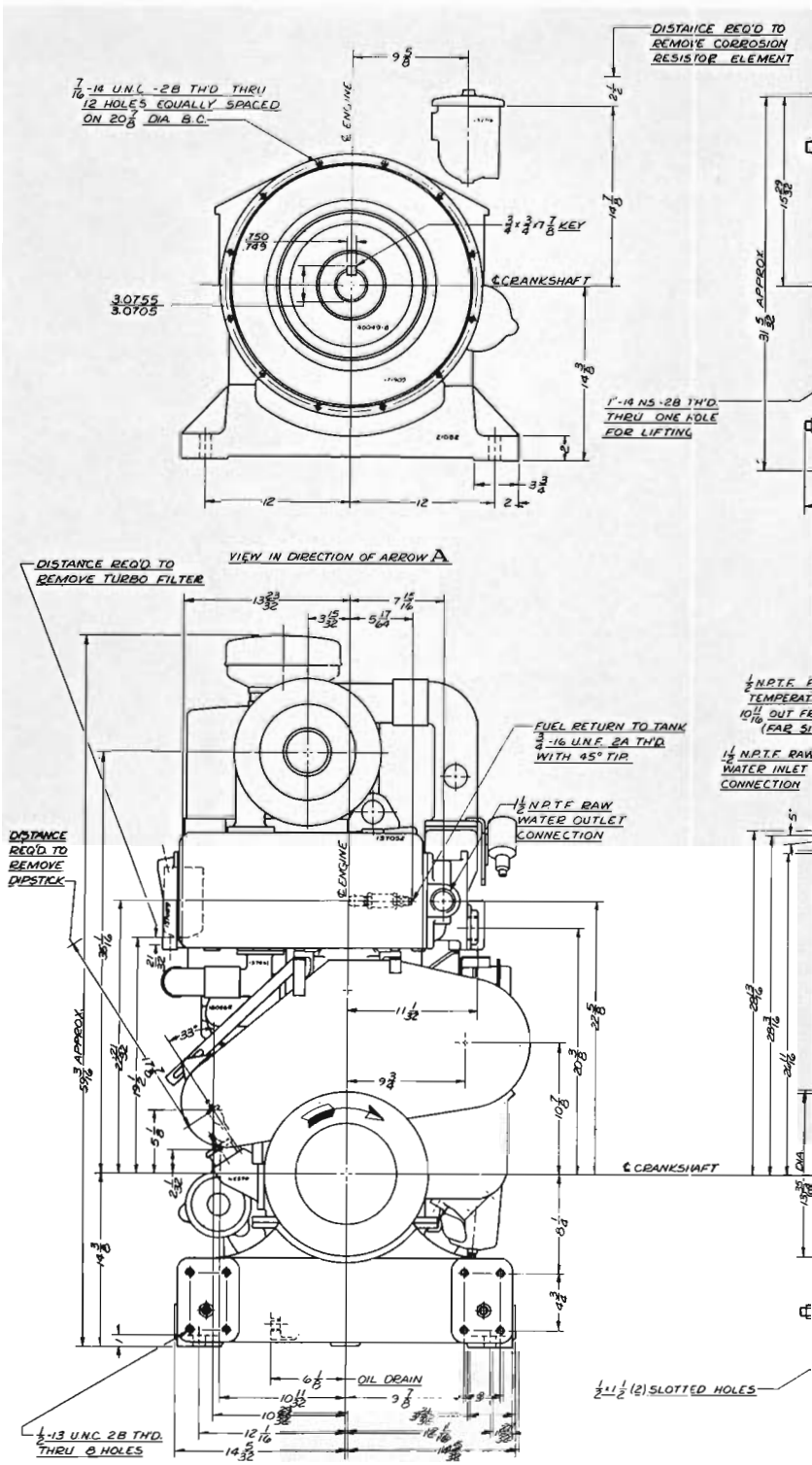
Panel, Instrument: Mounted. Includes ammeter, combination tachometer and hourmeter, water temperature gauge, lubricating oil pressure gauge, vernier type throttle control.

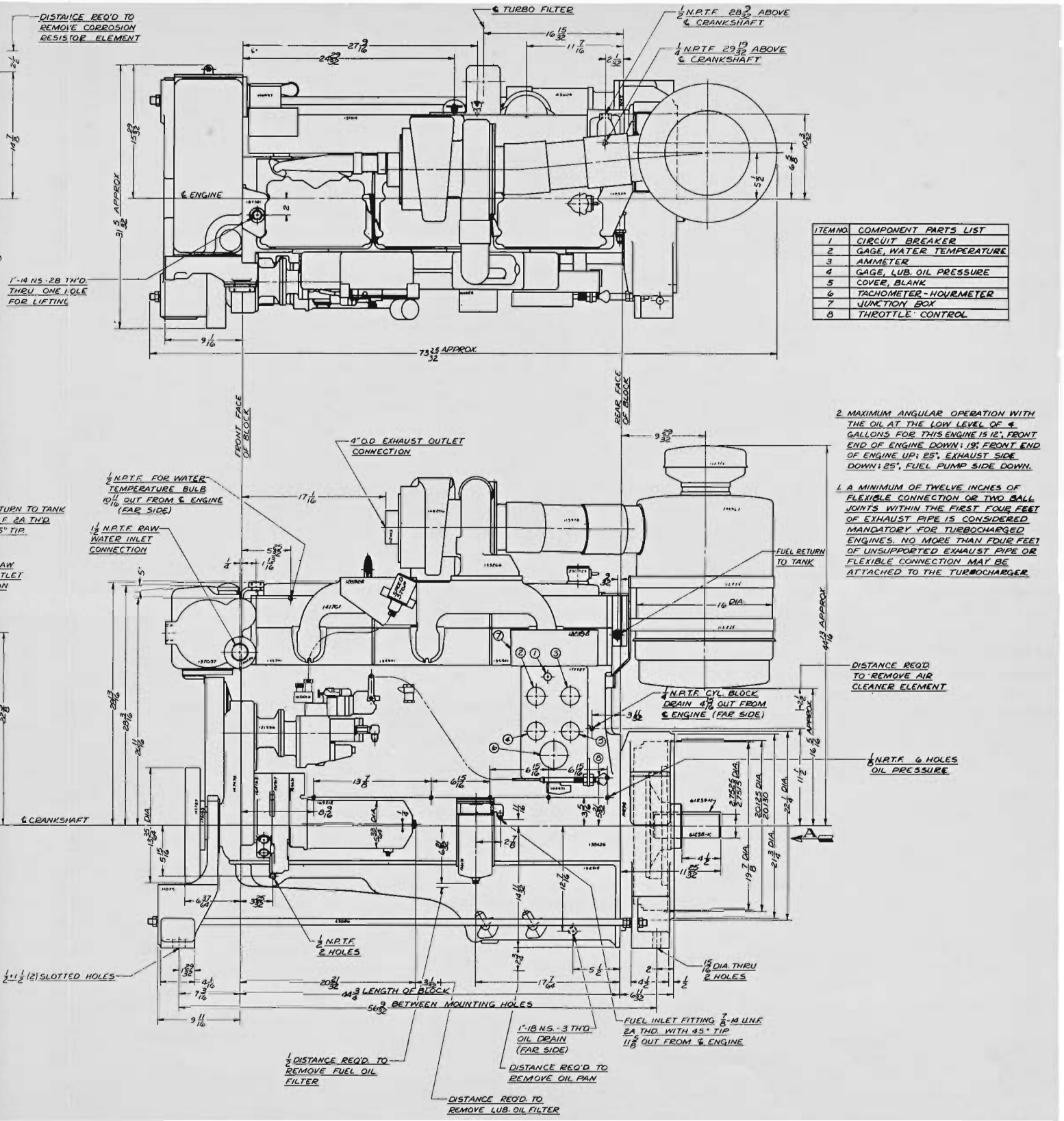
Pump, Coolant: Belt driven, centrifugal type.

Stubshaft: Mounted to drive flange on flywheel.

Support, Engine: Pedestal type, front and rear.

Turbocharger: Cummins T-50, top mounted.





ITEM NO.	COMPONENT PARTS LIST
1	CIRCUIT BREAKER
2	GAGE, WATER TEMPERATURE
3	AMMETER
4	GAGE, LUB. OIL PRESSURE
5	COVER, BLANK
6	TACHOMETER-HOURMETER
7	JUNCTION BOX
8	THROTTLE CONTROL

2. MAXIMUM ANGULAR OPERATION WITH THE OIL AT THE LOW LEVEL OF 4 GALLONS FOR THIS ENGINE IS 12°, FRONT END OF ENGINE DOWN; 19° FRONT END OF ENGINE UP; 25°, EXHAUST SIDE DOWN; 25°, FUEL PUMP SIDE DOWN.

1. A MINIMUM OF TWELVE INCHES OF FLEXIBLE CONNECTION OR TWO BALL JOINTS WITHIN THE FIRST FOUR FEET OF EXHAUST PIPE IS CONSIDERED MANDATORY FOR TURBOCHARGED ENGINES. NO MORE THAN FOUR FEET OF UNSUPPORTED EXHAUST PIPE OR FLEXIBLE CONNECTION MAY BE ATTACHED TO THE TURBOCHARGER.

NT-380-IF Engine Installation Diagram 185583

Specification sheet

Diesel generator set QSX15 series engine

450 kW – 500 kW Standby

Description

Cummins® commercial generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary standby and prime power applications.

Features

Cummins heavy-duty engine - Rugged 4-cycle, industrial diesel delivers reliable power, low emissions and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Permanent Magnet Generator (PMG) - Offers enhanced motor starting and fault clearing short-circuit capability.

Control system - The PowerCommand® electronic control is standard equipment and provides total genset system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protection, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Cooling system - Standard integral set-mounted radiator system, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.

Enclosures - Optional weather protective and sound attenuated enclosures are available.

Fuel tanks - Dual wall sub-base fuel tanks are also available.

NFPA - The genset accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

	Standby rating	Prime rating	Continuous rating	Data sheets
Model	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz
DFEJ	450 (563)	410 (513)		D-3400
DFEK	500 (625)	455 (569)		D-3401

Generator set specifications

Governor regulation class	ISO 8528 part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
EMS compatibility	IEC 61000-4-2: Level 4 Electrostatic discharge IEC 61000-4-3: Level 3 Radiated susceptibility

Engine specifications

Design	Turbocharged with air-to-air charge air-cooling
Bore	136.9 mm (5.39 in.)
Stroke	168.9 mm (6.65 in.)
Displacement	14.9 L (912.0 in^3)
Cylinder block	Cast iron with replaceable wet liners, in-line 6 cylinder
Battery capacity	1400 Amps minimum at ambient temperature 0 ℃ (32 ℉)
Battery charging alternator	35 Amps
Starting voltage	24 volt, negative ground
Fuel system	Full authority electronic (FAE) Cummins HPI-TP
Fuel filter	
Air cleaner type	
Lube oil filter type(s)	Single spin-on combination full flow and bypass filters
Standard cooling system	40 ºC (104 ºF) ambient radiator

Alternator specifications

Design	Brushless, 4 pole, drip-proof revolving field
Stator	2/3 pitch
Rotor	Single bearing, flexible discs
Insulation system	Class H
Standard temperature rise	125 ℃ standby at 40 ℃ ambient
Exciter type	PMG (Permanent Magnet Generator)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone influence factor (TIF)	< 50% per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 3%

Available voltages

60 Hz Line – Neutral/Line - Line

- 110/190
- 110/220
- 115/200
- 115/230
- 120/208
- 127/220
- 139/240
- 220/380
- 230/400
- 240/416
- 255/440
- 277/480
- 347/600

Note: Consult factory for other voltages.

Generator set options

Engine

- 208/240/480 V thermostatically controlled coolant heater for ambient above 4.5 ℃ (40℉)
- 208/240/480 V thermostatically controlled coolant heater for ambient below 4.5 ℃ (40℉)
- 120 V 300 W lube oil heater
- Heavy duty air cleaner with safety element

Alternator

- 80 ℃ rise
- 105 ℃ rise
- 150 ℃ rise
- 120/240 V 200 W anti-condensation heater

Exhaust system

- Critical grade exhaust silencer
- Exhaust packages
- Industrial grade exhaust silencer
- Residential grade exhaust silencer

Fuel system

- 1022 L (270 gal) sub-base tank
- 1136 L (300 gal) sub-base tank
- 1514 L (400 gal) sub-base tank
- 1893 L (500 gal) sub-base tank
- 2271 L (600 gal) sub-base tank
- 2498 L (660 gal) sub-base tank
- 3218 L (850 gal) sub-base tank
- 6435 L (1700 gal) sub-base tank
- 9558 L (2525 gal) sub-base tank

Cooling system

- High ambient 50 ℃ radiator

Control panel

- PC 3.3
- PC 3.3 with MLD
- 120/240 V 100 W control anti-condensation heater
- Ground fault indication
- Remote fault signal package
- Run relay package

Generator set

- AC entrance box
- Battery
- Battery charger
- Export box packaging
- UL 2200 Listed
- Main line circuit breaker
- Paralleling accessories
- Remote annunciator panel
- Spring isolators
- Enclosure: aluminium, steel, weather protective or sound attenuated
- 2 year standby power warranty
- 2 year prime power warranty
- 5 year basic power warranty
- 10 year major components warranty

*Note: Some options may not be available on all models - consult factory for availability.

Control system 2.3

The PowerCommand 2.3 control system - An integrated generator set control system providing voltage regulation, engine protection, generator protection, operator interface and isochronous governing (optional).

Control – Provides battery monitoring and testing features and smart-starting control system.

InPower™ – PC-based service tool available for detailed diagnostics.

PCCNet RS485 – Network interface (standard) to devices such as remote annunciator for NFPA 110 applications.

Control boards – Potted for environmental protection.

Ambient operation – Suitable for operation in ambient temperatures from -40 ℃ to +70 ℃ and altitudes to 13,000 feet (5000 meters). Prototype tested - UL, CSA and CE compliant.

AC protection

- AmpSentry protective relay
- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload
- Overload warning
- Reverse kW shutdown
- Reverse Var shutdown
- Short circuit protection

Engine protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- High, low and weak battery voltage warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown
- Fuel-in-rupture-basin warning or shutdown

Operator/display panel

- Manual off switch
- 128 x 128 Alpha-numeric display with push button access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols)
- LED lamps indicating genset running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -20 ºC to +70 ºC

Alternator data

- Line-to-Neutral AC volts
- Line-to-Line AC volts
- 3-phase AC current
- Frequency
- kVA, kW, power factor

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature

Control functions

- Time delay start and cool down
- Glow plug control (some models)
- Cycle cranking
- PCCNet interface
- (4) Configurable inputs
- (4) Configurable outputs
- Remote emergency stop
- Battle short mode
- Load shed
- Real time clock with exerciser
- Derate

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase Line-to-Line sensing
- Configurable torque matching
- Fault current regulation under single or three phase fault conditions

Other data

- Genset model data
- Start attempts, starts, running hours
- Fault history
- RS485 Modbus® interface
- Data logging and fault simulation (requires InPower service tool)
- Total kilowatt hours
- Load profile

Options

- Auxiliary output relays (2)
- 120/240 V, 100 W anti-condensation heater
- Remote annunciator with (3) configurable inputs and (4) configurable outputs
- PMG alternator excitation
- PowerCommand for Windows® remote monitoring software (direct connect)
- AC output analogue meters
- PowerCommand 2.3 and 3.3 control with AmpSentry protection

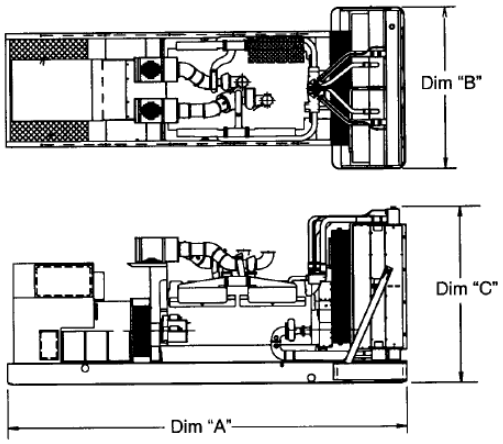
For further detail on PC 2.3 see document S-1569.
For further detail on PC 3.3 see document S-1570.

Emergency Standby Power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time running Power (LTP):
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



This outline drawing if for reference only. See respective model data sheet for specific model outline drawing number.

Do not use for installation design

Model	Dim 'A' mm (in.)	Dim 'B' mm (in.)	Dim 'C' mm (in.)	Set weight dry* kg (lbs)	Set weight wet* kg (lbs)
DFEJ	3864 (152.1)	1524 (60.0)	1812 (71.3)	4098 (9035)	4234 (9335)
DFEK	3864 (152.1)	1524 (60.0)	1812 (71.3)	4325 (9535)	4461 (9835)

*Weights represent a set with standard features. See outline drawings for weights of other configurations.

Codes and standards

Codes or standards compliance may not be available with all model configurations – consult factory for availability.

	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.		The generator set is available listed to UL 2200, Stationary Engine Generator Assemblies for all 60 Hz low voltage models. The PowerCommand control is Listed to UL 508 - Category NITW7 for U.S. and Canadian usage. Circuit breaker assemblies are UL 489 Listed for 100% continuous operation and also UL 869A Listed Service Equipment.
	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.	**U.S EPA**	Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards, 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.
	All low voltage models are CSA certified to product class 4215-01.	**International Building Code**	The generator set package is available certified for seismic application in accordance with the following International Building Code: IBC2000, IBC2003, IBC2006, IBC2009 and IBC2012.

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™

S-1582 (08/17)

TECHNICAL DATA SHEETS
SHEET 1 OF 3

Manufacturer: SPX Cooling Technologies

Item No.	Parameter Definition	Design
1.00	**Thermal Design**	
1.01	Water Flow Rate (gpm)	215,000
1.02	Cooling Range (°F)	28.0
1.03	Wet Bulb Temperature (°F)	72.0
1.04	Relative Humidity (%)	50
1.05	Approach Temperature (°F)	16.40
1.06	Cold Water Temperature (°F)	88.4
1.07	Total Static Head (ft.) Ref. Basin Curb Elevation	33.7
1.08	Total Dynamic Pumping Head (ft.) Ref. Basin Curb Elevation	11.8
1.09	Fill Water Loading (gpm/ft^2)	4.0
1.10	Height of Top of Shell Above Top of Air Inlet (ft.)	345.0
1.11	No. of Riser Pipes Furnished	8
1.12	Riser Pipe I.D. (in.)	36
1.13	Diameter of Counterflow Fill System (ft.)	345.0
1.14	Air Inlet Height (ft.)	25.0 (to basin curb)
1.15	Water Inlet Height (ft.) (Flange Centerline above Curb)	34' - 2 ¼"
1.16	% of Fill Plan Area Taken Out of Service in Winterzone Mode	38%

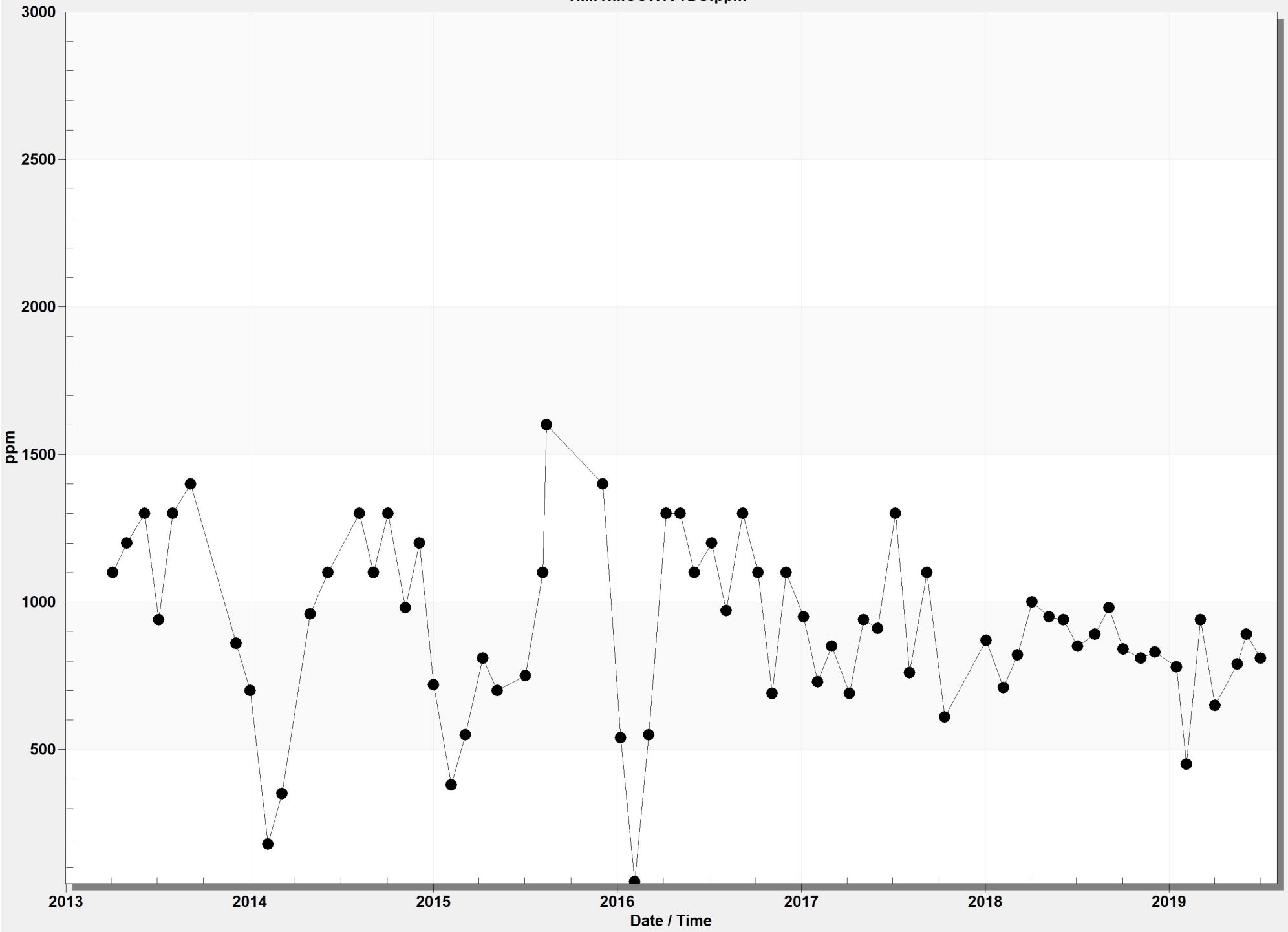
TECHNICAL DATA SHEETS
SHEET 2 OF 3

Manufacturer: SPX Cooling Technologies

Item No.	Parameter Definition	Design
1.17	Expected Life of Fill	15 years
1.18	Method of Supporting Fill	Bottom
1.19	Total Volume of Fill (ft^3)	321,966
1.20	Total Air Inlet Area (ft^2)	21,878
1.21	Depth of Fill System (ft.)	6
1.22	No. of Fill Layers or Tiers	2
1.23	Fill Types/ Model Numbers and Layer Depths	MVC20
1.24	Drift Eliminator Type	Marley TU12C
1.25	Liquid-to-Gas Ratio	1.623
1.26	Exit Air Temperature (°F)	105.94
1.27	KaV/L (Merkel No.)	1.479
1.28	Air Velocity at the Fill (fpm)	303
1.29	Inlet Air Velocity (fpm)	738
1.30	Drift Eliminator Plan Area (ft^2)	51,920
1.31	Guaranteed Drift Rate (%)	0.001
1.32	Air Velocity @ Throat (fpm)	696
1.33	Air Inlet ΔP (IWG)	0.02
1.34	Fill & Rain Zone ΔP (IWG)	0.187
1.35	Drift Eliminator ΔP (IWG)	0.023
1.36	Other ΔP (specify)	0.027
1.37	Total Static Pressure (IWG)	0.257
1.38	Velocity Pressure @ Throat (IWG)	0.027
1.39	Total Pressure (IWG)	0.284

TMI Circ Water TDS

All available data points between 1/1/2013 12:00:00 AM and 8/1/2019 11:59:00 PM



Boiler Nameplate Data

Alpha Boiler nameplate information:

Boiler Manufacturer: The Babcock & Wilcox Company
Contract Number: FM-1677
Boiler Frame Size: FM117-97B
Boiler Type: 2 drum package boiler
Furnace Configuration: Left-hand (LH)
Boiler Design Capacity: 125,000 lbs/hr
Design Pressure: 250 psig
Steam Temperature: 406 Deg F (saturated)
Boiler Heating Surface: 7095 Sq. Ft.
Furnace Heating Surface: 1072 Sq. Ft.
Operating Pressure: 150 psig
Year Built: 1969
National Board Number: 22885

Alpha Boiler Burner information:

Burner Manufacturer: The Babcock & Wilcox Company
Burner Contract Number: FM-1677
Burner Model Number: Circular Dual Control (CDC)
Rated Heat Input: 156.65 mmBtu/hr.
Fuels Fired: No. 2 Fuel Oil
Year Built: 1969

Alpha Boiler F.D. Fan information:

Fan Manufacturer: Clarage Fan Company – Kalamazoo, MI
Type: AFI
Class: 4A
Size: 89
Serial Number: 3333-AR
Motor Horsepower: 150 HP

Attachment E: Miscellaneous Source List

Updated Miscellaneous Source List from Past Permit 22-05029

Source ID	Source Description
EG-P-1A EG-P-1B EG-P-11B	Three small diesel powered air compressors for starting large station emergency generators (<20 HP)
N/A	Turbine Plant: vents and condenser off-gas
LO-T-1	Turbine oil vapor extractor, and 15,000 gal turbine lubricating oil storage tank
N/A	Storage tanks for water, and various water/waste water treatment chemical storage tanks of capacity range from less than 1,000 to 25,000 gallons.
N/A	Portable Circulating Water Flume Screen Washing Pump.
N/A	Portable and temporary equipment used to support plant operations and maintenance (e.g., welding machine, light stanchions, pumps, power generators).
N/A	Other operations and support equipment (e.g., closed-loop low VOC parts washer, fire suppression CO2 and halon systems, facility air conditioning, industrial gas use, on-site fire training).
FX-P-3A FX-P-3B	Portable 150 HP Emergency Diesel Fire Pumps
C1 C2	Industrial Mechanical Draft Cooling Towers (2 units).
FX-P-4	Three Portable Diesel Engine Driven 5-HP Trash Pumps (3 units).
FX-Y-3	Portable 350 kW Diesel Emergency Generator
FX-Y-7	Portable Yanmar 5.5 kW Diesel Powered Emergency Generator (Y7; 3 units).
~~EG-Y-8~~	~~Portable South Office Emergency Generator~~

Tank ID	#2 fuel oil storage tanks
FO-T-2	200,000 gal fuel tank for Auxiliary Boilers (B1A/B) and Emergency Diesel Generators (Y1A/B).
FO-T-1	50,000 gal fuel tank for Auxiliary Boilers (B1A/B) and Emergency Diesel Generators (Y1A/B).
DF-T-1	35,000 gal UST for Emergency Diesel Generator fuel (Y1A/B).
DF-T-4	100 gal day tank for diesel engine
DF-T-5 A/B	275 gal day tank for diesel engine
DF-T-8	25,000 gal fuel tank for Station Blackout Diesel Generator (Y4).
FO-T-3&4	350 gal fuel tank for Circulating Water Fire Pump (FSP1).
DF-T-2 A/B	550 gal fuel day tanks for Emergency Diesel Generators (Y1A/B).
DF-T-13	500 gal fuel day tank for diesel engine.
FX-T-2	5,000 gal diesel storage tank
FX-T-3	120 gal diesel storage tank
FX-T-4	200 gal diesel storage tank on FLEX truck
~~FO-T-5~~	~~285 gal tank for Fire Training Facility~~

Attachment F: BAT Supporting Documents

Cost Calculations - Oxidation Catalyst

Compression Ignition Emergency Generators - Y1A and Y1B

Engine Rating	4320	hp		
Capital Cost[1]	$ 117,429.00	2008 $		
Annualized Capital Cost	$ 18,358.18	2025 $	Assuming 7% for 15 years, CRF =	0.109795
Operational Cost[1]	$ 22,036.80	2008 $		
Operational Cost	$ 31,377.74	2025 $	CEPCI[3]	
Total Annual Cost	$ 49,735.91	2025 $	2008	575.4
Uncontrolled Emissions CO	3.24	tpy	October 2025	819.3
Removed Emissions CO[2]	3.08	tpy		
Cost Effectiveness	$ 16,158.52	$/tpy		

1. Capital Cost and O&M Cost Equations found in EPA memo: Control Costs for Existing Stationary CI RICE (January 29, 2010)

2. The Control Efficiency was assumed to be 95% for an Oxidation Catalyst on an internal combustion engine.

3. Costs are adjusted to 2025 values using the Chemical Engineering Plant Cost Index found through the Chemical Engineering publication.

Cost Calculations - SCR

Compression Ignition Emergency Generators - Y1A and Y1B

Engine Rating	4320	hp		
Capital Cost [1]	$ 525,360.00	2000 $		
Annualized Capital Cost	$ 119,915.30	2025 $	Assuming 7% for 15 years, CRF =	0.109795
Operational Cost	$ 16,224.32	2000 $		
Operational Cost	$ 33,728.96	2025 $	CEPCI[3]	
Total Annual Cost	$ 153,644.26	2025 $	2000	394.1
Uncontrolled Emissions	12.18	tpy	October 2025	819.3
Removed Emissions[2]	10.96	tpy		
Cost Effectiveness	$ 14,016.08	$/tpy		

1. Capital costs and O&M costs were taken from Equations for Capital Cost and O&M found in Section E.2 Status Report on NOx Controls: Technologies & Cost Effectiveness (December 2000 NESCAUM), https://www.nescaum.org/documents/nox-2000.pdf

2. The Control Efficiency was assumed to be 90% for an SCR on an internal combustion engine.

3. Costs are adjusted to 2025 values using the Chemical Engineering Plant Cost Index found through the Chemical Engineering publication.

Cost Calculations - Low NOx Burner

Boiler

Heat Capacity	156.65	MMBtu/hr		
Capital Cost - Vendor Quote[1]	$ 800,000.00	2022 $		
Annualized Capital Cost	$ 88,190.92	2025 $	Assuming 7% for 15 years, CRF =	0.109795
Operational Cost - High[2]	$ 234,975.00	1993 $		
Operational Cost - Low	$ 53,261.00	1993 $		
Operational Cost - Average	$ 144,118.00	1993 $	CEPCI	
Operational Cost - Average	$ 301,752.82	2025 $	1993	391.3
Annual Cost - Average	$ 389,943.73	2025 $	2022	816
Uncontrolled Emissions[2]	2.63	tpy	October 2025	819.3
Removed Emissions	1.05	tpy		
Cost Effectiveness	$ 370,171.23	$/tpy		

1. Attached vendor quote was taken from a publicly available application which provided quotes for LNBs for smaller sized boilers. This vendor quote can be found in Appendix B under the column for Boiler NOs 4-7. As these units are both older and larger, costs can expected to higher than this, making this a conservative estimate.

2. Operational costs are provided in the table below.

3. Emissions were taken as an operating average between the first year of operation with a higher operating potential and the remaining 14 years of life at the lower 100 hours per year.

Table 14. 1993 Costs of NOx Controls

	Cost of NOx Controls in 1993 Dollars					
Control Device	Low -Cap. $/MMBTU	High -Cap. $/MMBTU	Low - Oper. $/MMBTU	High -Oper. $/MMBTU	Low $/ton	High $/ton
LNB	650	8,300	340	1,500	240	4,300
LNB + FGR					650	7,630
SNCR	1,600	3,300	680	1,200	N/A	N/A
(1994 ESTIMATE)					700	1,300
SCR	2,400	20,000	1,500	5,800	1,810	10,900
(1994 ESTIMATE)					500	2,800

Document NOx Emissions from Industrial/Commercial/Institutional Boilers (EPA 453/R-94-

Technical Bulletin. Nitrogen Oxides (NOx), Why and How They are Controlled. EPA. https://www3.epa.gov/ttncatc1/dir1/fnoxdoc.pdf

Cost Calculations - SCR
Boiler

Data Inputs

Enter the following data for your combustion unit:

Is the combustion unit a utility or industrial boiler? Industrial

What type of fuel does the unit burn? Fuel Oil

Is the SCR for a new boiler or retrofit of an existing boiler? Retrofit

Please enter a retrofit factor between 0.8 and 1.5 based on the level of difficulty. Enter 1 for projects of average retrofit difficulty. 1

Complete all of the highlighted data fields:

What is the maximum heat input rate (QB)?	156.65	MMBtu/hour
What is the higher heating value (HHV) of the fuel?	137,000	Btu/gallon
What is the estimated actual annual fuel consumption?	219,461	gallons/year
Enter the net plant heat input rate (NPHR)	11	MMBtu/MW
Plant Elevation	250	Feet above sea level

If the NPHR is not known, use the default NPHR value:

Fuel Type	Default NPHR
Coal	10 MMBtu/MW
Fuel Oil	11 MMBtu/MW
Natural Gas	8.2 MMBtu/MW

Not applicable to units burning fuel oil or natural gas

Type of coal burned: Not Applicable

Enter the sulfur content (%S) = percent by weight

Not applicable to units buring fuel oil or natural gas

Note: The table below is pre-populated with default values for HHV and %S. Please enter the actual values for these parameters in the table below. If the actual value for any parameter is not known, you may use the default values provided.

Coal Type	Fraction in Coal Blend	%S	HHV (Btu/lb)
Bituminous	0	1.84	11,841
Sub-Bituminous	0	0.41	8,826
Lignite	0	0.82	6,685

Please click the calculate button to calculate weighted average values based on the data in the table above.

For coal-fired boilers, you may use either Method 1 or Method 2 to calculate the catalyst replacement cost. The equations for both methods are shown on rows 85 and 86 on the ***Cost Estimate*** tab. Please select your preferred method:

- ○ Method 1
- ○ Method 2
- ◉ Not applicable

Enter the following design parameters for the proposed SCR:

Number of days the SCR operates (t_{SCR})	7	days	Number of SCR reactor chambers (n_{scr})	1
Number of days the boiler operates (t_{plant})	7	days	Number of catalyst layers (R_{layer})	3

Inlet NO_x Emissions (NOx_{in}) to SCR	0.173913	lb/MMBtu
Outlet NO_x Emissions (NOx_{out}) from SCR	0.0173913	lb/MMBtu
Stoichiometric Ratio Factor (SRF)	1.050	

*The SRF value of 1.05 is a default value. User should enter actual value, if known.

Number of empty catalyst layers (R_{empty})	1	
Ammonia Slip (Slip) provided by vendor	2	ppm
Volume of the catalyst layers ($Vol_{catalyst}$) (Enter "UNK" if value is not known)	UNK	Cubic feet
Flue gas flow rate ($Q_{fluegas}$) (Enter "UNK" if value is not known)	UNK	acfm

Estimated operating life of the catalyst ($H_{catalyst}$)	24,000	hours
Estimated SCR equipment life	15	Years*

* For industrial boilers, the typical equipment life is between 20 and 25 years.

Gas temperature at the SCR inlet (T)	650	°F
Base case fuel gas volumetric flow rate factor (Q_{fuel})		ft^3/min-MMBtu/hour

Concentration of reagent as stored (C_{stored})	29	percent*
Density of reagent as stored (ρ_{stored})	56	lb/cubic feet*
Number of days reagent is stored ($t_{storage}$)	14	days

*The reagent concentration of 29% and density of 56 lbs/cft are default values for ammonia reagent. User should enter actual values for reagent, if different from the default values provided.

Densities of typical SCR reagents:

50% urea solution	71 lbs/ft^3
29.4% aqueous NH_3	56 lbs/ft^3

Select the reagent used: Ammonia

Enter the cost data for the proposed SCR:

Desired dollar-year	2025				
CEPCI for 2025	819.3	Enter the CEPCI value for 2025	541.7	2016 CEPCI	CEPCI = Chemical Engineering Plant Cost Index
Annual Interest Rate (i)	7	Percent			
Reagent ($Cost_{reag}$)	0.293	$/gallon for 29% ammonia*			* $0.293/gallon is a default value for 29% ammonia. User should enter actual value, if known.
Electricity ($Cost_{elect}$)	0.0676	$/kWh			* $0.0676/kWh is a default value for electricity cost. User should enter actual value, if known.
Catalyst cost ($CC_{replace}$)	227.00	$/cubic foot (includes removal and disposal/regeneration of existing catalyst and installation of new catalyst			* $227/cf is a default value for the catalyst cost based on 2016 prices. User should enter actual value, if known.
Operator Labor Rate	60.00	$/hour (including benefits)*			* $60/hour is a default value for the operator labor rate. User should enter actual value, if known.
Operator Hours/Day	4.00	hours/day*			* 4 hours/day is a default value for the operator labor. User should enter actual value, if known.

Note: The use of CEPCI in this spreadsheet is not an endorsement of the index, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Maintenance and Administrative Charges Cost Factors:

Maintenance Cost Factor (MCF) =	0.005
Administrative Charges Factor (ACF) =	0.03

SCR Design Parameters

The following design parameters for the SCR were calculated based on the values entered on the *Data Inputs* tab. These values were used to prepare the costs shown on the *Cost Estimate* tab.

Parameter	Equation	Calculated Value	Units	
Maximum Annual Heat Input Rate (Q_B) =	HHV x Max. Fuel Rate =	157	MMBtu/hour	
Maximum Annual fuel consumption (mfuel) =	(QB x 1.0E6 x 8760)/HHV =	10,016,453	gallons/year	
Actual Annual fuel consumption (Mactual) =		219,461	gallons/year	
Heat Rate Factor (HRF) =	NPHR/10 =	1.10		
Total System Capacity Factor (CF_{total}) =	(Mactual/Mfuel) x (tscr/tplant) =	0.022	fraction	
Total operating time for the SCR (t_{op}) =	CF_{total} x 8760 =	192	hours	
NOx Removal Efficiency (EF) =	(NOx_{in} - NOx_{out})/NOx_{in} =	90.0	percent	
NOx removed per hour =	NOx_{in} x EF x Q_B =	24.52	lb/hour	
Total NO_x removed per year =	(NOx_{in} x EF x Q_B x t_{op})/2000 =	2.35	tons/year	
NO_x removal factor (NRF) =	EF/80 =	1.13		
Volumetric flue gas flow rate ($q_{flue\ gas}$) =	Q_{fuel} x QB x (460 + T)/(460 + 700)n_{scr} =	0	acfm	
Space velocity (V_{space}) =	$q_{flue\ gas}$/$Vol_{catalyst}$ =	0.00	/hour	
Residence Time	$1/V_{space}$	#DIV/0!	hour	
Coal Factor (CoalF) =	1 for oil and natural gas; 1 for bituminous; 1.05 for sub-bituminous; 1.07 for lignite (weighted average is used for coal blends)	1.00		
SO_2 Emission rate =	(%S/100)x(64/32)*1x10^6)/HHV =			Not applicable; factor applies only to coal-fired boilers
Elevation Factor (ELEVF) =	14.7 psia/P =			Not applicable; elevation factor does not apply to plants located at elevations below 500 feet.
Atmospheric pressure at sea level (P) =	2116 x [(59-(0.00356xh)+459.7)/518.6]$^{5.256}$ x (1/144)* =	14.6	psia	
Retrofit Factor (RF)	Retrofit to existing boiler	1.00		

* Equation is from the National Aeronautics and Space Administration (NASA), Earth Atmosphere Model. Available at https://spaceflightsystems.grc.nasa.gov/education/rocket/atmos.html.

Catalyst Data:

Parameter	Equation	Calculated Value	Units
Future worth factor (FWF) =	(interest rate)(1/((1+ interest rate)^Y -1) , where Y = $H_{catalyts}$/(t_{SCR} x 24 hours) rounded to the nearest integer	0.0000	Fraction
Catalyst volume ($Vol_{catalyst}$) =	2.81 x Q_B x EF_{adj} x Slipadj x NOx_{adj} x S_{adj} x (T_{adj}/N_{scr})	640.07	Cubic feet
Cross sectional area of the catalyst ($A_{catalyst}$) =	$q_{flue\ gas}$ /(16ft/sec x 60 sec/min)	0	ft^2
Height of each catalyst layer (H_{layer}) =	($Vol_{catalyst}$/(R_{layer} x $A_{catalyst}$)) + 1 (rounded to next highest integer)	#DIV/0!	feet

SCR Reactor Data:

Parameter	Equation	Calculated Value	Units
Cross sectional area of the reactor (A_{SCR}) =	1.15 x $A_{catalyst}$	0	ft^2
Reactor length and width dimensions for a square reactor =	(A_{SCR})$^{0.5}$	0.0	feet
Reactor height =	(R_{layer} + R_{empty}) x (7ft + h_{layer}) + 9ft	#DIV/0!	feet

Reagent Data:

Type of reagent used: Ammonia

Molecular Weight of Reagent (MW) = 17.03 g/mole

Density = 56 lb/ft^3

Parameter	Equation	Calculated Value	Units
Reagent consumption rate ($m_{reagent}$) =	(NOx_{in} x Q_B x EF x SRF x MW_R)/MW_{NOx} =	10	lb/hour
Reagent Usage Rate (m_{sol}) =	$m_{reagent}$/Csol =	33	lb/hour
	(m_{sol} x 7.4805)/Reagent Density	4	gal/hour
Estimated tank volume for reagent storage =	(m_{sol} x 7.4805 x $t_{storage}$ x 24)/Reagent Density =	1,500	gallons (storage needed to store a 14 day reagent supply rounded to th

Capital Recovery Factor:

Parameter	Equation	Calculated Value
Capital Recovery Factor (CRF) =	i (1+ i)^n/(1+ i)^n - 1 = Where n = Equipment Life and i= Interest Rate	0.1098

Other parameters	Equation	Calculated Value	Units
Electricity Usage:			
Electricity Consumption (P) =	A x 1,000 x 0.0056 x (CoalF x HRF)$^{0.43}$ = where A = (0.1 x QB) for industrial boilers.	91.39	kW

Cost Estimate

Total Capital Investment (TCI)

TCI for Oil and Natural Gas Boilers

For Oil and Natural Gas-Fired Utility Boilers between 25MW and 500 MW:

$$TCI = 86{,}380 \times (200/B_{MW})^{0.35} \times B_{MW} \times ELEVF \times RF$$

For Oil and Natural Gas-Fired Utility Boilers >500 MW:

$$TCI = 62{,}680 \times B_{MW} \times ELEVF \times RF$$

For Oil-Fired Industrial Boilers between 275 and 5,500 MMBTU/hour :

$$TCI = 7{,}850 \times (2{,}200/Q_B)^{0.35} \times Q_B \times ELEVF \times RF$$

For Natural Gas-Fired Industrial Boilers between 205 and 4,100 MMBTU/hour :

$$TCI = 10{,}530 \times (1{,}640/Q_B)^{0.35} \times Q_B \times ELEVF \times RF$$

For Oil-Fired Industrial Boilers >5,500 MMBtu/hour:

$$TCI = 5{,}700 \times Q_B \times ELEVF \times RF$$

For Natural Gas-Fired Industrial Boilers >4,100 MMBtu/hour:

$$TCI = 7{,}640 \times Q_B \times ELEVF \times RF$$

Total Capital Investment (TCI) =	$4,689,283	in 2025 dollars

Annual Costs

Total Annual Cost (TAC)

TAC = Direct Annual Costs + Indirect Annual Costs

Direct Annual Costs (DAC) =	$24,879 in 2025 dollars
Indirect Annual Costs (IDAC) =	$515,215 in 2025 dollars
Total annual costs (TAC) = DAC + IDAC	$540,094 in 2025 dollars

Direct Annual Costs (DAC)

DAC = (Annual Maintenance Cost) + (Annual Reagent Cost) + (Annual Electricity Cost) + (Annual Catalyst Cost)

Annual Maintenance Cost =	0.005 x TCI =	$23,446 in 2025 dollars
Annual Reagent Cost =	$m_{sol} \times Cost_{reag} \times t_{op}$ =	$247 in 2025 dollars
Annual Electricity Cost =	$P \times Cost_{elect} \times t_{op}$ =	$1,186 in 2025 dollars
Annual Catalyst Replacement Cost =		$0 in 2025 dollars
	$n_{scr} \times Vol_{cat} \times (CC_{replace}/R_{layer}) \times FWF$	
Direct Annual Cost =		$24,879 in 2025 dollars

Indirect Annual Cost (IDAC)

IDAC = Administrative Charges + Capital Recovery Costs

Administrative Charges (AC) =	0.03 x (Operator Cost + 0.4 x Annual Maintenance Cost) =	$332 in 2025 dollars
Capital Recovery Costs (CR)=	CRF x TCI =	$514,883 in 2025 dollars
Indirect Annual Cost (IDAC) =	AC + CR =	$515,215 in 2025 dollars

Cost Effectiveness

Cost Effectiveness = Total Annual Cost/ NOx Removed/year

Total Annual Cost (TAC) =	$540,094 per year in 2025 dollars
NOx Removed =	2 tons/year
Cost Effectiveness =	$229,534 per ton of NOx removed in 2025 dollars

Vendor Estimate for Low NOx Burner

RACT PROJECT COSTS - BOILER NOS. 3 - 7 - 29 Jan22
AOC 2022 CPP RACT ANALYSIS

	BOILER NO. 3		BOILER NO. 4		BOILER NOS. 4 - 7	
	LNB ($)	LNB & FGR ($)	LNB ($)	LNB & FGR ($)	LNB ($)	LNB & FGR ($)
EQUIPMENT						
1. BURNER	1,050,000	1,100,000	200,000	225,000	800,000	900,000
2. FGR FAN	---	150,000	---	25,000	---	100,000
SUBTOTAL	1,050,000	1,250,000	200,000	250,000	800,000	1,000,000
DIRECT INSTALLATION						
1. BURNER INSTALLATION	80,000	80,000	20,000	20,000	80,000	80,000
2. FRONT WALL MODIFICATIONS	60,000	60,000	30,000	30,000	120,000	120,000
3. GAS PIPING	20,000	20,000	10,000	10,000	40,000	40,000
4. OIL PIPING	20,000	20,000	10,000	10,000	40,000	40,000
5. BREACHING	---	100,000	---	50,000	---	200,000
6. CONTROL DAMPER	---	20,000	---	15,000	---	60,000
7. CONTROL WIRING	40,000	50,000	20,000	25,000	80,000	100,000
8. CONTROL/ BMS INCORPORATION	60,000	60,000	30,000	30,000	120,000	120,000
9. ELECTRICAL	20,000	50,000	10,000	25,000	40,000	100,000
SUBTOTAL	300,000	460,000	130,000	215,000	520,000	860,000
INDIRECT INSTALLATION COSTS						
1. ENGINEERING (10%)	135,000	171,000	33,000	46,500	132,000	186,000
2. CONSTRUCTION ADMIN (4%)	54,000	68,400	13,200	18,600	52,800	74,400
3. CONTRACTOR FEES (10%)	135,000	171,000	33,000	46,500	132,000	186,000
4. START-UP (2%)	27,000	34,200	6,600	9,300	26,400	37,200
5. CONTINGENCY (3%)	40,500	51,300	9,900	13,950	39,600	55,800
SUBTOTAL	391,500	496,900	95,700	134,850	382,800	539,400
AOC REQUIRED INDIRECT COSTS						
1. CONTINGENCY (20%)	348,300	441,180	85,140	119,970	340,560	479,880
2. CONSTRUCTION ADMIN (4%)	69,660	88,236	17,028	23,994	68,112	95,976
3. GOVERNMENT TEST AND Q/C (2.5%)	43,538	55,148	10,643	14,996	42,570	59,985
4. AOC CONSTRUCTION MANAGEMENT (20%)	348,300	441,180	85,140	119,970	340,560	479,880
5. AOC PM FEES (5%)	87,075	110,295	21,285	29,993	85,140	119,970
6. OTHER (5%)	87,075	110,295	21,285	29,993	85,140	119,970
SUBTOTAL	983,948	1,246,334	240,521	338,915	962,082	1,355,661
GRAND TOTAL	2,725,448	3,452,234	666,221	938,765	2,664,882	3,755,061

AEI

January 2022

Project Costs Boilers 3 to 7 - Copy