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120 Tredegar Street
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Received
on August 1, 2023

Dominion Energy

BY CERTIFIED U.S. MAIL

Aug 1, 2023

Mr. James E. Kyle
Air Permit Manager
Piedmont Regional Office
Virginia Department of Environmental Quality
4949-A Cox Road
Glen Allen, VA 23060

RE: Chesterfield Power Station (Reg. No. 50396)
Chesterfield Energy Reliability Center Project
Supplemental Revision to Prevention of Significant Deterioration Permit Application

Dear Mr. Kyle:

Virginia Electric and Power Company d/b/a Dominion Energy (Dominion) operates the Chesterfield Power Station (Facility), an electric generating station located in Chesterfield County, Virginia under VA DEQ Title V Operating Permit No. PRO50396. Dominion is proposing, subject to relevant regulatory approval(s), to construct the Chesterfield Energy Reliability Center (CERC) at the Facility consisting of the installation of new simple-cycle combustion turbines (SCCT) and associated equipment. Dominion is providing this submission as a supplemental revision to the Prevention of Significant Deterioration (PSD) permit application dated December 13, 2019.

CERC will involve the construction of four (4) new General Electric SCCTs identified as ES-33, ES-34, ES-35, and ES-36, and will trigger review under the PSD program for CO, $PM_{2.5}$, VOC, and GHG. PSD avoidance for all other New Source Review (NSR) pollutants will be achieved through emissions netting, operation of proposed air pollution control equipment, and permit limits. The PSD and minor NSR application for the CERC project is included with this submission.

The original PSD application and application fee were submitted to DEQ on December 13, 2019; however, no final permit was issued. Therefore, Dominion understands that no additional application fee is due because this submission updates material already timely filed with DEQ.

If you have any questions regarding this submittal, please contact T.R Andrake at (804) 839-2760 or via email at thomas.r.andrake@dominionenergy.com.

Sincerely,

Molly A. Parker
VP, Environmental & Sustainability

cc: Alison Sinclair, VA DEQ

Air Permit Application for the Chesterfield Energy Reliability Center

ECT No. 230413-0700

VIRGINIA ELECTRIC AND POWER COMPANY
Chesterfield County, Virginia

Revision 1
July 2023

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Document Review

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc.'s (ECT's) Document Review Policy No. 9.03. ECT documents undergo technical/peer review prior to dispatching these documents to an outside entity.

This document has been authored and reviewed by the following employees:

Josh Ralph	Adam George, P.E.
Author	Peer Review
Joshua Ralph	
Signature	Signature
July 31, 2023	July 31, 2023
Date	Date

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List of Acronyms and Abbreviations

°F	degree Fahrenheit
$\mu g/m^3$	microgram per cubic meter
AAQS	ambient air quality standards
AERMAP	AERMOD terrain preprocessing program
AERMET	AERMOD meteorological preprocessing program
AERMIC	AMS/EPA Regulatory Model Improvement Committee
AERMOD	AERMIC model
AIG	AERMOD Implementation Guide
ARP	Acid Rain Program
BACT	Best Available Control Technology
BAL	Resource and Demand Balancing
BEEST	Providence Engineering and Environmental Group, LLC, BEEST suite
bhp	brake-horsepower
BPIP	Building Profile Input Program
BPIPPRM	BPIP for PRIME
BSER	best system of emissions reduction
Btu/kWh	British thermal unit per kilowatt-hour
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CAM	compliance assurance monitoring
CCS	carbon capture and sequestration
CEMS	continuous emissions monitoring system
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPS	Chesterfield Power Station
CSAPR	Cross-State Air Pollution Rule
CT	combustion turbine
DOE	U.S. Department of Energy
Dominion	Dominion Energy Services, Inc.
ECT	Environmental Consulting & Technology, Inc.
EJ	Environmental Justice
EOR	enhanced oil recovery
EPA	U.S. Environmental Protection Agency
FBN	chemically fuel bound nitrogen
FR	Federal Register

List of Acronyms and Abbreviations (Continued, Page 2 of 4)

ft	foot
fps	foot per second
Fuel Oil	No. 2 fuel oil with 15 ppm or less sulfur in accordance with ASTM D396
g/bhp-hr	grams per brake-horsepower-hour
GAQM	Guideline for Air Quality Models
GCP	good combustion practices
GeoTIFF	geospatial tagged image file format
GEP	good engineering practice
GHG	greenhouse gas
gr/100 dscf	grain per 100 dry standard cubic feet
GWP	global warming potential
H_2 fuel blend	Natural gas/hydrogen fuel blend with up to 10% hydrogen
H_2O	water
H_2SO_4	sulfuric acid
H8H	highest, eighth-highest
HAP	hazardous air pollutant
HHV	higher heating value
HP	high-pressure
hr/yr	hour per year
HRSG	heat recovery steam generator
IP	intermediate-pressure
ISO	International Organization for Standardization
km	kilometer
kWe	kilowatt-electric
LAER	lowest achievable emissions rate
lb	pound
lb CO_2/MWh	pound of carbon dioxide per megawatt-hour
lb/hr	pound per hour
lb/lb-mol	pound per pound-mole
lb/MMBtu	pound per million British thermal units
lb/MMcf	pound per million cubic feet
lb/MWh	pound per megawatt-hour
LLE	Low Load Emergency
LP	low-pressure
MACT	maximum achievable control technology
MECL	minimum emissions compliance load
MMBtu/hr	million British thermal units per hour

List of Acronyms and Abbreviations (Continued, Page 3 of 4)

MRLC	Multi-Resolution Land Characteristics Consortium
MW	Megawatt
MWe	Megawatt-electric
N_2	molecular nitrogen
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NED	National Elevation Dataset
NERC	North American Electric Reliability Corporation
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
NH_3	ammonia
NLCD92	USGS National Land Cover Data 1992
NMHC	nonmethane hydrocarbon
NNSR	nonattainment new source review
NO	nitric oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NSCR	nonselective catalytic reduction
NSPS	new source performance standards
NSR	new source review
O_2	oxygen gas
PJM	PJM Interconnect
PM	particulate matter
PM_{10}	particulate matter less than or equal to 10 micrometers
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers
ppb	part per billion
ppm	part per million
ppmv	part per million by volume
ppmvd	parts per million by volume, dry basis
PRIME	plume rise model enhancements
project	Chesterfield Energy Reliability Center
PSD	prevention of significant deterioration
psia	pound per square inch absolute
PTE	potential to emit
RACT	reasonably available control technology
RBLC	RACT/BACT/LAER Clearinghouse
RH	relative humidity
RMP	risk management program
SAAC	significant ambient air concentration

List of Acronyms and Abbreviations (Continued, Page 4 of 4)

scf/lb-mol	standard cubic foot per pound-mole
scf/MMBtu	standard cubic foot per million British thermal units
SCCT	simple cycle combustion turbine
SCR	selective catalytic reduction
SECARB	Southeast Regional Carbon Sequestration Partnership
SER	significant emissions rate
SF_6	sulfur hexafluoride
SIL	significant impact level
SIP	state implementation plan
SNCR	selective noncatalytic reduction
SO_2	sulfur dioxide
SO_3	sulfur trioxide
tpy	ton per year
TSP	total suspended particulate
USGS	U.S. Geological Survey
VAC	Virginia Administrative Code
VDEQ	Virginia Department of Environmental Quality
VOC	volatile organic compound

1.0 Introduction

Virginia Electric and Power Company, d/b/a Dominion Energy Virginia (Dominion, formerly d/b/a Dominion Virginia Power), is proposing to install the Chesterfield Energy Reliability Center (CERC) to be located on an approximate 94-acre parcel located within the James River Industrial Center in Chesterfield County, Virginia, adjacent to the existing Chesterfield Power Station (CPS). The CERC project will consist of four dual fuel simple-cycle combustion turbines (SCCT) firing primarily pipeline quality natural gas, as well as having the capability to fire No. 2 fuel oil with a maximum sulfur content of 15 ppm (fuel oil). Additionally, the SCCTs will be capable of operating on an advanced gaseous fuel blend consisting of natural gas with up to 10% hydrogen (H_2 fuel blend). One benefit of combusting H_2 fuel blend is the reduction in air emissions – especially greenhouse gas (GHG) emissions. The purpose and design of the CERC project is to respond quickly with reliable, dispatchable power generation to the grid when needed by the PJM Regional Transmission Operator (RTO)[1]. This includes during high demand periods, seasonal peaks, and extreme temperature events, as well as when intermittent generation resources (such as solar and wind) are unavailable or insufficient to meet customer needs. The proposed CERC dual-fuel SCCTs are focused on supporting the clean energy transition while also optimizing reliability and economics for our system customers.

PJM continues to add significant amounts of both solar and wind renewable generation capacity to its grid. Those resources are intermittent, in the sense that they depend on the availability of energy sources that fluctuate. While renewable generation reduces GHG emissions at the system-wide level, solar and wind capacity is operationally undependable with significant day-ahead and intra-day energy production variability, volatility, and intermittency. For grid stability and reliability, generating resources are required to be available to respond rapidly to changes in generation from both the renewable sources and normal changes in power demand. Failure to match generation to demand leads to frequency deviations in the interconnection, which, if severe enough, can cause customer load interruption or generators to trip offline through automated, protective action. To ensure reliability of the bulk power system, the North American Electric Reliability Corporation (NERC) has established operational requirements that must be adhered to by all responsible parties (including

[1] PJM is an RTO that is part of the Eastern Interconnection grid operating an electric transmission system serving parts of Virginia, Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, West Virginia, and the District of Columbia.

Dominion and PJM), such as NERC Resource and Demand Balancing (BAL) standards. This project is designed specifically to help meet these operational requirements.

The proposed CERC SCCT units will help address PJM needs for peak firing capacity with the ability of coming online quickly. The project is being designed and permitted to follow market demand. The proposed General Electric 7FA.05 gas turbines will have a nominal power output of 250 MW-electric per turbine.

The simple-cycle turbines will be equipped with dry low-NO_x (DLN) burners, which will reduce nitrogen oxides (NO_x) emissions when combusting natural gas or H_2 fuel blend; water injection will be utilized when combusting fuel oil, to reduce NO_x emissions. In addition, a selective catalytic reduction (SCR) system will be installed to further reduce emissions of NO_x, as well as an oxidation catalyst to further reduce emissions of carbon monoxide (CO) and volatile organic compounds (VOC). Good combustion practices (GCP) and the use of clean burning fuels will reduce emissions of all pollutants including NO_x, CO, particulate matter (PM), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), sulfur dioxide (SO_2), sulfuric acid mist (H_2SO_4), VOC, and Greenhouse Gas Pollutants (GHGs).

Dominion is also proposing to add black start capability to CERC with the four (4) new SCCTs and six (6) new 3,500 kilowatt-electric (kWe) (nominal) fuel oil-fired emergency generators. The SCCTs are configured to startup using electrical power provided by the grid. In the event of electrical grid failure, the emergency generators will provide the required electrical power to start up a SCCT. During black start events, each of the proposed SCCTs will have the ability to operate in low load emergency (LLE) mode, which is defined as emergency operation below minimum emission compliance load (MECL) to restore the electrical grid. One of the SCCTs could operate in LLE mode during a period of grid restoration and would continue LLE mode operation until system restoration is achieved.

The proposed project will also include the following ancillary equipment:

- One natural gas-fired fuel gas heater nominally rated at 18.8 MMBtu/hr.
- One nominal 190 bhp emergency firewater pump operating on fuel oil.

The proposed CERC project, as indicated above, will be located on adjacent/adjoining property to the CPS, thus co-located and considered single source with CPS. The CERC project will be considered a “major modification” under Title I of the Clean Air Act (CAA). Dominion is applying to the Virginia Department of Environmental Quality (VDEQ) for a prevention of significant deterioration (PSD) and minor stationary source air construction permit, as required by VDEQ. VDEQ has a U.S. Environmental Protection Agency (EPA) state implementation plan (SIP)-approved PSD and minor stationary source air construction permit program.

This application addresses the permitting requirements specified by VDEQ under the Virginia State Air Pollution Control Board Regulations for the Control and Abatement of Air Pollution, Title 9, Agency 5, Chapter 80, found in the Virginia Administrative Code (VAC) at 9 VAC 5-80.

1.1 Applicant Information

To facilitate VDEQ’s review of this document, Dominion’s permitting contact is identified below. VDEQ should contact this individual if additional information or clarification is required during their review process. The permitting contact information is as follows:

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DEES – Corporate Air Programs
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Richmond, VA 23219
804-839-2760
Thomas.R.Andrake@dominionenergy.com

1.2 Project Location

The proposed CERC project will be constructed in Chesterfield County approximately 4 miles northeast of Chester, Virginia, on approximate 94-acre parcel of property in the James River Industrial Center adjacent to the existing CPS which is located at 500 Coxendale Road as shown in Figure 1-1 and Figure 1-2. The proposed CERC project location is currently undeveloped, consisting of open pasture, mixed forest, and planted pine. Appendix D presents a detailed site plan of the proposed modification.

1.3 Facility Classification

There are two major classification criteria for the proposed project, one related to its industrial character and the other to its potential to emit (PTE) air pollutants. The designation of the facility under each of these is reviewed in the following subsections.

1.3.1 Industrial Classification Code

The United States government has devised the Standard Industrial Classification (SIC) code system, a method for grouping business activities according to their participation in the national commerce system. The system is based on classifying activities into major groups defined by the general character of a business operation. For example, electric, gas, and sanitary services, which include power production, are defined as a major group. Each major group is given a unique two-digit number for identification. Power production activities have been assigned a major group code "49."

To provide more detailed identification of a particular operation, an additional two-digit code is appended to the major group code. In the case of power generation facilities, the two-digit code is "11" to define the type of production involved.

The proposed project is classified under the SIC code system as a major group of 49, electric, gas, and sanitary services, and then electric services of 11, or SIC 4911.

The North American Industry Classification System was introduced as a replacement for SIC codes in 1997. This system's organization is similar to SIC codes. Under this system, this facility would be classified as 221112, Fossil Fuel Electric Power Generation.

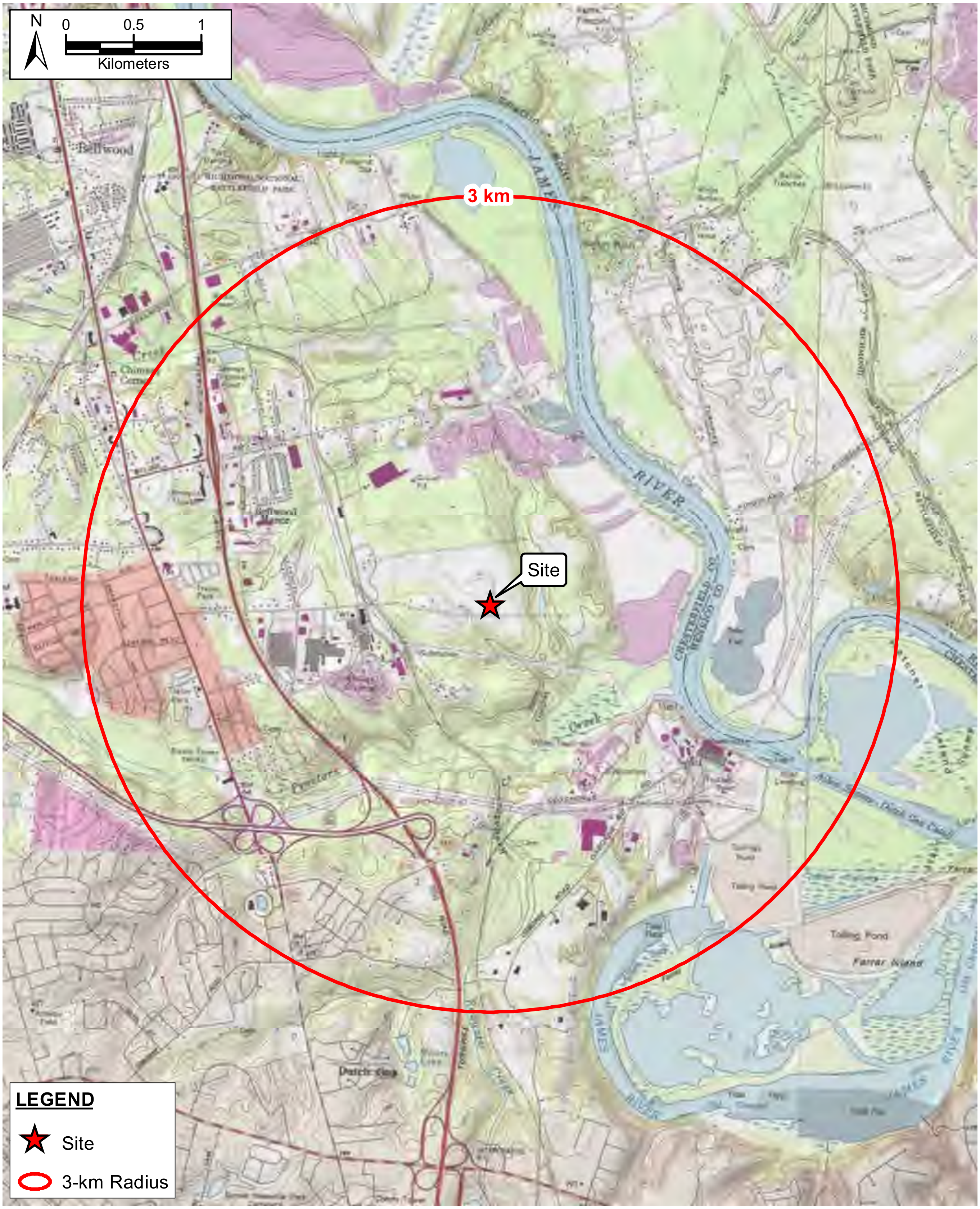

FIGURE 1-1.
PROJECT LOCATION AND TOPOGRAPHY

Sources: Esri Basemap USGS Topographic Quadrangles, ECT 2019.

Environmental Consulting & Technology, Inc.

FIGURE 1-2.
PROJECT LOCATION AERIAL

Sources: Esri Basemap Imagery, ECT 2019.

ECT Environmental Consulting & Technology, Inc.

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1.3.2 Air Quality Source Designation

With respect to air quality, new and existing industrial sources are classified as either major or minor sources based on their PTE of regulated air contaminants. This classification is also affected in part by whether the area in which the source is located is in attainment with national ambient air quality standards (NAAQS). EPA classifies an area as attainment or nonattainment on a pollutant-by-pollutant basis depending on what the concentration of each pollutant in the ambient air is relative to the standard for that pollutant. The area in which the proposed project is located is designated as attainment for all NAAQS in which EPA has issued a designation under Section 107 of the CAA.

CPS is considered a major stationary source. A major modification is defined as any physical change or change in the method of operation of a major stationary source that would result in a significant emission increase of a regulated NSR pollutant, and a significant net emission increase of that pollutant from the major stationary source. Based on the requested operational profile while combusting natural gas, H_2 fuel blend and fuel oil, the proposed CERC project will be classified as a major modification for some pollutants but not all and thus subject to review under PSD and stationary source (i.e., minor New Source Review (NSR)) permitting regulations.

1.4 Document Organization

The balance of this document is divided into sections that address each component of the PSD and stationary source air quality review process for the proposed project. The following list provides an overview of the contents of each of the remaining sections:

- Section 2.0: Process Description—General description of the primary simple-cycle combustion turbines as well as a description of auxiliary and supporting equipment.
- Section 3.0: Emissions Summary—Detailed summary of potential air emissions occurring during normal steady state operations and startup/shutdown that will occur at the project site subsequent to completion of project construction and development.
- Section 4.0: Applicable Requirements and Standards—Discussion of applicable state and federal air regulations. The focus of this section will be on establishing which regulations are directly applicable to the proposed SCCTs and the ancillary equipment and how compliance will be demonstrated.

- Section 5.0: Control Technology Review—Detailed evaluation of control technologies. Project emissions are projected to be significant for $PM_{2.5}$, CO, VOCs, and greenhouse gases (GHGs). As such, a "five-step, top down" best available control technology (BACT) analysis for these pollutants has been provided for each emissions unit. This section also includes minor source BACT determinations for NO_x, PM, PM_{10}, SO_2 and H_2SO_4, in accordance with the requirements of Virginia's minor NSR program.
- Section 6.0: PSD Class II Modeling Procedures—Summary of the dispersion modeling methodology and the manner in which the predicted impacts will be compared to the applicable standards. Specifically, this section discusses the modeling input data and various modeling scenarios evaluated.
- Section 7.0: Results of the Class II Area Significant Impact Level Analysis—Results of the Class II area significant impact analysis performed for the project.
- Section 8.0: Class II Cumulative Impact Assessment Results—Results of the Class II area air dispersion analysis performed for the project. This section compares predicted impacts to applicable standards to demonstrate the project will not cause or contribute to a NAAQS or PSD increment predicted exceedance.
- Section 9.0: Other Air Quality Issues—Supplemental information regarding potential impacts of the project. Specifically, this section discusses the potential for impacts to growth, soils, and vegetation and to the visibility of PSD Class I and Class II areas. This section also compares predicted impacts to Virginia's air toxics significant ambient air concentrations (SAACs).
- Section 10.0: Site Suitability and Environmental Justice—Summary of evaluation of the site's suitability, including environmental justice considerations, for the proposed project.
- Section 11.0: References—List of the documents relied upon during preparation of this document.
- Appendices—Permit application forms, emissions calculations, supporting BACT information, figures and diagrams, dispersion modeling files on computer disc, and supplemental materials supporting the information presented herein:

  - Appendix A—Application Forms
  - Appendix B—Emissions Calculations

- Appendix C—Control Technology Review from EPA's Reasonably Available Control Technology (RACT)/BACT/Lowest Achievable Emissions Rate (LAER) Clearinghouse (RBLC) Database
- Appendix D—Plot Plan
- Appendix E—Air Dispersion Modeling Files
- Appendix F—Background Emissions Inventory
- Appendix G—Air Quality Impacts, Contour Map
- Appendix H—Site Suitability and Environmental Justice Evaluation

2.0 Process Description

2.1 Overall Description

Dominion plans to modify the existing Chesterfield Power Station in Chesterfield County, Virginia, with the construction of four General Electric 7FA.05 SCCTs as part of the CERC project. The key elements of the proposed project include:

- Four (4) nominal 250 megawatt-electric (MWe) General Electric 7FA.05 SCCTs with SCR and oxidation catalyst, capable of firing the following fuels:
    1. 100% natural gas
    2. fuel oil.
    3. H_2 fuel blend (up to 10%)
- One (1) natural gas-fired fuel gas heater nominally rated at 18.8 MMBtu/hr.
- Six (6) nominal 3,500-kWe emergency generators operating on fuel oil.
- One (1) nominally rated 190-bhp emergency firewater pump operating on fuel oil.

The proposed CERC project will have a nominal generating capacity of 1,000 MWe at International Organization for Standardization (ISO) conditions (59ºF, 14.7 psia, and 60% RH). The project will employ BACT to minimize emissions of $PM_{2.5}$, CO, VOC, and GHG as required by Virginia's major source PSD program. The project will also employ BACT to minimize emissions of NO_x, PM, PM_{10}, SO_2, and H_2SO_4, as required by Virginia's minor NSR program.

2.2 Major Facility Components

The primary sources of pollutants associated with the proposed project are the General Electric 7FA.05 SCCTs. Other sources of pollutants associated with the proposed project include one fuel gas heater, six emergency generators, one emergency firewater pump, natural gas piping components, fuel oil storage tanks, and sixteen circuit breakers containing sulfur hexafluoride (SF_6). The following subsections provide brief descriptions of the major components of the project.

2.2.1 Simple-Cycle Turbines

The proposed project includes the construction and operation of four General Electric 7FA.05 SCCTs. The SCCTs will be dual-fueled, primarily firing pipeline-quality natural gas, with fuel oil as secondary source when natural gas is unavailable or during a black start condition. The SCCTs will also have the capability of firing a H_2 fuel blend. To qualify as a capacity performance resource in the PJM Interconnect (PJM), the unit must be capable of sustained, predictable operation that allows the resource to be available throughout the entire delivery year to provide needed energy and reserves whenever PJM determines. The SCCTs will meet this condition by having the capability of combusting fuel oil with adequate onsite fuel oil storage. Dominion is considering various means of delivering hydrogen to the site to support the combustion of H_2 fuel blend in the SCCTs. If the hydrogen delivery method chosen results in additional sources of air emissions, Dominion will revise this application to include these emission sources.

Combustion turbines (CTs) are heat engines that convert latent fuel energy into work using compressed hot gas as the working medium. CTs deliver mechanical output by means of a rotating shaft used to drive an electrical generator, thereby converting a portion of the engine's mechanical output to electrical energy. Ambient air is first filtered and then compressed in the CT compressor section. The CT compressor increases the pressure of the intake combustion air stream which also raises its temperature. During warm days (typically 60 degrees Fahrenheit [°F] or greater), the CT inlet ambient air can be cooled by evaporative cooling prior to entering the CT compressor stage, thus providing denser air for combustion and increasing the power output. The compressed combustion air is then combined with the fuel in the CT's high pressure (HP) combustor and burned to produce hot exhaust gases. These HP, hot exhaust gases enter the CT turbine section and expand to turn the turbine rotor to produce rotary shaft power, which is used to drive an electric generator as well as the CT compressor. The CT exhaust gases will then pass through the SCR and oxidation catalyst before being discharged to the atmosphere through a stack.

The CTs will also be capable of using wet compression for additional power output. During fuel oil operation, water is injected directly into the CT compressor section to increase mass of the intake air and thus power output. Demineralized water will be used for the evaporative cooling and wet injection processes. During some operational conditions, the temperature of the fuel gas will be increased by the use of a natural gas-fired fuel gas heater to prevent condensation in the CT fuel gas system.

The General Electric 7FA.05 model combustion turbine has a nominal electric power output of 250 MWe at ISO conditions. NO_x emissions are controlled via lean premix, dry low-NO_x combustors, when operating on natural gas or H_2 fuel blend and are controlled via water injection when operating on fuel oil. SCR will be used to further control NO_x emissions from the SCCTs, and oxidation catalyst will control CO and VOC emissions.

Minimum emissions compliance load (MECL), is defined as the minimum load at which the combustion turbine can operate and remain in compliance with permitted emission limits. Since the MECL, expressed as a percentage of the base load, varies based on ambient temperature, there is no single numerical percent load that can define MECL across ambient operating conditions.

Potential emissions from the SCCTs will be based on the maximum emissions, on a pollutant-by-pollutant basis, based on three separate annual operating scenarios. Annual operating scenario 1 will be based on 3,240 hours per year per turbine (hr/yr/turbine) of normal operation while combusting 100% natural gas and startup/shutdown (SUSD) emissions based on natural gas only. Annual operating scenario 2 will be based on operating 3,240 hr/yr/turbine of normal operation while combusting H_2 fuel blend and SUSD emissions based on natural gas only. Alternate operating scenario 3 will be based on operating 2,490 hr/yr/turbine of normal operation while combusting 100% natural gas and 750 hr/yr/turbine while combusting fuel oil and SUSD emissions based on natural gas and fuel oil.

The number of SUSD for the four turbines in aggregate will be limited to 2,000 startups per year and 2,000 shutdowns per year. This is equivalent to but not limited to 500 startups and 500 shutdowns for each CT per year with up to 120 startups and 120 shutdowns per year while firing fuel oil. This will be based on a 12-month rolling average. Since the SCCTs are designed to minimize time at SUSD events (30 minutes for startups and 15 minutes for shutdown), this will result in approximately 1,500 hr/yr of additional operation due to SUSD events for the four turbines. The SCCTs will only be capable of starting up on either 100% natural gas or fuel oil. The SCCTs will not be capable of starting up while combusting H_2 fuel blend. Potential SUSD emissions, therefore, only reflect combusting 100% natural gas or fuel oil. In addition, potential air emissions during SUSD events have conservatively not included emission reduction associated with either the SCR or oxidation catalyst.

The SCCTs will also be capable of operating in LLE mode, which is defined as extended operations at low loads below MECL, for the purpose of electrical grid restoration. The six emergency generators will be used not only to supply the electrical power to start one SCCT in LLE mode but will also have the capability of providing electrical power to the site. This SCCT will continue to operate at continuously varying loads in LLE mode to stabilize the grid voltage. Operation of the SCCT in LLE mode to restore and stabilize the grid is considered an emergency mode and therefore, hours of operation will not be limited and are not included in the 3,240 hours/year proposed limit for normal operation. Operation of the turbines in LLE mode will be tested annually to demonstrate availability in that mode and that testing will be included in the 3,240 hours/year proposed limit for normal operation.

The SCCTs will be subject to the applicable requirements of New Source Performance Standard (NSPS) 40 CFR Part 60 Subpart KKKK (for Stationary Combustion Turbines), Subpart TTTT (for Electric Generating Units), NSPS Subpart A (General Provisions), and National Emission Standard for Hazardous Air Pollutants (NESHAP) 40 CFR Part 63 Subpart YYYY (for Stationary Combustion Turbines) and NESHAP Subpart A, (General Provisions).

2.2.2 Fuel Gas Heater

The proposed project will utilize one fuel gas heater nominally rated at 18.8 MMBtu/hr. The heater will consist of two burners, with a separate exhaust stack for each burner, and will be used to heat the incoming natural gas fuel to prevent freezing of the gas regulating valves under certain gas system operating conditions. The heater will fire natural gas exclusively and use low-NO_x burners to control NO_x emissions. The heater will be permitted to operate 8,760 hours per year and will be capable of supporting any of the turbines. The fuel gas heater will be subject to the applicable requirements of NSPS 40 CFR Part 60 Subpart Dc (for Small Industrial-Commercial-Institutional Steam Generating Units) and NESHAP 40 CFR Part 63 Subpart DDDDD, (for Industrial, Commercial and Institutional Boilers and Process Heaters at Major Sources).

2.2.3 Diesel-fired Emergency Generators

The proposed project will include six nominal 3,500-kWe emergency generators that will be powered by diesel engines operating on fuel oil. The emergency diesel generators will provide power in emergency situations when electrical power is not available from the grid. The emergency diesel generators are also intended to provide power for a black start scenario. The emergency diesel generators will not be used for peak shaving or non-emergency power. Each emergency generator will be operated up to 100 hr/yr for non-emergency operation including maintenance checks and readiness testing. Operating hours during emergencies are not limited. Potential emissions for each emergency generator have been based on operating each generator 500 hours per year, based on EPA guidance that has been adopted by VDEQ. The diesel-fired emergency generators will be subject to the applicable requirements of NSPS 40 CFR Part 60 Subpart IIII (for Compression-Ignition Reciprocating Internal Combustion Engines), NSPS Subpart A (General Provisions), NESHAP 40 CFR Part 63 Subpart ZZZZ (for Stationary Reciprocating Internal Combustion Engines), and NESHAP Subpart A (General Provisions).

2.2.4 Diesel-fired Emergency Firewater Pump

The proposed project will include a nominal 190-bhp, diesel-fired emergency firewater pump engine to be used for water supply in the event of an on-site fire. The firewater pump engine will be limited to 100 hr/yr for routine testing and maintenance. Operating hours during emergencies are not limited. Potential emissions have been based on operating 500 hours per year, based on EPA guidance that has been adopted by VDEQ.

The diesel-fired emergency firewater pump engine will be subject to the applicable requirements of NSPS 40 CFR Part 60 Subpart IIII (for Compression-Ignition Reciprocating Internal Combustion Engines), NSPS Subpart A (General Provisions), NESHAP 40 CFR Part 63 Subpart ZZZZ (for Stationary Reciprocating Internal Combustion Engines).

2.2.5 Natural Gas Piping Components

The proposed project will include on-site natural gas piping and components including valves, flanges and relief valves associated with that piping. Small amounts of natural gas could potentially leak from these components, emitting VOCs and methane (CH_4) into the atmosphere. In addition, small quantities of natural gas will be released from the fuel system during maintenance inspection activities. Methane is considered a GHG. A conservative estimate of natural gas piping components has been provided, along with an estimate of the potential VOC and GHG emissions from those components as well as from maintenance and inspection activities.

2.2.6 Circuit Breakers

The proposed project will include sixteen switchyard circuit breakers, each circuit breakers will contain 224 pounds (lb) of sulfur hexafluoride (SF_6). SF_6 is considered a GHG and is used as an electrical insulating gas within each circuit breaker. Based on the above individual circuit breaker capacities, the project's total SF_6 capacity will be 3,584 lb. SF_6 emissions have been based on a standard leak rate of 0.5 percent annually. Each circuit breaker will be equipped with a local density indicator to continuously monitor pressure/density and will provide an alarm for loss of gas.

2.2.7 Fuel Gas System

Natural gas will be delivered to the plant boundary. The natural gas companies that potentially will be supplying the natural gas for the project will provide natural gas with a sulfur content up to 0.4 grains per 100 dry standard cubic feet (gr/100 dscf) based on an annual average. To account for variability in the natural gas sulfur content on a short-term basis, hourly emissions have been based on 1.0 gr/100 dscf.

2.2.8 Fuel Oil Storage Tanks

The project will include a new 12-million gallon fuel oil storage tank to supply fuel oil for the SCCTs. Each emergency generator will be equipped with an integral 3,500-gallon fuel oil storage tank. The diesel-fired emergency firewater pump will be equipped with a 500-gallon fuel oil storage tank. Fuel oil deliveries to the facility will occur via barge or tanker truck for the 12-million gallon fuel oil storage tank and by tanker truck for the other storage tanks.

3.0 Project Emissions Summary

This section presents a summary, organized by emissions sources, of project emissions and a discussion of the methodology used to calculate emissions. Within each emissions source subsection, the methods used to calculate potential emissions are discussed followed by a summary of the emissions estimates for each specific emissions source.

As indicated previously, the project consists of the following sources of air emissions:

- Four (4) nominal 250-MWe General Electric 7FA.05 SCCTs capable of combusting 100% natural gas, fuel oil, or H_2 fuel blend.
- One (1) natural gas-fired fuel gas heaters nominally rated at 18.8 MMBtu/hr.
- Six (6) nominal 3,500-kWe emergency generators operating on fuel oil.
- One (1) nominal 190-bhp emergency firewater pump operating on fuel oil.
- Fuel oil storage tanks.
- Circuit breakers containing SF_6 insulating gas.
- Fugitive emissions (natural gas piping components, maintenance activities, and truck traffic).

Emissions and emission calculation procedures used in determining the potential emissions from the project are based on information provided by the CT manufacturer, other equipment vendor data, emissions limitations specified by applicable NSPS or NESHAP regulations, emissions factors documented in EPA's "Compilation of Air Pollution Emissions Factors, AP-42," and proposed BACT emissions limits. Annual operational limitations have been accounted for where appropriate while estimating potential annual emissions.

Appendix A provides the applicable VDEQ forms. Appendix B presents detailed potential emission calculations for each emissions source. Potential emissions for the SCCTs are presented for each annual operating scenario based on each SCCT operating for 3,240 hours per year of normal operation including 750 hours per year firing fuel oil. The SCCTs will be equipped with SCR and oxidation catalyst to control NO_x, CO, and VOC emissions. Additionally, potential emissions include emissions based on each SCCT operating for 500 SUSD events which equates to an additional 1,500 hr/yr of operation for all four SCCTs during SUSD events. The potential emissions were compared to the PSD Significant Emission Rates to assess applicability of PSD requirements.

For purposes of assessing applicability to Virginia minor NSR permitting requirements, uncontrolled emissions must be calculated and compared to the thresholds listed in 9 VAC5-80-1105(D). Uncontrolled emissions from the combustion turbines are based on operating 8,760 hr/yr on either natural gas, fuel oil, or H_2 fuel blend, and assuming a natural gas sulfur content of 1 gr/100 scf. Uncontrolled emissions from emergency engines can be based on operating 500 hr/yr/per engine based on federal guidance adopted by DEQ. These uncontrolled emissions are discussed in more detail in Section 3.6.

3.1 Simple Cycle Combustion Turbine: Maximum Hourly Emission Rates

The following subsections present maximum hourly and annual emissions for the SCCTs during normal operations and SUSDs. Appendix B provides additional details, such as emissions and flow calculations at various loads, ambient temperatures, and with and without evaporative cooling.

3.1.1 Normal Operation Scenarios

Table 3-1 provides a summary of the maximum hourly emission rates for each mode of normal operation for natural gas, H_2 fuel blend, and fuel oil-firing. Performance and emissions data for twenty-two separate SCCT operating cases was provided by the CT manufacturer for natural gas, H_2 fuel blend, and fuel oil operation. These cases include ambient temperatures ranging from -10 deg. F to 107 deg. F, with and without evaporative cooling. For operating cases where the SCCTs are combusting natural gas or H_2 fuel blend, the SCCT load ranges from MECL to maximum power or 100% load. For operating cases where the SCCTs are combusting fuel oil, the SCCT load ranges from 50% load to maximum power or 100% load.

3.1.2 Startup and Shutdown

Startup and shutdown events for the project are defined as follows:

- Startup—Operations occurring between first flame and compliance with the steady-state emissions limit. Specifically:
  - Natural Gas Startup—A startup when firing natural gas is defined as the operations occurring between first flame until the SCCT reaches MECL with all steady-state emission limits.

  - Fuel Oil Startup—A startup when firing fuel oil is defined as the operations occurring between first flame until the SCCT reaches compliance with all steady-state emission limits (assumed to occur at 50% steady-state load).
  - Note: The SCCTs will not be capable of starting up on H_2 fuel blend.

- Shutdown—
  - Natural Gas/H_2 Fuel Blend Shutdown—Operations occurring between MECL and flame-out of the SCCT.
  - Fuel Oil Shutdown—Operations occurring between 50% load and flame-out of the SCCT.

Each startup event is expected to be 30 minutes. This is the amount of time required for the turbine to reach steady state conditions even though the units can start producing power in approximately 10 minutes for a quick start or 21 minutes for a slow start. Each shutdown is expected to be 15 minutes.

*Table 3-1. Hourly Emissions per Turbine during Normal Operations**

Pollutant	Maximum Hourly Emissions (lb/hr)		
	100% Natural Gas-Firing	H_2 fuel blend-Firing	Fuel Oil-Firing
NO_x	23.3	23.0	47.9
CO	11.3	11.2	11.7
VOC	3.2	3.2	6.7
PM (filterable)	11.9**	11.8**	24.0
$PM_{10}/PM_{2.5}$ (total)	19.7**	19.5**	45.0
SO_2	8.2**	8.1**	4.5
H_2SO_4	5.6**	5.5**	3.0
Lead	1.2E-03	1.2E-03	3.4E-02
GHGs (expressed as CO_2e)***	286,380	283,390	401,195

*See Appendix B, Tables B-1 through B-3 for a summary of the CT manufacturer operating cases which includes hourly emission data at various ambient temperatures, loads, with and without evaporative cooling and with SCR and oxidation catalyst controls.
** Based on maximum natural gas short-term sulfur content of 1.0 gr S/100 scf and H_2SO_4 formation from operation of the SCR

*** Includes contribution from methane (CH_4) and nitrous oxide (N_2O)
Source: General Electric, 2023.

Table 3-2 summarizes emissions during SUSD events. NO_x, CO, PM_{10}/$PM_{2.5}$, and VOC emissions were provided by the CT manufacturer. PM SUSD emissions were calculated based on the total PM_{10}/$PM_{2.5}$ emissions provided by the CT manufacturer and the maximum ratio of filterable to total PM emissions during normal operation. The total amount of fuel combusted during a SUSD event was also provided by the CT manufacturer. The total fuel combusted was used to estimate SO_2, H_2SO_4, and GHG emissions during SUSD events. (See Tables B-4, B-12, B-13, and B-14 for detailed SO_2, H_2SO_4, and GHG SUSD emissions.) These SUSD emissions conservatively assume no emission control due to the SCR or oxidation catalyst.

Table 3-2. SCCT Durations, Emissions during Startup and Shutdown Events (Per SCCT)

	Natural Gas		Fuel Oil	
	Startup	**Shutdown***	**Startup**	**Shutdown**
Duration (min)	30	15	30	15
Pollutant	**Emission Rate (lb/event)**			
NO_x	52	20	143	62
CO	366	152	1036	246
VOC	65	31	101	47
PM	2	1	10	5
PM_{10}	4	2	21	10
$PM_{2.5}$	4	2	21	10
SO_2	4	1	2	1
H_2SO_4	2	1	1	1
CO_2	133,819	34,904	186,431	48,626
Fuel	**Fuel Consumption Rate (MMBtu/event)**			
Natural Gas/Fuel Oil	1,031	269	1,031	269

*Shutdown emissions are for shutdown on natural gas or H_2 fuel blend.

Source: General Electric, 2023.

3.1.3 LLE Mode of Operation

Operation in LLE mode will only occur in an actual emergency, i.e., when there is a failure of the electrical grid, and during annual testing to demonstrate availability. In the event a black start is required, the CERC emergency generators will operate at full load until one SCCT can be started up in LLE mode. This SCCT will operate in continuously varying loads in LLE mode in order to stabilize and restore the electrical grid. Emissions associated with the annual testing are accounted for in the annual emission limits for the SCCTs.

3.2 Simple Cycle Combustion Turbine: Potential Annual Emissions

SCCT fuel firing rates and emissions rates vary as a function of operating load and ambient temperature. In addition, emissions rates of some pollutants (e.g., NO_x and CO) can be higher during startups and shutdowns as compared to normal operation, while emissions of other pollutants are typically higher during normal full-power operation (e.g., PM). Operation of the SCCT results in different emission rates for hazardous air pollutants (HAPs) as well. Therefore, to develop reasonable, yet conservative, estimates of potential emissions from the project, three potential annual operating scenarios were evaluated, encompassing the expected range of operating assumptions and numbers of startups and shutdowns to satisfy expected electricity demand from the SCCTs. The three operating scenarios evaluated were:

- Scenario 1—Potential emissions based on each SCCT operating 3,240 hours per year of normal operation on natural gas only and 500 startups and 500 shutdowns on natural gas only.
- Scenario 2 – Potential emission based on each SCCT operating 3,240 hours per year of normal operation on H_2 fuel blend and 500 startups on natural gas only and 500 shutdowns on H_2 fuel blend only.
- Scenario 3—Potential emissions based on each SCCT operating 3,240 hours per year of normal operation, 2,490 hr/yr on natural gas and 750 hr/yr on fuel oil, and 500 startups and 500 shutdowns, 380 on natural gas and 120 on fuel oil.

While Scenario 3 produces the maximum emissions for each criteria pollutant, neither Scenario 1, 2 or 3 produces the maximum emissions for every HAP; therefore, maximum emissions were based on Scenario 3 for each criteria pollutant and the highest of either scenario for each individual HAP.

Maximum emissions from the operating scenarios were calculated and are proposed to establish annual emissions limits. Tables 3-3 and 3-4 present the annual emissions (tpy) of regulated NSR pollutants and HAPs, respectively.

Table 3-3. SCCT Potential Annual Emissions (Total for Four Units)

	SCCT Potential Annual Emissions (tpy)			
Pollutant	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Potential Emissions**
NO_x	223.08	221.14	291.88	291.88
CO	591.12	590.48	774.96	774.96
VOC	116.74	116.74	134.49	134.49
PM (filterable)	51.17	50.78	79.00	79.00
$PM_{10}/PM_{2.5}$ (total)	98.06	97.42	150.21	150.21
SO_2	26.45	24.91	27.62	27.62
H_2SO_4	17.90	17.29	18.63	18.63
Lead	0.0083	0.0082	0.062	0.062
CO_2	2,008,033	1,988,656	2,194,773	2,194,733
Methane	37.8	37.4	55.4	55.4
Nitrous oxide	3.8	3.7	8.2	8.2
GHG Mass	2,006,003	1,986,645	2,191,014	2,191,014
CO_2e	2,008,033	1,988,656	2,194,773	2,194,773

Note: CO_2 = carbon dioxide.
CO_2e = carbon dioxide equivalent.

Source: ECT, 2023.

Table 3-4. SCCT Potential Annual HAP Emissions (Total for Four Units)

Pollutant†	Scenario 1	Scenario 2	Scenario 3	Potential Emissions (tpy)*
Acetaldehyde	0.69	0.68	0.53	0.69
Acrolein	0.11	0.11	0.08	0.11
Benzene	0.21	0.20	0.38	0.38
Ethylbenzene	0.55	0.54	0.42	0.55
Formaldehyde	4.51	4.47	5.06	5.06
Manganese	0.01	0.01	3.16	3.16
Polycyclic Aromatic Hydrocarbons (PAHs)	0.04	0.04	0.19	0.19
Propylene Oxide	0.50	0.49	0.38	0.50
Toluene	2.23	2.21	1.71	2.23
Xylene	1.10	1.09	0.84	1.10
Other HAPs	0.10	0.10	0.60	0.60
Total	10.05	9.96	13.34	13.34

Note: See Appendix B, Table B-12, B-13, and B-14 for detailed calculations.
†The highest ten CT HAPs in terms of annual emissions are presented in this table. The remaining HAP emissions are presented under the group "Other HAPs."
*Potential emissions for individual and total HAPs are based on the highest emissions from either Scenario 1, Scenario 2, or Scenario 3.

Source: ECT, 2023.

3.3 Ancillary Equipment

The project will include one fuel gas heater, six emergency generators, and one emergency firewater pump. Table 3-5 presents emissions calculations of regulated NSR pollutants and HAPs from the ancillary equipment, and Appendix B, Tables B-15 through B-17, provide detailed emissions calculations for the fuel gas heater, emergency generators, and emergency firewater pump. Emission calculations for the annual fuel oil throughput through the proposed fuel oil storage tanks are also provided in Appendix B.

3.3.1 Fuel Gas Heater

One (1) nominal 18.8-MMBtu/hr, natural gas-fired, fuel gas heater will be utilized for the proposed project. The heater will heat the natural gas prior to its use as fuel for the turbines to prevent condensed liquids in the natural gas from damaging the combustor sections of the turbine.

Emissions of air contaminants were calculated based on ultra-low NOx burners, AP-42 and Ventura County Air Pollution Control District emission factors and operating 8,760 hours per year. Table 3-5 presents emission rates of PSD pollutants and HAPs from the fuel gas heater, and Appendix B, Table B-15 provides detailed emissions calculations.

3.3.2 Diesel-Fired Emergency Generators

The facility will have six (6) nominal 3,500-kWe emergency generators, each powered by a nominal 4,694-bhp diesel-fired engine. The diesel-fired emergency generators will meet the emissions requirements in EPA's Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, July 11, 2006 (40 CFR 60, Subpart IIII). The diesel-fired emergency generators will also meet the applicable requirements of 40 CFR 63, Subpart ZZZZ. The emergency generators will be limited to 100 hr/yr per engine for non-emergency operation including maintenance checks and readiness testing. Since the diesel-fired emergency generators are considered emergency stationary RICE, rated greater than 500 hp and located at a major source of HAPS, they do not need to comply with 40 CFR 63, Subpart A or Subpart ZZZZ, except for the initial notification requirements 40 CFR 63.6645(f).

Potential emissions have been based on each engine operating 500 hr/yr in accordance with EPA guidance that has been adopted by VDEQ. There is no limit to the operation of the emergency generators during an emergency situation. Table 3-5 presents emissions calculations of regulated NSR pollutants and HAPs from the emergency generators, and Appendix B, Table B-17 provides detailed emissions calculations.

3.3.3 Diesel-Fired Emergency Firewater Pump

The facility will include one (1) nominal 190-bhp diesel-fired emergency firewater pump engine. The diesel-fired emergency firewater pump will meet the emissions requirements in EPA's Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, July 11, 2006 (40 CFR 60, Subpart IIII). The diesel-fired emergency firewater pump engine will also meet the requirements of 40 CFR 63, Subpart ZZZZ. Since the diesel-fired emergency firewater pump engine is rated less than 500 hp and located at a major source of HAPS, the only requirement for the emergency firewater pump engine under Subpart ZZZZ is to comply with the applicable requirements of 40 CFR 60, Subpart IIII. The emergency firewater pump engine will be limited to 100 hr/yr for non-emergency operation including maintenance checks and readiness testing.

Potential emissions have been based on operating 500 hr/yr in accordance with EPA guidance that has been adopted by VDEQ. There is no limit to the operation of the emergency firewater pump during an emergency situation. Table 3-5 presents emissions calculations of regulated NSR pollutants and HAPs from the emergency firewater pump engine, and Appendix B, Table B-16 provides detailed emissions calculations.

Table 3-5. Auxiliary Equipment Potential Annual Emissions

	Fuel Gas Heater		Emergency Generator*		Emergency Fire Water Pump		Fugitives	
Pollutant	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**
NO_x	0.21	0.91	34.57	8.64	0.88	0.22	N/A	N/A
CO	0.70	3.05	27.01	6.75	1.09	0.27	N/A	N/A
VOC	0.09	0.41	14.82	3.70	0.38	0.09	0.4	1.6
PM	0.04	0.15	1.54	0.39	0.06	0.02	0.03	0.11
$PM_{10}/PM_{2.5}$	0.13	0.58	1.80	0.45	0.61	0.15	0.01	0.02
SO_2	0.02	0.10	0.05	0.01	0.39	0.10	N/A	N/A
H_2SO_4	0.005	0.02	0.004	9.97E-04	0.03	0.01	N/A	N/A
Lead	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	N/A	N/A
HAPS (total)	1.1E-02	5.00E-02	5.8E-02	1.4E-02	Neg.	Neg.	Neg.	Neg.
GHG (as CO_2e)	2,202	9,644	5,520	1,380	238	59	32	140

Source: ECT, 2023.

*Per source.

3.3.4 Fuel Oil Storage Tanks

The project includes installation of a new 12-million gallon fuel oil storage tank. The project also will include six integral 3,500-gallon belly storage tanks for the six nominal 3,500-kWe emergency generators and one 500-gallon horizontal storage tank for the diesel-fired firewater pump engine. NSPS Subpart Kb does not apply to these storage tanks because of the low vapor pressure of fuel oil, as discussed in Section 4.4.4. VOC emissions were calculated using the Trinity Breeze TankESP Pro (Version 5.2.0). VOC emissions were calculated assuming a potential throughput equal to the maximum hourly fuel oil consumption rate for the SCCTs and operating the maximum 750 hours per year per SCCT. Table 3-5 presents VOC emissions from the new fuel oil storage tank based on this annual throughput and Appendix B, Table B-22 provides the basis for the VOC emission calculations. VOC emissions from the fuel oil tanks for the emergency engines are considered insignificant.

3.3.5 Circuit Breakers

The proposed project will include sixteen switchyard circuit breakers, each of the circuit breakers will contain 224 lb of SF_6 per unit. Therefore, the total SF_6 capacity at the facility will be 3,584 lb. The SF_6 leak rate will be limited to 0.5 percent on an annual basis. SF_6 emissions (as carbon dioxide equivalent [CO_2e]) from this source are expected to represent only 0.01 percent of the facility's CO_2e emissions. Appendix B, Table B-5, provides detailed emissions calculations.

3.3.6 Fugitive Emissions

VOC and GHG emission calculations for natural gas piping component fugitive emissions are based on emissions factors from Table W-1A of the Mandatory GHG Reporting Rules (40 CFR 98) for components in gas service for the Eastern United States. These emission factors provide the methodology for estimating the total mass emission rate of natural gas emitted from natural gas piping components. Releases of natural gas from annual maintenance and inspection activities is based on a conservative estimated volume of natural gas contained in the fuel system required to be purged.

Project-specific natural gas composition data, which was used to calculate each constituent percent (by weight), was used to calculate total VOC and GHG emissions from natural gas piping components and maintenance activities. GHG emissions consist of calculating both CO_2 and CH_4 emissions. HAP emissions from natural gas piping components and maintenance activities are considered insignificant.

The global warming potential (GWP) factors used to calculate CO_2e emissions are based on Table A-1 of 40 CFR 98. Appendix B, Table B-5 provides an estimate of the number of natural gas piping components, emission factors used and detailed calculations of GHG emission from natural gas piping components as well as from maintenance activities. Appendix B, Table B-23 provides detailed calculations of VOC emissions from natural gas piping components and maintenance activities.

Fugitive particulate matter emissions from truck traffic occur from aqueous ammonia, fuel oil tanker trucks, and demineralized water trailer trucks traveling across the paved road surfaces to and from the facility entrance to the loading areas. Emissions from truck traffic were estimated using emission calculation methodologies and factors provided in EPA's AP-42, Section 13.2.1 Paved Roads. These methodologies utilize equation inputs that include vehicle weights, vehicle miles traveled and road silt content. Appendix B, Table B-24 provides detailed calculations of particulate matter emissions from truck traffic.

3.4 Project Emissions

Table 3-6 presents the annual PTE of the project for the installation of four General Electric 7FA.05 SCCTs and the associated ancillary equipment (see Appendix B for details). A PSD applicability analysis is presented in Section 3.5, including the potential emissions from this project and other contemporaneous emissions increases and decreases.

Potential HAP emissions are estimated to be 14.68 tpy, with maximum single HAP emissions of 5.07 tpy (formaldehyde). Since these values are below the relevant major source thresholds of 25 tpy for all HAPs or 10 tpy for a single HAP the project by itself would not be considered a major source of HAP emissions.

Table 3-6. Total Annual Project Potential Emissions

Emission Source Description	Parameters (tpy) NO_x	CO	VOC	PM	PM_{10}	$PM_{2.5}$	SO_2	H_2SO_4	Lead	GHG (CO_2e)
Four SCCTs	291.88	774.96	134.49	79.00	150.21	150.21	27.62	18.63	0.06	2,194,773
One Fuel Gas Heater	0.91	3.05	0.4	0.15	0.61	0.61	0.09	0.02	Neg	9,644
Six Diesel-fired Emergency Generators	51.85	40.51	22.22	2.31	2.70	2.70	0.08	0.006	Neg.	8,279
One Diesel-fired Fire Water Pump	0.22	0.27	0.09	0.02	0.15	0.15	0.10	0.007	Neg.	59
Fuel Oil Storage Tanks	N/A	N/A	1.61	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fugitives	N/A	N/A	0.022	0.011	0.022	0.005	N/A	N/A	N/A	140
Circuit Breakers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	204
Total project emissions	344.86	818.79	158.85	81.59	153.66	153.66	27.89	18.66	0.06	2,213,100

Source: ECT, 2023.

3.5 <u>PSD Applicability</u>

As stated in Section 1.3, CPS is considered an existing major stationary source under the PSD regulations. A major modification is defined as any physical change or change in the method of operation of a major stationary source that would result in (1) a significant emission increase of a regulated NSR pollutant, and (2) a significant net emission increase of that pollutant from the major stationary source.

The first step is commonly referred to as the "Project Emission Increase" as it only accounts for emissions increases related to the proposed project itself. This step in the analysis does not include the proposed shutdown of any equipment at the facility. If the emissions increases estimated in step (1) exceed the major modification thresholds, then the applicant moves on to step (2), commonly referred to as the "Netting Analysis." If the resulting net emission increases exceed the major modification threshold, PSD permitting is required.

Table 3-7 compares the worst-case potential emissions for the proposed project to the PSD significant emission rate (SER). As shown, the project emissions increase does not exceed the PSD SER for SO_2 and lead. Therefore, the project is not subject to PSD for SO_2 and lead, and the analysis for these pollutants is complete. However, the project emissions increase exceeds the PSD SER for NO_x, CO, VOC, PM, PM_{10}, $PM_{2.5}$, H_2SO_4, and GHGs. Therefore, the analysis proceeds to step 2 for these pollutants.

Table 3-7. Total Annual Project Potential Emissions

Emission Source Description	Parameters (tpy)									
	NO_x	CO	VOC	PM	PM_{10}	$PM_{2.5}$	SO_2	H_2SO_4	Lead	GHG (CO_2e)
Total project emissions	344.86	818.79	158.85	81.59	153.66	153.66	27.89	18.66	0.06	2,213,100
PSD SER	40	100	40	25	15	10	40	7	0.6	75,000
Netting Required?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes

Note: Facility is located in Chesterfield County, Virginia, which is designated as either unclassifiable or attainment for all pollutants.

Source: ECT, 2023.

The contemporaneous netting analysis under Step 2 looks at creditable emissions increases and decreases within the five years preceding the anticipated date of construction for the project up to when the project becomes operational and adds them to the project emissions increase calculated in Step 1. CPS permitted three projects in this time period, including the Coal Combustion Residual Pond Closure (February 2021), Beneficial Use Processing and Material Handling Equipment (November 2021), and the Replacement of Existing Thermoflux Pipeline Heater with New Gas Tech Pipeline Heater (April 2022). The maximum permitted emissions are assumed to be the creditable emissions increase for each of these projects.

In addition, CPS has just completed the permanent shutdown of Boilers 5 and 6 (May 2023). Baseline actual emissions are the maximum average actual emissions occurring over any consecutive 24-month period within the contemporaneous period. A different 24-month period may be selected for each pollutant. Baseline emissions from Boilers 5 and 6 have been estimated using site records (fuel use, CEM data, etc.) to determine the creditable emissions decrease associated with the shutdown. The emissions decreases associated with these activities have not been relied upon in issuing a permit under the PSD review program; therefore, they meet the definition of creditable. Appendix B provides detailed documentation for the baseline emissions from Boilers 5 and 6.

Table 3-8 summarizes the total net emissions changes over the contemporaneous period for NO_x, CO, VOC, PM, PM_{10}, $PM_{2.5}$, H_2SO_4, and GHGs. As shown, the net emissions increase exceeds the PSD SER for CO, VOC, $PM_{2.5}$, and GHGs, and the CERC project is subject to PSD as a major modification for these pollutants. However, the net emissions increase does not exceed the PSD SER for NO_x, PM, PM_{10}, and H_2SO_4. As such, the project is not subject to PSD for these pollutants.

Table 3-8. Contemporaneous Netting Analysis

Emission Source	Parameters (tpy)							
Description	NO_x	CO	VOC	PM	PM_{10}	$PM_{2.5}$	H_2SO_4	GHG (CO_2e)
Total project emissions	344.86	818.79	158.85	81.59	153.66	153.66	18.66	2,213,100
Boiler 5 & 6 Shutdown	(453.55)	(165.28)	(19.29)	(277.75)	(221.96)	(43.99)	(427.97)	(1,700,338)
Pond Closure Project	N/A	N/A	N/A	42.39	12.08	1.49	N/A	N/A
Beneficial Use Proc. Equip.	3.74	18.41	3.07	4.46	2.48	2.07	0.022	2,317
Gas Tech Pipeline Heater	3.50	2.94	0.19	0.01	0.02	0.02	0.02	3,819
Net Emissions Increase	**(101)**	**675**	**143**	**(149)**	**(54)**	**113**	**(409)**	**518,898**
PSD SER	40	100	40	25	15	10	7	75,000
Project Exceeds SER?	No	**Yes**	**Yes**	No	No	**Yes**	No	**Yes**

Note: Facility is located in Chesterfield County, Virginia, which is designated as either unclassifiable or attainment for all pollutants.

Source: ECT, 2023.

3.6 Project Emissions for Virginia Minor NSR Applicability

In addition to the PSD program, Virginia has a minor NSR program for pollutants with uncontrolled emissions rates that exceeds certain thresholds in 9VAC5-80-1105 D. Because the levels provided in 9VAC5-80-1105 D are equal to or lower than those levels provided in the definition of "significant" under the PSD regulations, the project would trigger Virginia minor NSR permitting requirements for the pollutants for which the project triggers PSD, including CO, VOC, $PM_{2.5}$, and GHG. However, 9VAC5-80-1100.H indicates that PSD provisions take precedent.

As previously discussed, the applicability analysis for Virginia's minor NSR program cannot take into account limits on hours of operation, sulfur content and other conditions unless they are required by enforceable permit conditions. Therefore, uncontrolled emission rates are calculated for those pollutants that do not exceed PSD applicability thresholds, including NO_x, PM, PM_{10}, SO_2, H_2SO_4, and lead, based on the following conditions to determine minor NSR permitting applicability:

1. Hours of operation for the SCCTs based on 8,760 hr/yr.
2. The sulfur content of the natural gas combusted in the SCCTs and the fuel gas heater based on the highest potential sulfur content of natural gas available at the project site or 1.0 gr S/100 scf.
3. The sulfur content of the fuel oil combusted in the SCCTs based on the sulfur content limit contained in NSPS Subpart KKKK or 0.06 lb SO_2/MMBtu heat input.

The potential hours of operation for each emergency engine can remain at 500 hr/yr since this annual operating limit is based on federal guidance that has been adopted by VDEQ.

Table 3-9 provides a summary of the uncontrolled emission rates for comparison to the Virginia Minor NSR applicability thresholds. Based on the uncontrolled emissions rates, minor NSR permitting is triggered for NOx, PM, PM_{10}, SO_2, and H_2SO_4, but not lead.

Table 3-9. Uncontrolled Emission Rates for Virginia Minor NSR Applicability (tpy)

Emission Source Description	NOx	PM	PM_{10}	SO_2	H_2SO_4	Lead
Four SCCTs	6,977.2	423.9	781.4	141.9	96.9	0.59
One fuel gas heater	0.9	0.2	0.6	0.1	0.02	4.04E-05
Six diesel-fired emergency generators	51.9	2.3	2.70	0.01	0.006	4.6E-04
One diesel-fired firewater pump	0.2	0.02	0.2	0.1	0.008	3.3E-06
Fuel Oil ASTs	N/A	N/A	N/A	N/A	N/A	N/A
Fugitive emissions	N/A	0.11	0.02	N/A	N/A	N/A
Circuit breakers	N/A	N/A	N/A	N/A	N/A	N/A
Total uncontrolled project emissions	7,030.0	427.0	785.0	142.2	96.9	0.59
Virginia Minor NSR threshold	10	15	10	10	6	0.6
Subject to Virginia Minor NSR	Yes	Yes	Yes	Yes	Yes	No

*See Appendix B, Tables B-18 through B-21, for detailed calculations.

Source: ECT, 2023.

4.0 Applicable Requirements and Standards

This section presents a review of the air quality regulations that will govern permitting and operation of the proposed project. Specifically, the following regulations and standards were reviewed for applicability to the proposed project:

- VDEQ PSD regulations.
- Good engineering practice (GEP) stack height regulations.
- NSPS.
- National Emissions Standards for Hazardous Air Pollutants (NESHAP).
- Compliance assurance monitoring (CAM).
- Mandatory Greenhouse Gas Reporting
- EPA's Acid Rain Program (ARP) regulations.
- Risk management program (RMP).
- Title V permit program.
- Cross-State Air Pollution Rule (CSAPR).
- VDEQ Minor NSR regulations.
- Virginia SIP.
- CO_2 Budget Trading Program.

Federal regulatory programs, as administered by or delegated to VDEQ and approved by EPA, have been developed under the authority of the CAA and its amendments. The following subsections review the key elements of the federal regulatory program and the impact they have on the permitting and operation of the proposed project. Attention is placed on PSD (9VAC5-80-1605), NSPS (40 CFR 60), NESHAP (40 CFR 61 and 63), RMP (40 CFR 68), ARP regulations (40 CFR 72, 73, 75, 76, and 77), and CSAPR (40 CFR 97). Discussion of applicable Virginia regulatory citations is also included in this section.

The CAM Rule, 40 CFR Part 64, addresses monitoring for certain emission units at major sources, thereby assuring that facility owners and operators conduct effective monitoring of their air pollution control equipment. A CAM Plan is not a requirement of a Construction Permit Application. A CAM Plan requires a final design of the facility and specific vendor information; hence, it is not usually prepared until the final parameters are selected and the facility starts operating. Since this is a pre-construction permit, a CAM Plan is not included as part of this application.

4.1 Classification with Regard to Ambient Air Quality

The 1970 CAA gave EPA specific authority to establish the minimum level of air quality to protect public health (primary) and welfare (secondary). Table 4-1 presents the federally promulgated standards, adopted by Virginia as state standards.

Table 4-1. Ambient Air Quality Standards

Pollutant	Averaging Period*	NAAQS & VDEQ Standards (µg/m³†)	
		Primary	Secondary
SO_2	Annual‡	80	—§
	24-hour‡	365	—§
	1-hour	196	—§
	3-hour	—§	1,300
PM_{10}	24-hour	150	150
$PM_{2.5}$	Annual	12	15
	24-hour	35	35
CO	8-hour	10,000	—§
	1-hour	40,000	—§
Ozone	8-hour	0.070 ppm	0.070 ppm
NO_2	Annual	53 ppb	53 ppb
	1-hour	100 ppb	—§
Lead	3-month£	0.15	—§

Note: ppm = part per million. ppb = part per billion. NO_2 = nitrogen dioxide.

*National and Virginia short-term ambient standards may be exceeded once per year; annual standards may never be exceeded. Ozone standard is attained when the expected number of days of an exceedance is equal to or less than one.
†Standards expressed in micrograms per cubic meter (µg/m³) unless otherwise noted.
‡Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in this rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.
§No ambient standard for this pollutant and/or averaging period.
£The rule signed October 15, 2008, finalized a new lead standard. The 1978 lead standard of 1.5 µg/m³ as a quarterly average remains in effect until one year after an area is designated for the 2008 standard, except in areas designated nonattainment for the 1978 standard, where the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

Sources: 40 CFR 50.
9 VAC 5-30.

The 1990 CAA Amendments called for a review of the ambient air quality of all regions of the United States. By March 15, 1991, states were required to file with EPA recommended designations of all areas as either attainment, nonattainment, or unclassifiable. Areas of the country that had monitored air quality levels equal to or better than these standards (i.e., ambient concentrations less than a standard) as of March 15, 1991, became designated as attainment areas, while those areas where monitoring data indicated air quality concentrations greater than the standards became known as nonattainment areas.

The designation of unclassifiable indicates there is insufficient monitoring data to determine if the area has attained the federal standards; however, the limited data available indicates the standard has been achieved. Areas with this classification are treated by EPA as attainment areas for permitting purposes.

Table 4-2 lists the current federal air quality classifications for each criteria pollutant for the project area in Chesterfield County. The designation of an area has particular importance for a proposed project as it is a factor that, in part, determines whether a pollutant is subject to PSD review or nonattainment new source review (NNSR). However, EPA has confirmed that NAAQS implementation is a requirement imposed on States in the SIP; it is not imposed directly on a source. *Operating Permit Program*, 57 Fed. Reg. 32250, 32276 (July 21, 1992); *see also In the Matter of Duke Energy, LLC, Roxboro Steam Electric Plant*, Permit No. 01001T49, Petition No. IV-2016-07 (EPA Adm'r, June 30, 2017) ("A source is not obligated to reduce emissions as a result of the [NAAQS] until the state identifies a specific emission reduction measure needed for attainment (and applicable to the source), and that measure is incorporated into a SIP approved by [the] EPA.").