PSD Air Quality Impact Analyses Report for the Chesterfield Energy Reliability Center

May 2025
ECT No. 230413-0800

VIRGINIA ELECTRIC AND POWER COMPANY
Chesterfield County, Virginia

Revision 2
June 2025

ECT
2409 Crabtree Boulevard, Suite 107
Raleigh, North Carolina 27604
www.ectinc.com

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:

Joshua Ralph
Author

Signature

June 12, 2025
Date

Kathy Ferry
Peer Review

Signature

June 12, 2025
Date

Table of Contents

Appendices

List of Tables

List of Figures

List of Acronyms and Abbreviations

°F	degree Fahrenheit
μg/m^3	microgram per cubic meter
AAQS	ambient air quality standards
ACFM	actual cubic feet per minute
AERMAP	AERMOD terrain preprocessing program
AERMET	AERMOD meteorological preprocessing program
AERMIC	AMS/EPA Regulatory Model Improvement Committee
AERMOD	AERMIC model
AIG	AERMOD Implementation Guide
AMS	American Meteorological Society
BEEST	Providence Engineering and Environmental Group, LLC, BEEST suite
Bhp	brake-horsepower
BPIP	Building Profile Input Program
BPIPPRM	BPIP for PRIME
CAQT	Critical Air Quality Threshold
CERC	Chesterfield Energy Reliability Center
CFR	Code of Federal Regulations
CO	carbon monoxide
CPS	Chesterfield Power Station
CT	Combustion turbine
Dominion	Virginia Electric and Power Company, d/b/a Dominion Energy Virginia (formerly d/b/a Dominion Virginia Power)
DLN	Dry Low NO_x
ECT	Environmental Consulting & Technology, Inc.
EPA	U.S. Environmental Protection Agency
fps	feet per second
ft	feet
GAQM	Guideline for Air Quality Models
GCP	Good combustion practice
GeoTIFF	geospatial tagged image file format
GEP	good engineering practice
GHG	Greenhouse gases
HHV	higher heating value
hr/yr	hour per year
km	Kilometer
kWe	kilowatt-electric
lb/hr	pound per hour
m	meter
MECL	Minimum Emission Compliance Load
MERP	Modeled Emission Rate for Precursors
MMBtu/hr	million British thermal units per hour
MRLC	Multi-Resolution Land Characteristics Consortium
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NED	National Elevation Dataset
NEI	National Emissions Inventory

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

NSR	new source review
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
ppb	part per billion
ppm	part per million
PRIME	plume rise model enhancements
PSD	prevention of significant deterioration
SCR	selective catalytic reduction
SER	significant emissions rate
SIP	state implementation plan
SUSD	startup/shutdown
tpy	ton per year
USGS	U.S. Geological Survey
VAC	Virginia Administrative Code
VDEQ	Virginia Department of Environmental Quality

1.0 Introduction

1.1 Project Overview

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 or Project) at the existing Chesterfield Power Station (CPS). CERC will consist of four dual fuel simple-cycle combustion turbines (CT) 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 CTs will be capable of operating on an advanced gaseous fuel blend consisting of natural gas with up to 10% hydrogen (H_2 fuel blend).

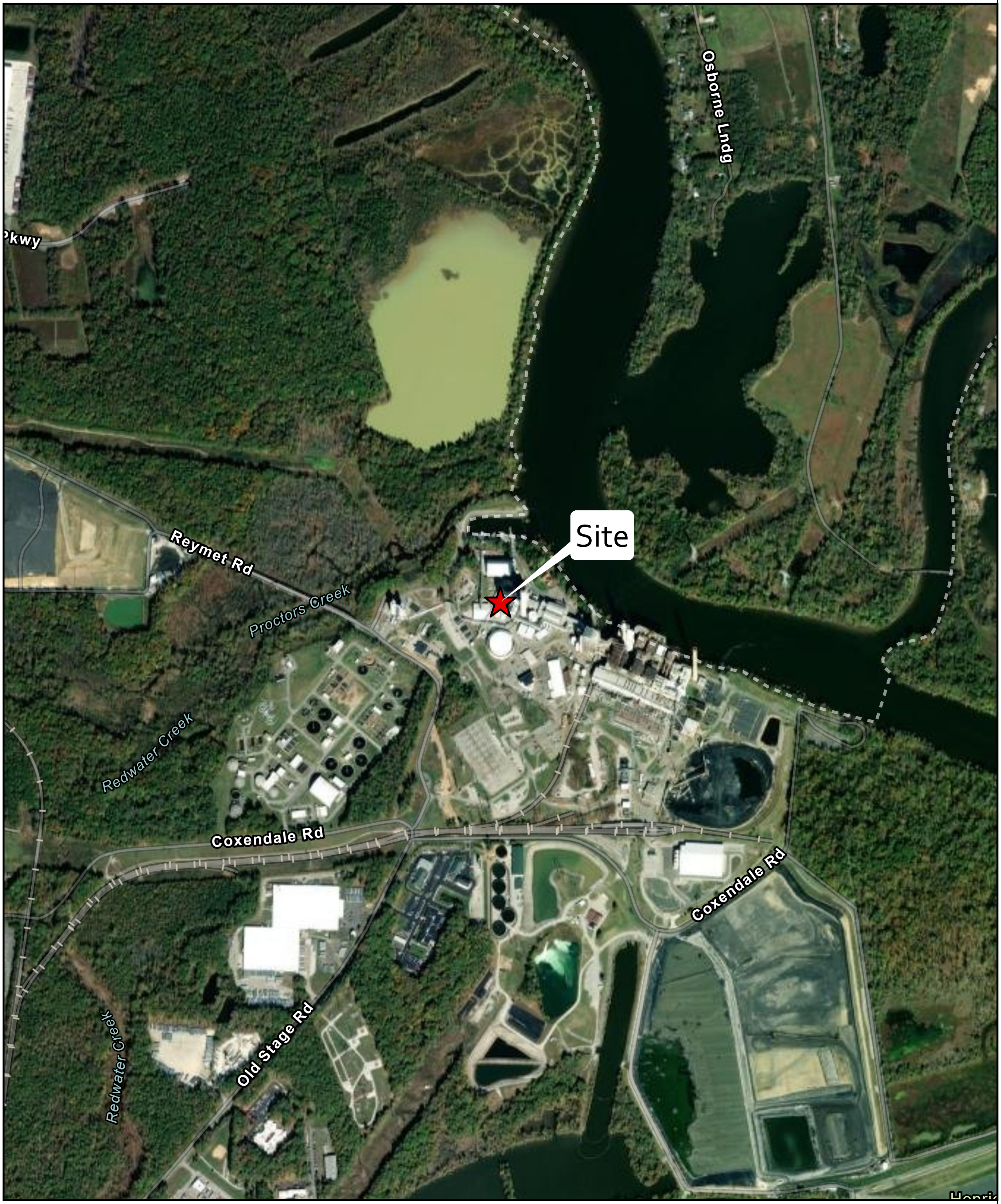
The Project will be considered a “major modification” under Title I of the Clean Air Act (CAA). Dominion is applying to the Virginia Department of Environmental Quality (VDEQ) for a prevention of significant deterioration (PSD) and minor stationary source air construction permit, as required by VDEQ. VDEQ has U.S. Environmental Protection Agency (EPA) state implementation plan (SIP)-approved PSD and minor stationary source air construction permit programs.

An application addressing 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 was submitted August 1, 2023 and amended on August 20, 2024, September 26, 2024, March 3, 2025, and May 9, 2025.

Dominion submitted the air quality impact analyses modeling protocol on December 30, 2024, and revised it on January 23, 2025 to address VDEQ comments, outlining the methodology to be followed for assessing the potential ambient air impacts from the PSD pollutant emissions associated with the Project (Appendix D). VDEQ approved the protocol on January 30, 2025 (Appendix D). The ambient air quality analyses were conducted as set forth in the approved protocol and as described in this Air Quality Impact Analysis Modeling Report, which is being submitted in support of the PSD Permit application.

1.2 Project Location

The Project will be constructed in Chesterfield County approximately 6 km northeast of Chester, Virginia, at the existing CPS, which is located at 500 Coxendale Road. The approximate central location of the Project is 288,719.92 mE, 4,140,193.24 mN NAD 83 datum and in Zone 18 (37°23'3.98"N, 77°23' 11.25"W). Figures 1-1 and 1-2 present an aerial and a topographical map of the site region, respectively. Appendix A contains a site plan showing the plant property, adjacent roadways, and source locations.



Site

N

0 1,000 2,000

Feet

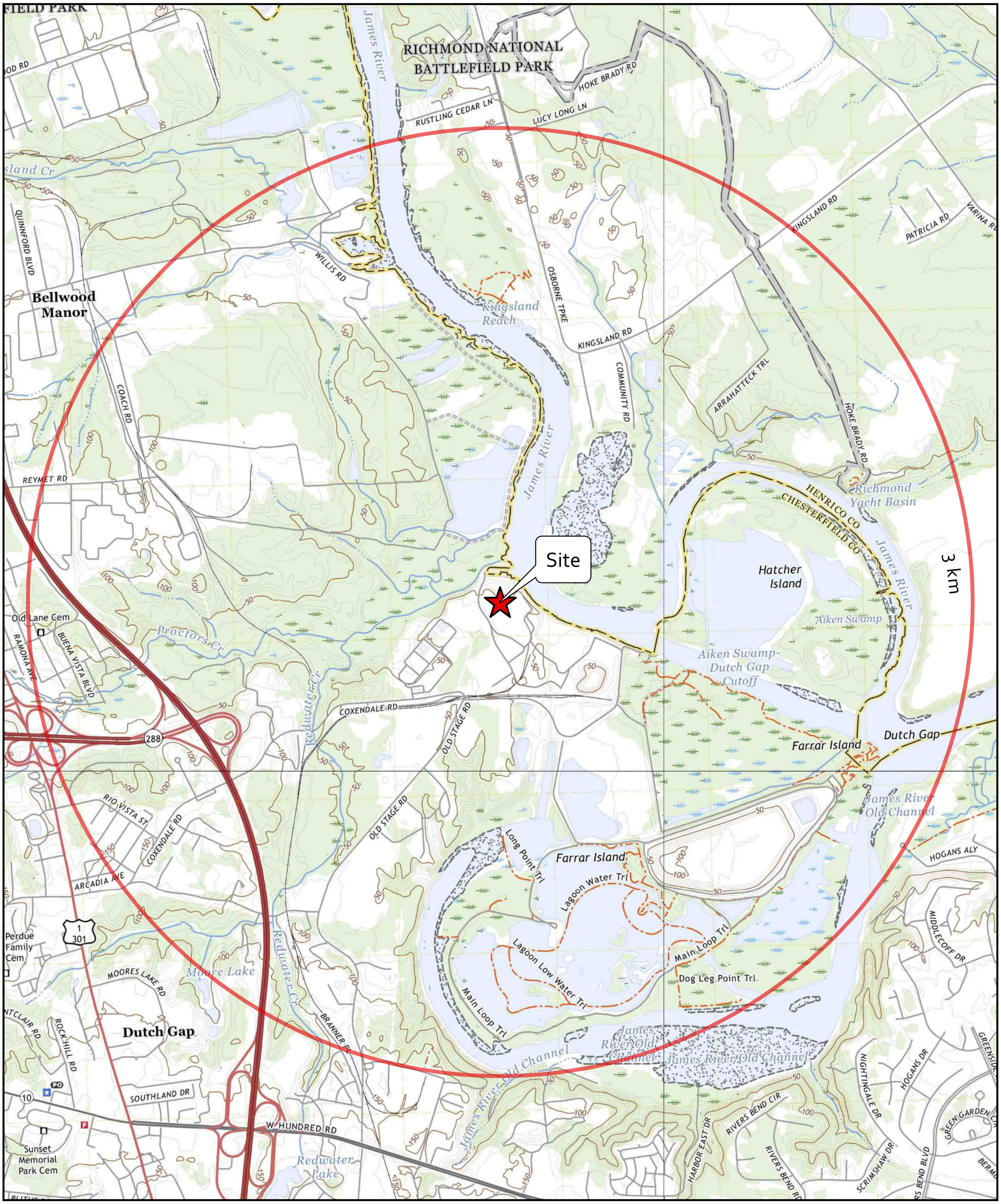
Base Layer: Esri Basemap Imagery, 2024

Figure 1-1
Site Location Map

Chesterfield County, Virginia

Date: 2/24/2025

ECT



Site

3-km Radius

N

0 1.5 3

Kilometers

Base Layer: USGS Topographic Quad Drewrys Bluff, Chester, Dutch Gap, & Hopewell, 2022

Figure 1-2
Topographic Map

Chesterfield County, Virginia

Date: 2/24/2025

ECT

1.3 Overview of Methodology

The effects on ambient pollutant concentrations are estimated using a dispersion model applied in conformance to applicable guidelines. The methodology applied for these analyses is based on policies and procedures contained in the US EPA Guideline on Air Quality Models (GAQM, 40 CFR Part 51, Appendix W), EPA's *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program* (April 2024), and direction from the VDEQ's modeling staff.

Key elements of analyses are as follows:

- Air quality analyses for the Project sources for carbon monoxide (CO), and particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) including $PM_{2.5}$ precursor emissions of nitrogen oxides (NO_x) and sulfur dioxide (SO_2) for comparison to the National Ambient Air Quality Standards (NAAQS);
- The averaging periods to be evaluated include 1-hour CO, 8-hour CO, 24-hour $PM_{2.5}$, and Annual $PM_{2.5}$;
- Air quality impact analyses for the Project sources for $PM_{2.5}$ including $PM_{2.5}$ precursor emissions for comparison to the PSD Class I and Class II Increment;
- Use of the latest version of AERMOD (v24142) with the regulatory default options to estimate air quality impacts;
- Use of five (5) years of meteorological data provided by VDEQ and processed using the most recent version of AERMET (v24142); and
- Demonstration that the Project will not cause or contribute to an exceedance of the NAAQS for Ozone.

Section 2 contains a description of the Project emissions. Section 3 presents a detailed description of the modeling approach used in evaluating air quality impacts of the Project including model selection criteria, good engineering practice stack height determination, refined modeling analyses, and ambient air quality compliance. Section 4 presents the results of the analyses. Section 5 presents the additional impact analysis results. Section 6 contains the conclusion to the air impact analyses. Appendix A contains the site plan. Appendix B provides the modeling support data. Appendix C provides the background concentration monitor support data. Appendix D provides the PSD Air Quality Impact Analysis Modeling Protocol including the VDEQ approval.

2.0 Project Emissions

This section describes several aspects of the Project that are relevant for the air quality impact analyses conducted in support of the air permit application including the Project components and emissions.

2.1 Project Emission and Source Characteristics

2.1.1 Overall Methodology

The air dispersion modeling was conducted with emissions rates and flue gas exhaust characteristics (flow rate and temperature) expected to represent the worst-case parameters among the range of possible values for each of the proposed operating scenarios considered for the Project.

The following subsections present stack parameters and emissions for the combustion turbines (CTs), emergency generators, and fuel gas heaters.

2.1.2 Simple-Cycle Combustion Turbine

2.1.2.1 Normal Operation

Based on current Project design parameters, Dominion has applied for a permit that will allow annual operation of each CT for 3,240 hours, of which 750 hours may be on fuel oil. Since CT emission rates and flue gas characteristics for a given CT load vary as a function of ambient temperature, data was derived for the following ambient temperatures and load scenarios for the proposed CT:

- Ambient temperatures (107, 98, 59, 29, and -10°F).
- Natural gas: Five operating loads (100 percent (with and without evaporative cooling), 80 percent, 70 percent, 50 percent, and minimum emission compliance load (MECL).
- Fuel oil: Four operating loads (100 percent (with and without evaporative cooling), 80 percent, 70 percent, and MECL).

For each CT load in the modeling, the highest pollutant-specific emissions rate coupled with the lowest exit temperature and exit velocity enveloped across all ambient temperatures were selected to represent the worst case dispersion for each short-term load scenario.

The natural gas exit temperature and exit velocity associated with 100 percent load were used for the annual averaging period analyses for both natural gas only and dual fuel operations. Emissions representing worst case annual potential to emit were used. The potential annual emissions are based on the following:

- Natural Gas Only: 3,240 hours per year at 100 percent load with an additional 500 Startup/Shutdown (SUSD) events; and
- Dual Fuel: 2,490 hr/yr on natural gas and 750 hr/yr on fuel oil at 100% load with an additional 380 SUSD events on natural gas and 120 SUSD events on fuel oil.

Tables 2-1 and 2-2 summarize worst-case emissions parameters for the CT over the five operating loads for natural gas and four operating loads for fuel oil.

Table 2-1. Worst-Case Data for Proposed Natural Gas-Fired Simple-cycle Turbine Operation

Parameter		100%	80%	70%	50%	MECL
Stack height (ft)		125	125	125	125	125
Stack diameter (ft)		24.5	24.5	24.5	24.5	24.5
Exit temperature (°F)		850.0	850.0	850.0	850.0	850.0
Exit velocity (fps)		117.32	99.66	92.43	81.33	67.52
Pollutant emissions per CT (lb/hr)						
	CO	11.30	9.30	8.40	6.90	5.00
	$PM_{2.5}$‡	19.70	16.50	16.40	15.40	14.40

‡ Based on maximum natural gas short-term sulfur content of 1.0 gr S/100 scf
Source: ECT, 2025.

Table 2-2. Worst-Case Data for Proposed Fuel Oil-Fired Simple-cycle Turbine Operation

Parameter		100%	80%	70%	MECL
Stack height (ft)		125	125	125	125
Stack diameter (ft)		24.5	24.5	24.5	24.5
Exit temperature (°F)		850.0	850.0	850.0	850.0
Exit velocity (fps)		127.01	110.83	105.20	94.81
Pollutant emissions per CT (lb/hr)					
	CO	11.70	9.70	8.90	7.40
	$PM_{2.5}$	44.80	44.80	45.00	44.60

Source: ECT, 2025.

2.1.2.2 Startup/Shutdown Operation

Startup/shutdown (SUSD) modeling was conducted for the pollutants with short-term averaging periods that have elevated emissions combined with lower plume rise during SUSD conditions. The pollutants and averaging periods evaluated include 1-hour CO, 8-hour CO, and 24-hour $PM_{2.5}$.

For the SUSD scenarios, two stacks (same stack location) were used in the model to represent each scenario and the associated averaging period. One stack represents the SUSD event, which is less than an hour (30 minutes), and the other stack represents normal operation emissions during the balance of time for the associated averaging period. Emission rates were calculated for each stack (SUSD and Normal operation) and then source grouped to get a total impact for both stacks for the full averaging period. SUSD emissions are based on the SUSD lb/event emissions data provided by the turbine vendor. Since emissions are higher for startup operations than for shutdown, the more conservative startup case was modeled. For the “normal operation stack,” the worst-case load identified in the load analysis runs was used for the balance of the averaging period when it is not in startup mode. Tables 2-3 and 2-4 summarize the emissions rates for each pollutant for all startup scenarios. All loads were modeled for the annual averaging period. Additional information is included in Appendix B.

Table 2-3. Summary of Modeled Stack Parameters and Emissions Rates for Natural Gas-Fired Simple-cycle Turbine

Scenario	Units	Startup				Worst Case Load		
		1-hour Average Period Parameters	8-hour Average Period Parameters	24-hour Average Period Parameters	Annual Average Period Parameters	1-hour Average Period Parameters	8-hour Average Period Parameters	24-hour Average Period Parameters
Estd. average flow rate*	ACFM	1,909,878	1,909,878	1,909,878	1,909,878	2,818,994	2,818,994	1,909,878
Estd. average stack temp.	ºF	850.0	850.0	850.0	850.0	850.0	850.0	850.0
CO	lb	366.00	45.75			4.65	8.72	
$PM_{2.5}$	lb			0.17				14.10
$PM_{2.5}$**	ton				1.35			

*Estimated flow rates calculated based on data provided by GE.
** Annual emissions based on 500 startups and shutdowns on natural gas per year.
Source: Dominion, 2025.
ECT, 2025.

Table 2-4. Summary of Modeled Stack Parameters and Emissions Rates for Fuel Oil-Fired Simple-cycle Turbine

Scenario	Units	Startup					Worst Case Load		
		1-hour Average Period Parameters	8-hour Average Period Parameters	24-hour Average Period Parameters	Annual Average Period Parameters (Dual Fuel - NG)	Annual Average Period Parameters (Dual Fuel- FO)	1-hour Average Period Parameters	8-hour Average Period Parameters	24-hour Average Period Parameters
Estd. average flow rate*	ACFM	2,681,806	2,681,806	2,681,806	1,909,878	2,681,806	2,975,699	2,681,806	2,681,806
Estd. average stack temp.	°F	850.0	850.0	850.0	850.0	850.0	850.0	850.0	850.0
CO	lb	1,036.00	129.50				4.45	6.94	
$PM_{2.5}$	lb			0.88					43.67
$PM_{2.5}$**	ton				1.03	1.85			

*Estimated flow rates calculated based on data provided by GE.
** Annual emissions based on 380 startups and shutdowns on natural gas per year and 120 startups and shutdowns on fuel oil per year.
Source: Dominion, 2025.
ECT, 2025.

2.2 Auxiliary Sources

Since the performance data for the auxiliary equipment are not affected by ambient conditions, only one set of parameters was modeled (i.e., stack parameters and emissions rates associated with 100-percent load).

The emergency diesel generators are expected to operate no more than 1 hour in a 24-hour period per unit and 100 hr/yr per unit (operability testing) under non-emergency conditions, and no more than 500 hr/yr total. Therefore, for the assessment of short-term modeled averaging periods, the modeled short-term emissions (24 hours or less) were based on operating 1 hour within the averaging period. The modeled annual emissions rates were based on 500 hr/yr for the assessment of annual modeled averaging periods. Table 2-5 provides stack parameters and emissions rates for the emergency diesel generators.

The fuel gas heater will be in operation any time a CT is operating on natural gas. The 18.8-MMBtu/hr fuel gas heater will consist of two burners, with a separate exhaust stack for each burner. The fuel gas heater is being permitted to operate up to 8,760 hr/yr. Table 2-5 presents short-term and annual emissions rates.

Table 2-5. Source Parameters and Criteria Pollutant Emissions Rates for Emergency Equipment

Fuel oil-Fired Source	Stack Height (ft)	Stack Diameter (ft)	Exit Temperature (°F)	Exit Velocity (fps)	Emissions			
					CO		$PM_{2.5}$	
					1-Hour (lb/hr)	8-Hour (lb/hr)	24-Hour (lb/hr)	Annual (tpy)
Emergency generators (per unit)	18	2	862.8	479.6	27.01	3.38‡	0.075§	0.45*
Fuel Gas Heater (per stack)	30	2	823.0	12.2	0.35	0.35	0.07	0.29

* Based on 500 hours per year
‡ Emission rate based on operating 1 hour in an 8-hour period
§ Emission rate based on operating 1 hour in a 24-hour period
Source: ECT, 2025.

2.2.1 Secondary Sources

In addition to the Project's fuel gas heater, the natural gas suppliers will have fuel gas heaters that will be in operation any time natural gas is being supplied for the CTs. As they support the Project they are included as secondary sources in the analyses. There will be three heaters described as follows:

- one (1) 4 MMBtu heater
- two (2) 22 MMBtu heaters

Each heater will consist of two burners, with a separate exhaust stack for each burner. All three heaters are presumed to operate up to 8,760 hr/yr. Table 2-6 presents short-term and annual emissions rates.

Table 2-6. Source Parameters and Criteria Pollutant Emissions Rates for Secondary Fuel Gas Heaters (Per Stack)

Fuel Gas Heater	Stack Height (ft)	Stack Diameter (ft)	Exit Temperature (°F)	Exit Velocity (fps)	Emissions			
					CO		$PM_{2.5}$	
					1-Hour (lb/hr)	8-Hour (lb/hr)	24-Hour (lb/hr)	Annual (tpy)
4 -MMBtu/hr	30	1	300.0	8.1	0.074	0.074	0.014	0.061
22 -MMBtu/hr	30	2	823.0	12.2	0.410	0.410	0.077	0.337

Stack parameters and emissions are provided on a per stack basis.
Source: ECT, 2025.

3.0 Air Quality Impact Assessment Methodology

The dispersion modeling analyses conducted for the Project adhere to the EPA Guideline on Air Quality Models (GAQM) (40 CFR Part 51, Appendix W) (EPA, 2024), and direction received from VDEQ's Modeling Section. The following subsections present the procedures used for assessing ambient air impacts from the Project's emissions, and the standards to which the predicted impacts were compared.

3.1 Model Selection Discussion

The most recent version of EPA's AERMOD model (currently v24142) was used for predicting ambient impacts for each modeled pollutant.

3.2 Ambient Air Quality Standards

Modeled design value concentrations of criteria pollutants were used to demonstrate that the Project, in addition to existing ambient concentrations of pollutants, will not cause a violation of any NAAQS or PSD Increment. The values of the NAAQS are shown in Table 3-1. The values of the PSD Increment are shown in Table 3-2.

Table 3-1. National Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)
CO	1-Hour	40,000
	8-Hour	10,000
$PM_{2.5}$	24-Hour	35
	Annual	9
Ozone	8-Hour	70 ppb

Source: 9VAC5-30
US EPA

Table 3-2. PSD Increment

Pollutant	Averaging Period	Class I ($\mu g/m^3$)	Class II ($\mu g/m^3$)
$PM_{2.5}$	24-Hour	2	9
	Annual	1	4

Source: ECT, 2025.

3.3 Meteorological Data

Guidance for air quality modeling recommends the use of one year of onsite meteorological data or five years of representative off-site meteorological data. Dominion used representative off-site meteorological data available from the National Weather Service (NWS) for the period of 2019-2023 in the analyses. The Surface meteorological data was collected at the NWS station at the Richmond International Airport, which is approximately 9 miles NNE from the site, and the upper air data from Sterling, Virginia. The meteorological data was provided by VDEQ and generated using the most recent version of AERMET (24142). Table 3-3 summarizes identifying and location information for the Richmond and Sterling stations.

Table 3-3. Meteorological Data Used in Running AERMET

Meteorological Site	Latitude	Longitude	Base Elevation (meters)
Richmond International Airport	37.5115	-77.3234	50
Sterling Virginia	38.9800	-77.4700	85

Source: ECT, 2025.

3.4 Receptor Grids

A comprehensive Cartesian receptor grid extending out to approximately 10 kilometers (km) from the Project was used in the analyses to assess the maximum ground-level concentration of each air contaminant.

The Cartesian receptor grid consists of the following receptor spacing, per VDEQ modeling guidance:

- Fence Line Receptors—Receptors placed on the Project fence line spaced 25 meters apart.
- Extra Fine Receptors— Receptors at 50-meter spacings starting at the fence line and extending to approximately 1,000 meters.
- Fine Receptors—Receptors at 100-meter spacings starting 1,000 meters from the Project fence line receptors and extending to approximately 3,000 meters.
- Medium Receptors—Receptors at 250-meter spacings starting at 3,000 meters and extending to approximately 10,000 meters.

AERMAP was used to define ground elevations and hill scales for each receptor. The property boundary was used as the boundary to determine ambient air. The property boundary will be fenced, and no receptors were placed within this boundary.

3.5 Building Downwash

The stack heights for Project emission sources will comply with Good Engineering Practice (GEP) stack height regulations.

While the GEP stack height rules address the maximum stack height that can be employed in a dispersion modeling analysis, stacks having heights lower than GEP stack height can potentially result in higher downwind concentrations due to building downwash effects. AERMOD evaluates the effects of building downwash based on the plume rise model enhancements (PRIME) building downwash algorithms. For the Project ambient impact analysis, the complex downwash analysis implemented by AERMOD was performed using the current version of EPA's Building Profile Input Program (BPIP) for PRIME (BPIPPRM) (Version 04274 dated September 30, 2004). The EPA BPIPPRM program was used to determine the area of influence for each building/structure, whether a particular stack is subject to building downwash, the area of influence for directionally dependent building downwash, and to generate the specific building dimension data required by the model.

3.6 Background Concentrations

For the NAAQS air quality analyses, representative background concentrations were included for CO, $PM_{2.5}$, and Ozone, which were provided by VDEQ. Table 3-4 summarizes the 2022-2024 air quality data from the monitoring stations that were used for background concentrations. A discussion of the rationale for the selected background monitors is provided in Appendix C.

Table 3-4. Summary of Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	Station ID	Station Location	Distance from Project (km)	
CO	1-hour	1,610	51-013-0020	Aurora Hills Visitor Center	166	NE
	8-hour	1,380				
$PM_{2.5}$	24-hour	11.5	51-036-0002	Shirley Plantation	12.1	SE
	Annual	5.8				
Ozone	8-hour	58 (ppb)	51-036-0002	Shirley Plantation	12.1	SE

Source: ECT, 2025.

3.7 Secondary Impacts

Secondary $PM_{2.5}$ is formed from gaseous emissions of NO_x and SO_2. These gases can form fine particulates through chemical reactions in the atmosphere. EPA has issued *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program* (April 2024). The Guidance provides a Tier 1 demonstration tool for $PM_{2.5}$ PSD sources in a $PM_{2.5}$ attainment or unclassifiable area.

The secondary impacts for $PM_{2.5}$ on a daily and annual basis in Class II areas were calculated in accordance with the Tier 1 assessment in the Guidance memo and based on guidance provided by VDEQ. The appropriate MERP values for NO_x and SO_2 were obtained from the EPA MERPs View Qlik website (https://www.epa.gov/scram/merps-view-qlik) and their impacts calculated using the equation below (See Appendix B). The results for NO_x and SO_2 were then summed to calculate a total impact that was added to modeled impacts from the direct $PM_{2.5}$ emissions. The MERPs are summarized in Table 3-5.

$PM_{2.5}$-24-hour:

$$Project\ Air\ Quality\ Impact\ \left(\frac{\mu g}{m3}\right)$$
$$= Project\ NOx\ emissions\ (tpy)x\left(\frac{hypothetical\ source\ modeled\ NOx\ impact\ \left(\frac{\mu g}{m3}\right)}{hypothetical\ source\ NOx\ emissions\ (tpy)}\right)$$
$$+ Project\ SO2\ emissions\left(\frac{hypothetical\ source\ modeled\ SO2\ impact\ \left(\frac{\mu g}{m3}\right)}{hypothetical\ source\ SO2\ emissions\ (tpy)}\right)$$

$$0.21\ \left(\frac{\mu g}{m3}\right) = 353.28\ (tpy)x\left(\frac{0.19484\left(\frac{\mu g}{m3}\right)}{500\ (tpy)}\right) + 27.81\ (tpy)x\left(\frac{1.23096\ \left(\frac{\mu g}{m3}\right)}{500\ (tpy)}\right)$$

$PM_{2.5}$-Annual:

$$Project\ Air\ Quality\ Impact\ \left(\frac{\mu g}{m3}\right)$$
$$= Project\ NOx\ emissions\ (tpy)x\left(\frac{hypothetical\ source\ modeled\ NOx\ impact\ \left(\frac{\mu g}{m3}\right)}{hypothetical\ source\ NOx\ emissions\ (tpy)}\right)$$
$$+ Project\ SO2\ emissions\ (tpy)\left(\frac{hypothetical\ source\ modeled\ SO2\ impact\ \left(\frac{\mu g}{m3}\right)}{hypothetical\ source\ SO2\ emissions\ (tpy)}\right)$$

$$0.009\ \left(\frac{\mu g}{m3}\right) = 353.28(tpy)x\left(\frac{0.01037\left(\frac{\mu g}{m3}\right)}{500\ (tpy)}\right) + 27.81(tpy)x\left(\frac{0.02939\ \left(\frac{\mu g}{m3}\right)}{500\ (tpy)}\right)$$

Table 3-5. Summary of $PM_{2.5}$ Class II MERPs

Pollutant	Averaging Period	MERP ($\mu g/m^3$)
$PM_{2.5}$	24-hour	0.21
$PM_{2.5}$	Annual	0.009

Source: ECT, 2025.

For the Class I PSD increment analysis, following EPA's Guidance, the MERPs were adjusted to account for the distance from the Project to the Class I areas. As EPA explains in the Guidance, the MERPs represent the maximum impact within 50 km of the source and impacts at greater distances would be less. The distance between the closest Class I area (Shenandoah National Park) and the

Project is approximately 144 km. Dominion used the MERPs for the Class I PSD increment analysis obtained from EPA's MERPs View Qlik website at a distance of 140 km. The MERPs are summarized in Table 3-6.

$PM_{2.5}$-24 hour:

$$Project\ Air\ Quality\ Impact\ \left(\frac{\mu g}{m3}\right) = Project\ NOx\ emissions\ (tpy)x\left(\frac{hypothetical\ source\ modeled\ NOx\ impact\ \left(\frac{\mu g}{m3}\right)}{hypothetical\ source\ NOx\ emissions\ (tpy)}\right) + Project\ SO2\ emissions\ (tpy)\left(\frac{hypothetical\ source\ modeled\ SO2\ impact\ \left(\frac{\mu g}{m3}\right)}{hypothetical\ source\ SO2\ emissions\ (tpy)}\right)$$

$$0.04\ \left(\frac{\mu g}{m3}\right) = 353.28\ (tpy)x\left(\frac{0.05061\left(\frac{\mu g}{m3}\right)}{500\ (tpy)}\right) + 27.81\ (tpy)x\left(\frac{0.10429\left(\frac{\mu g}{m3}\right)}{500\ (tpy)}\right)$$

$PM_{2.5}$-Annual:

$$Project\ Air\ Quality\ Impact\ \left(\frac{\mu g}{m3}\right) = Project\ NOx\ emissions\ (tpy)x\left(\frac{hypothetical\ source\ modeled\ NOx\ impact\ \left(\frac{\mu g}{m3}\right)}{hypothetical\ source\ NOx\ emissions\ (tpy)}\right) + Project\ SO2\ emissions\ (tpy)\left(\frac{hypothetical\ source\ modeled\ SO2\ impact\ \left(\frac{\mu g}{m3}\right)}{hypothetical\ source\ SO2\ emissions\ (tpy)}\right)$$

$$0.001\ \left(\frac{\mu g}{m3}\right) = 353.28(tpy)x\left(\frac{0.00136\left(\frac{\mu g}{m3}\right)}{500\ (tpy)}\right) + 27.81(tpy)x\left(\frac{0.00213\left(\frac{\mu g}{m3}\right)}{500\ (tpy)}\right)$$

Table 3-6. Summary of $PM_{2.5}$ Class I MERPs

Pollutant	Averaging Period	MERP ($\mu g/m^3$)
$PM_{2.5}$	24-hour	0.04
$PM_{2.5}$	Annual	0.001

Source: ECT, 2025.

3.8 Offsite Source Inventory

VDEQ provided the inventory of nearby sources to include in the NAAQS and PSD Increment analyses. The facilities included in the cumulative modeling are provided in the electronic modeling files.

4.0 Ambient Air Analyses Results

Ambient air analyses were performed for CO, $PM_{2.5}$, and ozone.

4.1 Significant Impact Level and Significant Impact Area Analysis Results

A significant impact level (SIL) analysis was performed to evaluate the significant impact area (SIA) for each modeled pollutant and averaging period. The Project's modeled sources included the CTs, fuel gas heater, emergency generators as well as the secondary fuel gas heaters. The Project sources were modeled based on the operating characteristics and scenarios discussed in Section 2.

For the 24-hour and annual $PM_{2.5}$ significance modeling, modeled concentrations at each receptor were averaged over the 5-year meteorological period. Averaging was performed internally by the model by enabling the appropriate keywords in AERMOD. For the 1-hour and 8-hour CO significance modeling, maximum concentrations at each receptor were calculated for each receptor for each individual meteorological year. The overall maximum concentration is the highest concentration over the 5-year meteorological period.[1]

Table 4-1 provides the results of the SIL analysis along with the maximum SIA for CO and $PM_{2.5}$ NAAQS. To determine the maximum SIA, each operating load was evaluated in AERMOD as described in 4.2. The operating load with the maximum SIA is presented in the table.

Table 4-1. SIL Results with Maximum SIA

Pollutant	Averaging Period	Maximum Concentration (µg/m³)	Load Case	Fuel Scenario	SIL (µg/m³)	NAAQS SIA (m)
CO	1-hour	1,848.44	SUSD	Natural Gas	2,000	--
	1-hour	1,849.44	SUSD	Fuel Oil	2,000	--
	8-hour	103.03	SUSD	Natural Gas	500	--
	8-hour	103.06	SUSD	Fuel Oil	500	--
$PM_{2.5}$	24-hour	2.27	MECL	Natural Gas	1.2	1,006
	24-hour	2.90	MECL	Fuel Oil	1.2	1,847
	Annual	0.20	Annual	Natural Gas	0.13	499
	Annual	0.21	Annual	Dual Fuel	0.13	684

Source: ECT, 2025.

[1] See Table D.1 of South Carolina Department of Environmental Services *South Carolina Modeling Guidelines for Air Quality Permits.*

As shown in Table 4-1, the 1-hour and 8-hour CO maximum concentrations are less than the applicable SILs; therefore, there is no SIA for CO. The SIAs for $PM_{2.5}$ are 1.847 km for the 24-hour NAAQS and 0.684 km for the annual NAAQS.

Per VDEQ request, the NAAQS analyses were performed using a 10-km receptor grid as described in Section 3.4. The 10-km receptor grid extends well beyond the Project's SIAs.

4.2 Load Analysis Results

The Project was modeled for different worst-case turbine load scenarios (see Section 2). The results of the turbine load analyses are provided in Table 4-2 and Table 4-3. The worst-case scenario for each short-term pollutant and averaging period was used for blending in the subsequent startup/shutdown NAAQS analyses. For annual, startup/shutdown emissions were paired with each load scenario.

Table 4-2. Load Analysis Results – Natural Gas

Load Scenario	Maximum Modeled Concentration by Pollutant and Averaging Period (μg/m³)			
	CO		$PM_{2.5}$	
	1-hr	8-hr	24-hr	Annual
100	2.55	1.03	0.72	0.008
80	**2.85**	**1.29**	0.87	0.010
70	2.82	1.27	0.96	0.011
50	2.59	1.15	1.08	0.013
MECL	2.15	1.00	**1.25**	**0.017**

Source: ECT, 2025.

Table 4-3. Load Analysis Results – Fuel Oil

Load Scenario	Maximum Modeled Concentration by Pollutant and Averaging Period (μg/m^3)			
	CO		$PM_{2.5}$	
	1-hr	8-hr	24-hr	Annual (Dual Fuel)
100	2.50	0.99	1.40	0.011
80	2.45	1.06	1.91	0.014
70	**2.51**	1.08	2.15	0.016
MECL	2.41	**1.09**	**2.53**	**0.022**

Source: ECT, 2025.

4.3 NAAQS Analysis Results

4.3.1 CO and $PM_{2.5}$ NAAQS Analysis

A cumulative modeling analysis was conducted for 1-hour and 8-hour CO and 24-hour and Annual $PM_{2.5}$. Nearby offsite sources have been included in the cumulative modeling analysis, as explained in Section 3.8. Background concentrations (Section 3.6) were also combined with the modeled design value concentrations before comparison to the NAAQS. For $PM_{2.5}$, the results of the MERP calculation (Section 3.7) were also included for the Project before comparison to the NAAQS. MERP calculations were not performed for the nearby sources based on EPA guidance that such secondary $PM_{2.5}$ formation are accounted for by the background concentrations.

The results of the NAAQS analysis are provided in Tables 4-4 through 4-6 below. The short-term NAAQS results are provided in Table 4-4, for natural gas operation, and Table 4-5, for fuel oil operation. The annual NAAQS results are provided in Table 4-6 for natural gas only and for dual fuel operations. As shown in the tables, the NAAQS are not exceeded for any compound for any of the modeled scenarios. This demonstrates that the Project will not cause or contribute to exceedances of the 1-hour and 8-hour CO, and 24-hour and annual $PM_{2.5}$ NAAQS; therefore, the Project will not adversely impact the public health or welfare.

Table 4-4. Short-term NAAQS Results – Natural Gas

Pollutant	Averaging Period	Maximum Modeled Concentration (μg/m³)	Monitored Background Concentration (μg/m³)	Maximum Total Concentration (μg/m³)	NAAQS (μg/m³)	Percentage of NAAQS (%)
CO	1-hour	5,569.81	1,610	7,179.81	40,000	17.95
	8-hour	3,613.40	1,380	4,993.40	10,000	49.93
$PM_{2.5}$*	24-hour	11.97	11.5	23.47	35	67.06

*Maximum Modeled Concentration includes Secondary $PM_{2.5}$ MERPs.
Source: ECT, 2025.

Table 4-5. Short-term NAAQS Results – Fuel Oil

Pollutant	Averaging Period	Maximum Modeled Concentration (μg/m³)	Monitored Background Concentration (μg/m³)	Maximum Total Concentration (μg/m³)	NAAQS (μg/m³)	Percentage of NAAQS (%)
CO	1-hour	5,569.81	1,610	7,179.81	40,000	17.95
	8-hour	3,613.40	1,380	4,993.40	10,000	49.93
$PM_{2.5}$*	24-hour	11.97	11.5	23.47	35	67.06

*Maximum Modeled Concentration includes Secondary $PM_{2.5}$ MERPs.
Source: ECT, 2025.

Table 4-6. Annual $PM_{2.5}$ NAAQS Results

Pollutant	Annual Operating Scenario	Maximum Modeled Concentration (μg/m³)	Monitored Background Concentration (μg/m³)	Maximum Total Concentration (μg/m³)	NAAQS (μg/m³)	Percentage of NAAQS (%)
$PM_{2.5}$	Natural Gas Only	2.34	5.8	8.14	9	90.44
	Dual Fuel	2.34	5.8	8.14	9	90.44

Note:

-Maximum Modeled Concentration includes Secondary $PM_{2.5}$ MERPs.

-Natural Gas only results are based on each CT operating 3,240 hours per year on natural gas with an additional 500 SUSD events on natural gas at each load scenario.

-Dual Fuel results are based on each CT operating 2,490 hr/yr on natural gas and 750 hr/yr on fuel oil with an additional 380 SUSD events on natural gas and 120 SUSD events on fuel oil at each load scenario.

Source: ECT, 2025.

4.3.2 Ozone NAAQS Analysis

The Project is a source of ozone precursor emissions (NO_X and VOC). An assessment of air quality concentrations for ozone was conducted based on the Project's emission rates of ozone precursors and the air quality modeling results included in the MERPs guidance.

The estimated Project ozone concentrations are based on the highest daily maximum 8-hour ozone concentration from a hypothetical NO_X source and a hypothetical VOC source that were identified from multiple model simulation results contained in the MERPs guidance. For NO_X, the hypothetical source located at Allendale, South Carolina with a surface release (L), annual NO_X emissions of 500 tpy, and a maximum concentration of 2.94 ppb was used. Therefore, the estimated ozone concentration from the Project's NO_X emissions was determined as follows:

(353.28 tpy NO_X from Project PTE / 500 tpy NO_X MERP) × 2.94 ppb = 2.08 ppb

For VOC, the hypothetical source located at Broward County, Florida with a surface release (L), annual VOC emissions of 500 tpy, and a maximum concentration of 0.426 ppb was used. Therefore, the estimated ozone concentration from the Project's VOC emissions was determined as follows:

(162.46 tpy VOC from Project PTE / 500 tpy VOC MERP) × 0.426 ppb = 0.14 ppb

The monitored ozone design concentration for the area is approximately 58 ppb and includes contributions from nearby sources. The addition of the Project's estimated NO_X and VOC concentrations to the monitored design concentration equals 60.22 ppb (2.08 ppb + 0.14 ppb + 58 ppb), which is well below the 8-hour ozone NAAQS of 70 ppb. Table 4-7 provides a summary of the ozone NAAQS results.

Table 4-7. Ozone NAAQS Results

Pollutant	Averaging Period	MERP (ppb)	Monitored Background Concentration (ppb)	Maximum Total Concentration (ppb)	NAAQS (ppb)	Percentage of NAAQS (%)
Ozone	8-hour	2.22	58	60.22	70	86.03

Source: ECT, 2025

4.4 Increment Analysis Results

4.4.1 Class II PSD Increment Analysis Results

An increment modeling analysis was conducted for 24-hour and Annual $PM_{2.5}$. The Project establishes the minor source baseline date for $PM_{2.5}$. At the request of VDEQ, in addition to the

Project emissions, direct $PM_{2.5}$ emission from the existing sources at the Chesterfield Power Station were included in the analysis.

A summary of the 24-hour and annual $PM_{2.5}$ PSD increment analysis is present in Tables 4-8 and 4-9. Table 4-8 provides the Class II short-term PSD increment results. Table 4-9 provides the Class II annual PSD increment results. The results show there are no exceedances of 24-hour and annual $PM_{2.5}$ PSD increment. Therefore, the Project demonstrates compliance with the increment standards.

Table 4-8. Class II Short-term PSD Increment Model Results

Pollutant	Short-term Operating Scenario	Maximum Model Concentration (μg/m^3)	PSD Increment (μg/m^3)	Percentage of Increment (%)
$PM_{2.5}$	Natural Gas	3.84	9	42.67
	Fuel Oil	3.87	9	43.00

Maximum modeled concentration Includes primary plus secondary $PM_{2.5}$ impacts from the Project sources.
Source: ECT, 2025.

Table 4-9. Class II Annual PSD Increment Model Results

Pollutant	Annual Operating Scenario	Maximum Model Concentration (μg/m^3)	PSD Increment (μg/m^3)	Percentage of Increment (%)
$PM_{2.5}$	Natural Gas Only	1.11	4	27.75
	Dual Fuel	1.11	4	27.75

Note:
-Maximum Modeled Concentration includes Secondary $PM_{2.5}$ MERPs.
-Natural Gas only results are based on each CT operating 3,240 hours per year on natural gas with an additional 500 SUSD events on natural gas at each load scenario.
-Dual Fuel results are based on each CT operating 2,490 hr/yr on natural gas and 750 hr/yr on fuel oil with an additional 380 SUSD events on natural gas and 120 SUSD events on fuel oil at each load scenario.
Source: ECT, 2025.

4.4.2 Class I Increment Analysis Results

There are five Class I areas within 300 km of the proposed Project site:

- Shenandoah National Park, approximately 144 km away.
- James River Face Wilderness Area, approximately 178 km away.
- Swanquarter Wilderness, approximately 239 km away.
- Dolly Sods Wilderness, approximately 246 km away.

- Otter Creek Wilderness, approximately 262 km away.

AERMOD was used as a screening model to evaluate the 24-hour and annual $PM_{2.5}$ PSD Class I increments at the areas. Since AERMOD is not an EPA-recommended model for use beyond a distance of 50 km from the stack, the Class I increment analysis was performed using a ring of receptors at 1-degree intervals at a radial distance of 50 km from the stack.

Impacts from the Project emissions at the receptors at 50 km are below the Class I increment, and impacts would be expected to be even less at the Class I area considering the dispersion that would occur over the additional distance. The results of the PSD increment modeling are presented in Tables 4-10 and 4-11. Table 4-10 provides the Class I short-term PSD increment results. Table 4-11 provides the Class I annual PSD increment results. The results show there are no exceedances of 24-hour and annual $PM_{2.5}$ Class I PSD increment.

Table 4-10. Class I Short-term PSD Increment Model Results

Pollutant	Short-term Operating Scenario	Maximum Model Concentration (μg/m³)	PSD Increment (μg/m³)	Percentage of Increment (%)
$PM_{2.5}$	Natural Gas	0.14	2	7.0
	Fuel Oil	0.25	2	12.6

Maximum modeled concentration Includes primary plus secondary $PM_{2.5}$ impacts from the Project sources.
Source: ECT, 2025.

Table 4-11. Class I Annual PSD Increment Model Results

Pollutant	Annual Operating Scenario	Maximum Model Concentration (μg/m³)	PSD Increment (μg/m³)	Percentage of Increment (%)
$PM_{2.5}$	Natural Gas Only	0.0062	1	0.62
	Dual Fuel	0.0073	1	0.73

Note:
-Maximum Modeled Concentration includes Secondary $PM_{2.5}$ MERPs.
-Natural Gas only results are based on each CT operating 3,240 hours per year on natural gas with an additional 500 SUSD events on natural gas at each load scenario.
-Dual Fuel results are based on each CT operating 2,490 hr/yr on natural gas and 750 hr/yr on fuel oil with an additional 380 SUSD events on natural gas and 120 SUSD events on fuel oil at each load scenario.
Source: ECT, 2025.

5.0 Additional Impact Analysis Results

5.1.1 Associated Growth Analysis

The purpose of the growth impact analysis is to quantify growth resulting from the construction and operation of the proposed Project and assess air quality impacts that would result from that growth.

In general, it is anticipated the Project will have a positive impact on regional development. Several hundred temporary construction jobs will be created during the expected 32-month construction phase of the Project. Once CERC becomes operational, approximately 10 full-time staff will support the Project.

There will be limited routine truck transport of bulk materials into and out of the facility. These transports will include fuel oil, ammonia, parts and supplies. Again, the level of this traffic should not affect the normal flow of traffic in or around the facility.

There should be no substantial increase in community growth, or need for additional infrastructure. It is not anticipated that the Project will result in an increase in secondary emissions associated with non-project related activities.

5.1.2 Vegetation and Soils Impact Analysis

The screening methodology provided in EPA's guidance document for soils and vegetation, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (EPA 450/2-81-078) was supplemented with a more robust soils and vegetation analysis.

As an indication of whether emissions from the Project will significantly impact the surrounding vegetation and soil (i.e., cause acute or chronic exposure to each evaluated pollutant), modeled emissions concentrations were compared against both a range of injury thresholds found in various peer-reviewed research articles that specifically examine effects of different pollutants on vegetation as well as established NAAQS secondary standards. Since secondary NAAQS were set to protect public welfare, including protection against damage to crops and vegetation, comparing the modeled emissions to these standards provides an indication as to whether potential impacts are likely to be significant.

For the analysis, concentrations of CO, $PM_{2.5}$, and ozone were compared against sensitivity thresholds listed in the aforementioned 1980 EPA guidance and secondary NAAQS. Table 5-1 illustrates injury threshold ranges determined through a review of readily available research. The same meteorological data and Cartesian grid (10-km extent) as described in Section 3.0 was used for the analysis.

As shown in Tables 5-2 and 5-3, results clearly indicate no adverse impacts will occur to sensitive vegetation as a result of operation of the Project.

Table 5-1. Injury Threshold for Vegetation

Pollutants	Averaging period	EPA's 1980 Screening Concentration (µg/m^3)	Secondary NAAQS
CO	1-week	1,800,000	None
$PM_{2.5}$	24-hour	None	35 µg/m^3
Ozone	8-hour	0.06 (ppm)	0.070 (ppm)

Source: ECT, 2025.

Table 5-2. Comparison to EPA Criteria for Gaseous Pollutant Impacts on Natural Vegetation and Crops – Natural Gas

Pollutant	Averaging Period	Analysis Results	Minimum Impact Level for Effects on Sensitive Plants
CO	1-week‡	3,613.40	1,800,000 µg/m3
$PM_{2.5}$	24-hour	11.97	35 µg/m3
Ozone	8-hour	0.0022	0.06 ppm

‡8-hour average used to conservatively represent one-week average impact.
Source: ECT, 2025.

Table 5-3. Comparison to EPA Criteria for Gaseous Pollutant Impacts on Natural Vegetation and Crops – Fuel Oil

Pollutant	Averaging Period	Analysis Results	Minimum Impact Level for Effects on Sensitive Plants
CO	1-week‡	3,613.40	1,800,000 µg/m^3
$PM_{2.5}$	24-hour	11.97	35 µg/m^3
Ozone	8-hour	0.0022	0.06 ppm

‡8-hour average used to conservatively represent one-week average impact.
Source: ECT, 2025.

5.2 Visibility Impairment Analysis

Emissions of NO_2, sulfates (SO_4), and PM can cause visibility impacts resulting from particles interacting with light. The pollutant loading can become visible due to the contrast or color difference between the plume and a viewed background such as a landscape feature or the sky. In addition, visibility can also become impaired via a general alteration in the appearance of the sky or landscape features caused by a uniform haze produced when the plume disperses through a stable atmospheric layer.

All Class II areas around the area should see an improvement in visibility as result of the net decrease of visibility-impacting pollutants of 592 tons, as shown in Table 5-4.

Table 5-4. Emission of Visibility Impacting Pollutants

Pollutant	Project Net Emission Decrease (tpy)
NO_2	93
H_2SO_4	410
Particulates	89

Source: ECT, 2025

6.0 Air Quality Impact Analyses Conclusion

The results of the air quality analyses demonstrate that the Project does not cause or contribute to any exceedance of the NAAQS for CO, $PM_{2.5}$, and ozone and does not exceed the Class I or Class II PSD increment for $PM_{2.5}$. The Project will have little to no associated growth, and no adverse impacts will occur to sensitive vegetation as a result of operation of the Project.

Electronic modeling files were provided to VDEQ over a secure file transfer as part of this report. The following summarizes the contents of the electronic files:

- AERMOD input and output files for PSD NAAQS and Increment analyses
- Meteorological data used in the analyses
- BPIP input and output

7.0 References/Bibliography

U.S. Environmental Protection Agency (EPA). 1980. A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals EPA 450/2-81-078. Research Triangle Park, North Carolina.

———. 1985. Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations [Revised]). EPA-450/4-80-023R. Research Triangle Park, North Carolina.

———. 2024a. Guideline on Air Quality Models (Revised). Codified in 40 CFR 51, Appendix W. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. November.

———. 2024b. User's Guide for the AMS/EPA Regulatory Model (AERMOD). EPA-454/B-24-007 (November 2024). Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

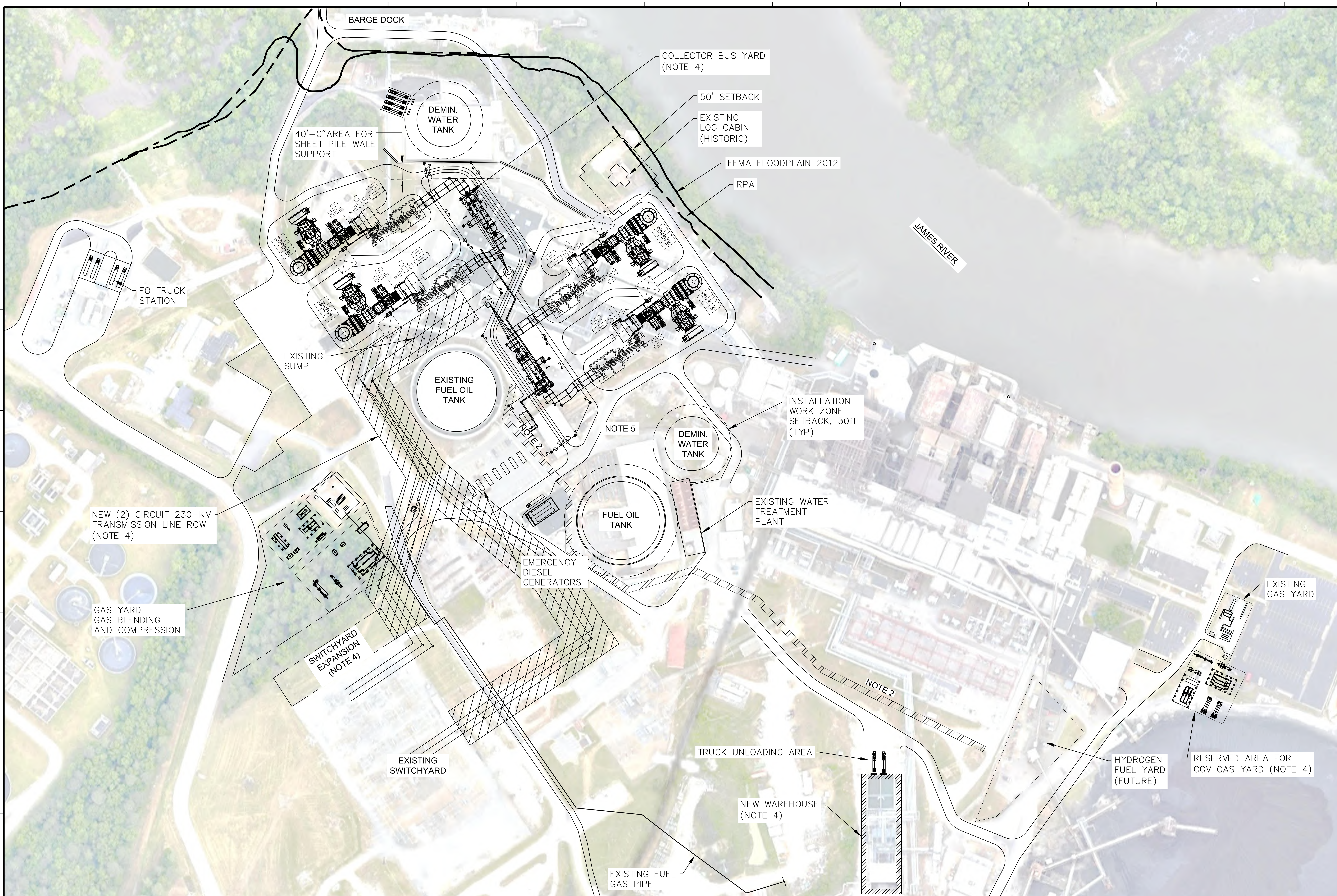
———. 2024c. User's Guide for the AERMOD Meteorological Preprocessor (AERMET). (EPA-454/B-24-004, November 2024). Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

———. 2024d. User's Guide for the AERMOD Terrain Preprocessor (AERMAP). (EPA-454/B-24-008, November 2024). Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

———. 2024e. Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program

———. 2024f. Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program

Appendix A Site Plan



N
CERC PLANT NORTH

NOTES:

1. CERC POWER ISLAND EQUIPMENT BASED ON GE DRAWING SET – IPS1646562-7F05-H35
2. OPTION PRICING UTILITY RACK – PIPE AND CABLE TRAY RACK CONNECTING THE CERC POWER ISLAND TO THE UNIT 7 & 8 TRUCK ENTRANCE. SEE PIPE RACK SECTION DETAIL FOR RACK LOADING AND ROAD CROSSING DETAILS.
3. FOR CLARITY – NOT ALL EXISTING STRUCTURES IN CLOSE PROXIMITY TO THE PROJECT ARE IDENTIFIED.
4. INFORMATION ONLY – NOT IN EPC SCOPE
5. EXISTING UNIT 7 & 8 FUEL OIL FORWARDING PUMPS TO REMAIN. SUCTION PIPING CAN REMAIN UNDISTURBED BUT THE DISCHARGE PIPING SHALL BE RELOCATED TO ACCOMMODATE THE NEW DEMINERALIZED WATER TANK. NEW PIPING CAN BE INSTALLED ON THE NEW PIPE RACK OR OTHER.

LEGEND:

———	EXISTING STRUCTURE TO REMAIN (NOTE 3)
– – – –	SETBACK FOR WORK ZONE OR EQUIPMENT REQUIRED SETBACKS

PRELIMINARY NOT FOR CONSTRUCTION
11/05/2024

0 120' 240'
SCALE: 1"=120'

Dominion Energy

REV.	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE
F	ISSUED FOR REVIEW	PMD	AC		11/05/2024
E	ISSUED FOR BID	PMD	AC		07/19/2024
D	ISSUED FOR REVIEW	PMD	AC		06/27/2024
C	ISSUED FOR REVIEW	PMD	AC		06/18/2024
B	ISSUED FOR REVIEW	PMD	AC		03/27/2024
A	ISSUED FOR REVIEW	PMD	AC		03/13/2024

DRAWING REVISIONS

Stantec
Stantec Consulting Services Inc.
50 Derby Street, Suite 260
Hingham, MA 02902
Tel. 617.786.7960
Fax. 617.786.7962
www.stantec.com

FILE NAME: 2057318100-M-001-f.dwg

COA #

SEAL

DRAWN: P. DEFAZIO	CHECKED: A. CELLA	IND. REVIEW
DESIGNED: P. DEFAZIO	CHECKED: A. CELLA	APPROVED: A. CELLA
PROJECT NO: 2057318100		SCALE: 1"=120'

CLIENT/PROJECT:
DOMINION ENERGY
CHESTERFIELD ENERGY RELIABILTY CENTER (CERC)
CHESTERFIELD, VIRGINIA

TITLE:
OVERALL SITE PLAN
1000 MW SIMPLE CYCLE PLANT

SHT 1 OF 1
DWG NO: 2057318100-M-001
REV: F

Appendix B Model Support Data

GE - Natural Gas

	Exit Temperature	Exit Velocity	CO 1- Turbine 1
	F	fps	
Startup			
Start[1,2]	850.000	67.52	366.00
Normal Operation[3]	850.000	99.66	4.65

1. Exhaust velocity for the MECL load from performance data provided by vendor and/or Dominion
2. Exit temperature for the MECL load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the 80% load from performance data provided by vendor and/or Dominion

	Exit Temperature	Exit Velocity	CO 8- Turbine 1
	F	fps	
Startup			
Start[1,2]	850.000	67.52	45.75
Normal Operation[3]	850.000	99.66	8.72

1. Exhaust velocity for the MECL load from performance data provided by vendor and/or Dominion
2. Exit temperature for the MECL load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the 80% load from performance data provided by vendor and/or Dominion

	Exit Temperature	Exit Velocity	PM2.5 24-hour Turbine 1
	F	fps	
Startup			
Start[1,2]	850.000	67.52	0.17
Normal Operation[3]	850.000	67.52	14.10

1. Exhaust velocity for the MECL load from performance data provided by vendor and/or Dominion
2. Exit temperature for the MECL load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the MECL load from performance data provided by vendor and/or Dominion

CO-Startup/Shutdown Modeling Calculations

	Startup
Total emission per event (lbs)	366.00
Maximum 1-hour rolling average rate during startup (lb/hr)	366.00
Time (min)	30
Maximum CO 1 - hour during normal operation - 80% (lb/hr)	9.30
Maximum CO 8 - hour during normal operation - 80% (lb/hr)	9.30

CO 1-hr

	Turbine 1
	Startup
CO 1-hour (min)	60
Startup/Shutdown (min)	30.0
emissions (lbs/hr)	**366.00**
Remaining Time (min)	30.0
emissions (lbs/hr)	**4.65**

CO 8-hr

	Turbine 1
CO 8-hour (min)	480
Startup/Shutdown (min)	30.0
emissions (lbs/hr)	366.0
Remaining Time (min)	450.0
emissions (lbs/hr)	**69.75**

<u>Scenarios</u>

CO 1 - hour

	Turbine 1
Startup	366.00
Normal Operation	9.30

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	366.00
Remaining time in Normal Operation	4.65

CO 8 hour

	Turbine 1
Startup	366.00
Normal Operation	69.75

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	45.75
Remaining time in Normal Operation	8.72

PM2.5-Startup/Shutdown Modeling Calculations

	Startup
	Turbine 1
Total emission per event	4
Maximum 1-hour rolling average rate during startup (lb/hr)	4.00
Time (min)	30
PM2.5 from worst case scenario for Load analysis (MECL)	14.40

	Turbine 1 Startup
PM2.5- 24hour (min)	1440
Startup/Shutdown (min)	30
Startup/Shutdown (hrs)	0.50
emissions	**4.00**

Remaining Time for Normal Operation for Turbine 1 in sequence (min)	1410
hours	23.50
emissions (lb/event)	**338.40**

Scenarios

PM2.5 24-hr

	Turbine 1
PM2.5 24-hour (min)	1440
Startup/Shutdown (min)	30.0
emisisons (lb/event)	4.0

Remaining Time for Normal Operation for Turbine 1 after startup (min)	1410.0
emissions (lb/24-hr)	**338.40**

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	0.17
Remaining time in Normal Operation	14.10

GE - Fuel Oil

	Exit Temperature	Exit Velocity	CO 1-hour Turbine 1
	F	fps	
Startup			
Start[1,2]	850.00	94.81	1036.00
Normal Operation[3]	850.00	105.20	4.45

1. Exhaust velocity for the 50% load from performance data provided by vendor and/or Dominion
2. Exit temperature for the 50% load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the 70% load from performance data provided by vendor and/or Dominion

	Exit Temperature	Exit Velocity	CO 8-hour Turbine 1
	F	fps	
Startup			
Start[1,2]	850.00	94.81	129.50
Normal Operation[3]	850.00	94.81	6.94

1. Exhaust velocity for the 50% load from performance data provided by vendor and/or Dominion
2. Exit temperature for the 50% load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the MECL load from performance data provided by vendor and/or Dominion

	Exit Temperature	Exit Velocity	PM2.5 24-hour Turbine 1
	F	fps	
Startup			
Start[1,2]	850.00	94.81	0.88
Normal Operation[3]	850.00	94.81	43.67

1. Exhaust velocity for the 50% load from performance data provided by vendor and/or Dominion
2. Exit temperature for the 50% load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the MECL load from performance data provided by vendor and/or Dominion

CO-Startup/Shutdown Modeling Calculations

	Startup
Total emission per event (lbs)	1036.00
Maximum 1-hour rolling average rate during startup (lb/hr)	1036.00
Time (min)	30
Maximum CO 1 - hour during normal operation - 70% (lb/hr)	8.90
Maximum CO 8 - hour during normal operation - MECL (lb/hr)	7.40

CO 1-hr

	Turbine 1 Startup
CO 1-hour (min)	60
Startup/Shutdown (min)	30.0
emissions (lbs/hr)	**1036.00**
Remaining Time (min)	30.0
emissions (lbs/hr)	**4.45**

CO 8-hr

	Turbine 1
CO 8-hour (min)	480
Startup/Shutdown (min)	30.0
emissions (lbs/hr)	1036.0
Remaining Time (min)	450.0
emissions (lbs/hr)	**55.50**

Scenarios

CO 1 - hour

	Turbine 1
Startup	1036.00
Normal Operation	8.90

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	1036.00
Remaining time in Normal Operation	4.45

CO 8 hour

	Turbine 1
Startup	1036.00
Normal Operation	55.50

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	129.50
Remaining time in Normal Operation	6.94

PM2.5-Startup/Shutdown Modeling Calculations

	Startup
	Turbine 1
Total emission per event	21
Maximum 1-hour rolling average rate during startup (lb/hr)	21.00
Time (min)	30
PM2.5 from worst case scenario for Load analysis (MECL)	44.60

	Turbine 1 Startup
PM2.5- 24hour (min)	1440
Startup/Shutdown (min)	30
Startup/Shutdown (hrs)	0.50
emissions	**21.00**

Remaining Time for Normal Operation for Turbine 1 in sequence (min)	1410
hours	23.50
emissions (lb/event)	**1048.10**

Scenarios

PM2.5 24-hr

	Turbine 1
PM2.5 24-hour (min)	1440
Startup/Shutdown (min)	30.0
emisisons (lb/event)	21.0

Remaining Time for Normal Operation for Turbine 1 after startup (min)	1410.0
emissions (lb/24-hr)	**1048.10**

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	0.88
Remaining time in Normal Operation	43.67

Class II - SecondaryPM2.5_Daily

State	County	Metric	Precursor	Emissions	Stack	MaxConc
Alabama	Autauga	Daily PM2.5	NOx	500	10	0.178049013
Alabama	Tallapoosa	Daily PM2.5	NOx	500	10	0.091530144
North Carolina	Ashe	Daily PM2.5	NOx	500	10	0.051641222
North Carolina	Lincoln	Daily PM2.5	NOx	500	10	0.059281711
North Carolina	Nash	Daily PM2.5	NOx	500	10	0.115615852
South Carolina	Allendale	Daily PM2.5	NOx	500	10	0.082199417
South Carolina	**Horry**	**Daily PM2.5**	**NOx**	**500**	**10**	**0.194835022**
Virginia	Dinwiddie	Daily PM2.5	NOx	500	10	0.137432978

State	County	Metric	Precursor	Emissions	Stack	MaxConc
Alabama	**Autauga**	**Daily PM2.5**	**SO2**	**500**	**10**	**1.230955005**
Alabama	Tallapoosa	Daily PM2.5	SO2	500	10	0.325321376
North Carolina	Ashe	Daily PM2.5	SO2	500	10	0.274361819
North Carolina	Lincoln	Daily PM2.5	SO2	500	10	0.235381484
North Carolina	Nash	Daily PM2.5	SO2	500	10	0.479544163
South Carolina	Allendale	Daily PM2.5	SO2	500	10	0.512832224
South Carolina	Horry	Daily PM2.5	SO2	500	10	0.659346998
Virginia	Dinwiddie	Daily PM2.5	SO2	500	10	0.601250351

Maximum Concentration	NOx	0.19484	ug/m3
	SO2	1.23096	ug/m3
Project Emissions	NOx	353.28	tpy
	SO2	27.81	typ
Secondary PM2.5	NOx	0.13766	ug/m3
	SO2	0.06847	ug/m3
	Total	**0.21**	**ug/m3**

Class II - SecondaryPM2.5_Annual

State	County	Metric	Precursor	Emissions	Stack	MaxConc		State	County	Metric	Precursor	Emissions	Stack	MaxConc
Alabama	**Autauga**	**Annual PM2.5**	**NOx**	**500**	**10**	0.010371829		**Alabama**	**Autauga**	**Annual PM2.5**	**SO2**	**500**	**10**	**0.029385092**
Alabama	Tallapoosa	Annual PM2.5	NOx	500	10	0.003380076		Alabama	Tallapoosa	Annual PM2.5	SO2	500	10	0.009754663
North Carolina	Ashe	Annual PM2.5	NOx	500	10	0.003707573		North Carolina	Ashe	Annual PM2.5	SO2	500	10	0.010283131
North Carolina	Lincoln	Annual PM2.5	NOx	500	10	0.004643059		North Carolina	Lincoln	Annual PM2.5	SO2	500	10	0.006152079
North Carolina	Nash	Annual PM2.5	NOx	500	10	0.006108583		North Carolina	Nash	Annual PM2.5	SO2	500	10	0.018388109
South Carolina	Allendale	Annual PM2.5	NOx	500	10	0.005835705		South Carolina	Allendale	Annual PM2.5	SO2	500	10	0.016083088
South Carolina	Horry	Annual PM2.5	NOx	500	10	0.009841161		South Carolina	Horry	Annual PM2.5	SO2	500	10	0.023041686
Virginia	Dinwiddie	Annual PM2.5	NOx	500	10	0.005152589		Virginia	Dinwiddie	Annual PM2.5	SO2	500	10	0.014329711

Maximum Concentration	NOx	0.01037	ug/m3
	SO2	0.02939	ug/m3
Project Emissions	NOx	353.28	tpy
	SO2	27.81	typ
Secondary PM2.5	NOx	0.00733	ug/m3
	SO2	0.00163	ug/m3
	Total	**0.009**	**ug/m3**

Clas I - SecondaryPM2.5_Daily

State	County	Distance	Metric	Precursor	Emissions	Stack	Concentration
Virginia	Dinwiddie	140	Daily PM2.5	NOx	500	10	0.021451162
North Carolina	Lincoln	140	Daily PM2.5	NOx	500	10	0.015377422
North Carolina	**Nash**	**140**	**Daily PM2.5**	**NOx**	**500**	**10**	**0.050611373**
South Carolina	Allendale	140	Daily PM2.5	NOx	500	10	0.018226283
Alabama	Autauga	140	Daily PM2.5	NOx	500	10	0.021129692
Alabama	Tallapoosa	140	Daily PM2.5	NOx	500	10	0.023450008
North Carolina	Ashe	140	Daily PM2.5	NOx	500	10	0.009198559
South Carolina	Horry	140	Daily PM2.5	NOx	500	10	0.026607437

State	County	Distance	Metric	Precursor	Emissions	Stack	Concentration
Virginia	**Dinwiddie**	**140**	**Daily PM2.5**	**SO2**	**500**	**10**	**0.104286589**
North Carolina	Lincoln	140	Daily PM2.5	SO2	500	10	0.035493232
North Carolina	Nash	140	Daily PM2.5	SO2	500	10	0.091162063
South Carolina	Allendale	140	Daily PM2.5	SO2	500	10	0.082712494
Alabama	Autauga	140	Daily PM2.5	SO2	500	10	0.066047698
Alabama	Tallapoosa	140	Daily PM2.5	SO2	500	10	0.057228077
North Carolina	Ashe	140	Daily PM2.5	SO2	500	10	0.027949249
South Carolina	Horry	140	Daily PM2.5	SO2	500	10	0.082673334

Maximum Concentration	NOx	0.05061	ug/m3
	SO2	0.10429	ug/m3
Project Emissions	NOx	353.28	tpy
	SO2	27.81	typ
Secondary PM2.5	NOx	0.03576	ug/m3
	SO2	0.00580	ug/m3
	Total	**0.04**	**ug/m3**

Clas I - SecondaryPM2.5_Annual

State	County	Distance	Metric	Precursor	Emissions	Stack	Concentration
Virginia	Dinwiddie	140	Annual PM2.5	NOx	500	10	0.00063538
North Carolina	Lincoln	140	Annual PM2.5	NOx	500	10	0.000653626
North Carolina	Nash	140	Annual PM2.5	NOx	500	10	0.000895584
South Carolina	Allendale	140	Annual PM2.5	NOx	500	10	0.000606906
Alabama	Autauga	140	Annual PM2.5	NOx	500	10	0.000314558
Alabama	Tallapoosa	140	Annual PM2.5	NOx	500	10	0.00043855
North Carolina	Ashe	140	Annual PM2.5	NOx	500	10	0.000420963
South Carolina	**Horry**	**140**	**Annual PM2.5**	**NOx**	**500**	**10**	**0.001360483**

State	County	Distance	Metric	Precursor	Emissions	Stack	Concentration
Virginia	Dinwiddie	140	Annual PM2.5	SO2	500	10	0.001524917
North Carolina	Lincoln	140	Annual PM2.5	SO2	500	10	0.001055746
North Carolina	Nash	140	Annual PM2.5	SO2	500	10	0.001722605
South Carolina	Allendale	140	Annual PM2.5	SO2	500	10	0.001639321
Alabama	Autauga	140	Annual PM2.5	SO2	500	10	0.001363661
Alabama	Tallapoosa	140	Annual PM2.5	SO2	500	10	0.001051712
North Carolina	Ashe	140	Annual PM2.5	SO2	500	10	0.000837991
South Carolina	**Horry**	**140**	**Annual PM2.5**	**SO2**	**500**	**10**	**0.00212683**

Maximum Concentration	NOx	0.00136	ug/m3
	SO2	0.00213	ug/m3
Project Emissions	NOx	353.28	tpy
	SO2	27.81	typ
Secondary PM2.5	NOx	0.00096	ug/m3
	SO2	0.00012	ug/m3
	Total	**0.001**	**ug/m3**

Truck trips per year calculations

1) Ash hauling UAP to FFCP

Truck trips per hour:	39
Working hours per day:	10
Working days per week:	7
Working weeks per year:	52
Truck trips per year:	141,960

2) Ash hauling - UAP to Beneficial Use (BU)

Truck trips per hour:	18
Working hours per day:	10
Working days per week:	7
Working weeks per year:	52
Truck trips per year:	65,520

3) Water trucks

Working days per week:	7
Working weeks per year:	52
VMT @10% of Haul Road Traffic, Low ADT:	2,424
VMT @10% of Haul Road Traffic, Medium ADT:	0

Truck trips per day calculations

1) Ash hauling UAP to FFCP

Truck trips per hour:	39
Working hours per day:	10
Truck trips per day:	390

2) Ash hauling - UAP to Beneficial Use (BU)

Truck trips per hour:	18
Working hours per day:	10
Truck trips per day:	180

2. Haul Roads Data

a. UAP Load Truck through FFCP Dropoff (Loaded Truck)

Segment	Segment	Length (miles)	Characterization	Silt Loading		Vehicle Speed (mph)	Suppression Method	Dust Control (%)	truck trips /year	lb PM-30 / VMT	lb PM-10 / VMT	lb PM-2.5 / VMT	controlled emission tons PM-30 / year	controlled emission tons PM-10 / year	controlled emission tons PM-2.5 / year	truck trips /day	controlled emission tons PM-30 / day	controlled emission tons PM-10 / day	controlled emission tons PM-2.5 / day
Ash Pickup and Exit through UAP	1	0.45	unpaved (packed)	8.4	%	25 mph or less	watering & speed limit	97.2%	141,960	7.533	2.147	0.215	6.73	1.92	0.19	390	1.85E-02	5.27E-03	5.27E-04
UAP Entrance Road	2	0.15	paved (med ADT)	0.2	g/m2	35	remove road deposits	90.0%	141,960	0.086	0.017	0.0042	0.091	0.018	0.0045	390	2.51E-04	5.02E-05	1.23E-05
From UAP Entrance Road to UAP/LAP Wheel Wash Station	3	0.20	paved (med ADT)	0.2	g/m2	35	remove road deposits	90.0%	141,960	0.086	0.017	0.0042	0.12	0.024	0.0060	390	3.35E-04	6.69E-05	1.64E-05
From Wheel Wash on Henricus to Coxendale at BU Entrance Road	4	0.77	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	141,960	0.086	0.017	0.0042	0.094	0.019	0.0046	390	2.58E-04	5.15E-05	1.26E-05
Coxendale from BU Entrance Road to Dominion Entrance at Old Stage	5	0.51	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	141,960	0.086	0.017	0.0042	0.063	0.013	0.0031	390	1.72E-04	3.45E-05	8.46E-06
Dominion Entrance to FFCP Entry	6	0.89	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	141,960	0.086	0.017	0.0042	0.11	0.022	0.0053	390	2.97E-04	5.95E-05	1.46E-05
FFCP Entrance to Phase 4 Entry	7	0.43	unpaved (gravel)	4.8	%	25 mph or less	watering & speed limit	97.2%	141,960	5.091	1.298	0.130	4.35	1.11	0.11	390	1.20E-02	3.05E-03	3.05E-04
Ash Dropoff in Phase 4	8	0.15	unpaved (packed)	8.4	%	25 mph or less	watering & speed limit	97.2%	141,960	7.533	2.147	0.215	2.18	0.62	0.06	390	5.98E-03	1.71E-03	1.71E-04

b. Ash hauling UAP to FFCP (Unloaded Truck)

Segment	Segment	Length (miles)	Characterization	Silt Loading		Vehicle Speed (mph)	Suppression Method	Dust Control (%)											
From FFCP Dropoff to FFCP Perimeter Road at Phase 4	9	0.12	unpaved (packed)	8.4	%	25 mph or less	watering & speed limit	97.2%	141,960	6.049	1.724	0.172	1.47	0.42	0.042	390	4.04E-03	1.15E-03	1.15E-04
Phase 4 Exit Point to Wheel Wash	10	0.45	unpaved (gravel)	8.4	%	25 mph or less	watering & speed limit	97.2%	141,960	6.049	1.724	0.172	5.39	1.54	0.15	390	1.48E-02	4.22E-03	4.22E-04
Truck Wash to FFCP Entrance	11	0.08	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	141,960	0.052	0.010	0.0026	0.0060	0.0012	0.00029	390	1.64E-05	3.29E-06	8.06E-07
FFCP Entrance to Dominion Entrance	6	0.89	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	141,960	0.052	0.010	0.0026	0.066	0.013	0.0032	390	1.81E-04	3.62E-05	8.88E-06
Coxendale From Dominion Entrance to BU Entrance Road	5	0.51	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	141,960	0.052	0.010	0.0026	0.038	0.008	0.0019	390	1.05E-04	2.10E-05	5.15E-06
From BU Entrance Road to Wheel Wash on Henricus	4	0.77	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	141,960	0.052	0.010	0.0026	0.057	0.011	0.0028	390	1.57E-04	3.13E-05	7.69E-06
From UAP Entrance Road to UAP/LAP Wheel Wash Station	3	0.20	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	141,960	0.052	0.010	0.0026	0.015	0.0030	0.0007	390	4.07E-05	8.14E-06	2.00E-06
UAP Entrance Road	2	0.15	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	141,960	0.052	0.010	0.0026	0.011	0.0022	0.0005	390	3.05E-05	6.11E-06	1.50E-06
From UAP Entrance to Ash Pickup	1	0.45	unpaved (packed)	8.4	%	25 mph or less	watering & speed limit	97.2%	141,960	6.049	1.724	0.172	5.40	1.54	0.15	390	1.48E-02	4.23E-03	4.23E-04

c. UAP to BU Building to Dominion Entrance (BU Loaded Truck)

Segment	Segment	Length (miles)	Characterization	Silt Loading		Vehicle Speed (mph)	Suppression Method	Dust Control (%)											
Ash Pickup and Exit through UAP	1	0.45	unpaved (packed)	8.4	%	25 mph or less	watering & speed limit	97.2%	65,520	7.533	2.147	0.215	3.11	0.89	0.089	180	8.54E-03	2.43E-03	2.43E-04
UAP Entrance Road	2	0.15	paved (med ADT)	0.2	g/m2	25 mph or less	remove road deposits	90.0%	65,520	0.086	0.017	0.004	0.042	0.008	0.0021	180	1.16E-04	2.32E-05	5.69E-06
From UAP Entrance Road to UAP/LAP Wheel Wash Station	3	0.20	paved (med ADT)	0.2	g/m2	25 mph or less	remove road deposits	90.0%	65,520	0.086	0.017	0.004	0.056	0.011	0.0028	180	1.54E-04	3.09E-05	7.58E-06
From Wheel Wash to Coxendale at Intersection of LAP Entrance Road	4	0.77	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	65,520	0.086	0.017	0.004	0.043	0.009	0.0021	180	1.19E-04	2.38E-05	5.84E-06
Coxendale from Intersection of LAP Entrance to BU Building	12	0.21	paved (low ADT)	0.6	g/m2	35	wheel washing & remove deposits	98.0%	65,520	0.142	0.028	0.007	0.020	0.004	0.0010	180	5.36E-05	1.07E-05	2.63E-06
CCR Dropoff in BU Bldg	13	0.03	unpaved (packed)	8.4	%	25 mph or less	speed limit	44.0%	65,520	7.533	2.147	0.215	4.15	1.18	0.12	180	1.14E-02	3.25E-03	3.25E-04
CCR Dropoff to BU Truck Wash	14	0.03	unpaved (packed)	8.4	%	25 mph or less	speed limit	44.0%	65,520	7.533	2.147	0.215	4.15	1.18	0.12	180	1.14E-02	3.25E-03	3.25E-04
From BU Building to Coxendale	15	0.16	paved (low ADT)	0.6	g/m2	35	wheel washing & remove deposits	98.0%	65,520	0.142	0.028	0.007	0.015	0.0030	0.0007	180	4.09E-05	8.17E-06	2.01E-06
Coxendale to Dominion Entrance	5	0.51	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	65,520	0.086	0.017	0.004	0.029	0.0058	0.0014	180	7.95E-05	1.59E-05	3.90E-06

d. Beneficial Reuse to UAP (BU Unloaded Truck)

Segment	Segment	Length (miles)	Characterization	Silt Loading		Vehicle Speed (mph)	Suppression Method	Dust Control (%)											
Coxendale to Dominion Entrance	5	0.51	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	65,520	0.052	0.010	0.0026	0.02	0.00	0.00	180	4.84E-05	9.68E-06	2.38E-06
From BU Entrance Road to Wheel Wash on Henricus	4	0.77	paved (med ADT)	0.2	g/m2	35	wheel washing & remove deposits	98.0%	65,520	0.052	0.010	0.0026	0.03	0.01	0.00	180	7.23E-05	1.45E-05	3.55E-06
From UAP/LAP Wheel Wash Station to UAP Entrance Road	3	0.20	paved (med ADT)	0.2	g/m2	25 mph or less	wheel washing & remove deposits	98.0%	65,520	0.052	0.010	0.0026	0.01	0.00	0.00	180	1.88E-05	3.76E-06	9.23E-07
UAP Entrance Road	2	0.15	paved (med ADT)	0.2	g/m2	25 mph or less	wheel washing & remove deposits	98.0%	65,520	0.052	0.010	0.0026	0.01	0.00	0.00	180	1.41E-05	2.82E-06	6.92E-07
LAP Haul Road Entrance to CCR Pickup	1	0.45	unpaved (packed)	8.4	%	25 mph or less	watering & speed limit	97.2%	65,520	6.049	1.724	0.172	2.50	0.71	0.07	180	6.86E-03	1.96E-03	1.96E-04

e. Watering Truck Traffic - assumed to be equal to 10 percent of the ash haul traffic provided above.

f. Dust control methods

Paved roads - combination of road sweeping and trackout minimization from unpaved areas (wheel washing)

Unpaved roads - combination of limiting vehicle speed and road watering

g. Data sources and assumptions for traffic data

Segment lengths: Roadway lengths established by measurements using Google Earth.

Paved road silt loadings: AP-42, Table 13.2.1-2. Only the haul traffic within the BU area is less than 500 VMT/day with a silt loading of 0.6 g/m2.

Coxendale and Henricus paved roads are public roads with ADT of 1,200 ADT baseline (2018 VA DOT database). Ash hauling alone is somewhat higher than 500 ADT. Silt loading = 0.2 g/m2 for all other roads with ADT of 500 - 5,000.

Upaved road silt loading: unpaved packed roads, AP-42, Table 13.2.2-1 (western surface mining, 8.4%). Gravel roads used silt loading information provided by manufacturer (4.8%). Gravel road from FFCP exit is 8.4% due to ash/soil buildup.

Vehicle speeds: Coxendale posted speed limit is 35 mph. Henricus is posted at 25 mph. All other plant roads assumed limited to 25 mph.

3. Vehicle Data

Vehicle Type	Loaded Weight (tons)	Unloaded Weight (tons)	Data Source
Ash hauling truck	31.5	19.35	Chesterfield Basis of Design, 90 lb/ft3 density, 10 ft3 capacity
Fill hauling truck	40	23.8	Chesterfield Basis of Design, 120 lb/ft3 density, 10 ft3 capacity
Water truck (4000 gal capacity)	7.4	24.1	Representative truck rental (Herc Rentals) data
Watering truck use	N/A	N/A	Assumed watering truck mileage is 10% of haul truck traffic

4. Landfill and Ash Pond Equipment (number per area)

Equipment Type	Landfill	LAP [1]	UAP	Basis of Estimate
CAT 330L Excavator	1	N/A	2	AECOM Equipment Estimation
Other Excavators	1	N/A	2	AECOM Equipment Estimation
Compactors/Graders	1	N/A	2	AECOM Equipment Estimation
CAT D6 Bulldozer	1	N/A	8	AECOM Equipment Estimation
Miscellaneous	1	N/A	1	AECOM Equipment Estimation
CAT 963 Loader	1	N/A	2	FFCP Phase 1 Application, assumed 2 needed in LAP to maintain projected haul traffic

Note 1: LAP trafffic not considered because no non-construction activities occurring within 20206 - 2027 worst-case emissions projection.

5. Material Handling and Operating Schedule

Equipment Type	BU Loadout Operation
980M Wheel Loader	2
CAT 745 Truck	2

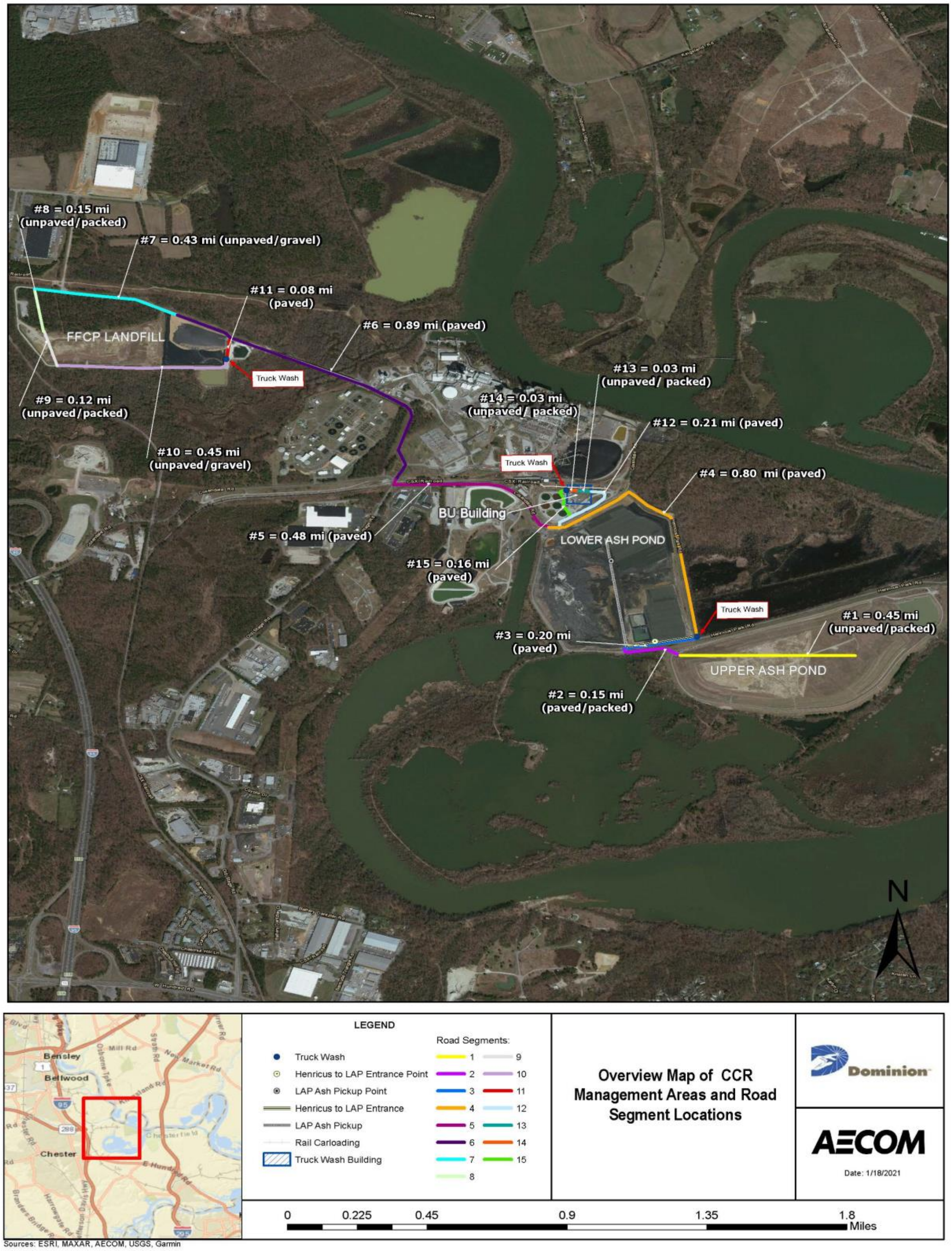
Calculation Inputs	Value		Data Source
Site wind speed	6.2	miles per hour	Weatherspark.com - Average Weather in Chesterfield, VA
Ash density	90	lb/ft^3	Common engineering assumption
	1.22	ton/CY	Converted value
Ash moisture content	20	%	Beneficial Reuse of Coal Ash from Dominion Energy Coal Ash Sites Feasibility Assessment, https://www.southernenvironment.org/uploads/words_docs/Coal_Ash_Recycling_Feasiblity_Assessment.pdf
Hauling capacity, ash trucks	10	CY/truck	Basis of Design Document, AECOM
Loading rate, UAP to FCCP	39	trucks/hr	*Calculated Value*
Annual rate, UAP to FFCP	###########	CY/yr	*Calculated using inputs*
Annual ash to BU	655,200	CY/yr	Charah Design Data, emission calculation spreadsheet 10/20/20
Total CCR Transported	###########	CY/yr	Summation of FFCP and BU rows above
Trucks/hr based to BU on annual rate and design schedule	18	trucks/hr	*Calculated using inputs (rounded value used)*
Daily work schedule	10	hrs/day	Basis of Design Document, AECOM
Weekly work schedule	7	days/week	Basis of Design Document, AECOM
Annual work schedule	52	weeks/yr	Worst-case assumption; design basis is 22 days/month
Working vehicle speed, heavy equipment in UAP and FFCP	2.0	miles per hour	Engineering estimate

Short-term Emission Rates

											Modeled emission Rate		
		PM30 tons/day	PM10 tons/day	PM2.5 tons/day		PM30 lb/hr	PM10 lb/hr	PM2.5 lb/hr		Number of Modeled Volume sources	PM30 lb/hr	PM10 lb/hr	PM2.5 lb/hr
Segment	Segment												
Ash Pickup and Exit through UAP	1	4.87E-02	1.39E-02	1.39E-03		4.06E+00	1.16E+00	1.16E-01		74	5.49E-02	1.56E-02	1.56E-03
UAP Entrance Road	2	4.12E-04	8.23E-05	2.02E-05		3.43E-02	6.86E-03	1.68E-03		25	1.37E-03	2.74E-04	6.73E-05
From UAP Entrance Road to UAP/LAP Wheel Wash Station	3	5.49E-04	1.10E-04	2.69E-05		4.57E-02	9.15E-03	2.24E-03		35	1.31E-03	2.61E-04	6.41E-05
From Wheel Wash on Henricus to Coxendale at BU Entrance Road	4	6.06E-04	1.21E-04	2.97E-05		5.05E-02	1.01E-02	2.48E-03		143	3.53E-04	7.06E-05	1.73E-05
Coxendale from BU Entrance Road to Dominion Entrance at Old Stage	5	2.77E-04	5.54E-05	1.36E-05		2.31E-02	4.62E-03	1.13E-03		85	2.72E-04	5.43E-05	1.33E-05
Dominion Entrance to FFCP Entry	6	4.78E-04	9.56E-05	2.35E-05		3.98E-02	7.97E-03	1.96E-03		176	2.26E-04	4.53E-05	1.11E-05
FFCP Entrance to Phase 4 Entry	7	1.20E-02	3.05E-03	3.05E-04		9.96E-01	2.54E-01	2.54E-02		72	1.38E-02	3.53E-03	3.53E-04
Ash Dropoff in Phase 4	8	5.98E-03	1.71E-03	1.71E-04		4.99E-01	1.42E-01	1.42E-02		26	1.92E-02	5.47E-03	5.47E-04
From FFCP Dropoff to FFCP Perimeter Road at Phase 4	9	4.04E-03	1.15E-03	1.15E-04		3.37E-01	9.60E-02	9.60E-03		27	1.25E-02	3.56E-03	3.56E-04
Phase 4 Exit Point to Wheel Wash	10	1.48E-02	4.22E-03	4.22E-04		1.23E+00	3.51E-01	3.51E-02		82	1.50E-02	4.29E-03	4.29E-04
Truck Wash to FFCP Entrance	11	1.64E-05	3.29E-06	8.06E-07		1.37E-03	2.74E-04	6.72E-05		20	6.85E-05	1.37E-05	3.36E-06
Coxendale from Intersection of LAP Entrance to BU Building	12	5.36E-05	1.07E-05	2.63E-06		4.47E-03	8.94E-04	2.19E-04		37	1.21E-04	2.42E-05	5.93E-06
CCR Dropoff in BU Bldg	13	1.14E-02	3.25E-03	3.25E-04		9.49E-01	2.71E-01	2.71E-02		6	1.58E-01	4.51E-02	4.51E-03
CCR Dropoff to BU Truck Wash	14	1.14E-02	3.25E-03	3.25E-04		9.49E-01	2.71E-01	2.71E-02		6	1.58E-01	4.51E-02	4.51E-03
From BU Building to Coxendale	15	4.09E-05	8.17E-06	2.01E-06		3.41E-03	6.81E-04	1.67E-04		24	1.42E-04	2.84E-05	6.97E-06

Annual Emission Rates

						Modeled emission Rate			
		PM30 tons/year	PM10 tons/year	PM2.5 tons/year		Number of Modeled Volume sources	PM30 lb/hr	PM10 lb/hr	PM2.5 lb/hr
Segment	Segment								
Ash Pickup and Exit through UAP	1	17.73	5.05	0.51		74	2.40E-01	6.83E-02	6.83E-03
UAP Entrance Road	2	0.15	0.03	0.01		25	5.99E-03	1.20E-03	2.94E-04
From UAP Entrance Road to UAP/LAP Wheel Wash Station	3	0.20	0.04	0.01		35	5.71E-03	1.14E-03	2.80E-04
From Wheel Wash on Henricus to Coxendale at BU Entrance Road	4	0.22	0.04	0.01		143	1.54E-03	3.08E-04	7.57E-05
Coxendale from BU Entrance Road to Dominion Entrance at Old Stage	5	0.10	0.02	0.00		85	1.19E-03	2.37E-04	5.83E-05
Dominion Entrance to FFCP Entry	6	0.17	0.03	0.01		176	9.89E-04	1.98E-04	4.85E-05
FFCP Entrance to Phase 4 Entry	7	4.35	1.11	0.11		72	6.04E-02	1.54E-02	1.54E-03
Ash Dropoff in Phase 4	8	2.18	0.62	0.06		26	8.38E-02	2.39E-02	2.39E-03
From FFCP Dropoff to FFCP Perimeter Road at Phase 4	9	1.47	0.42	0.04		27	5.45E-02	1.55E-02	1.55E-03
Phase 4 Exit Point to Wheel Wash	10	5.39	1.54	0.15		82	6.57E-02	1.87E-02	1.87E-03
Truck Wash to FFCP Entrance	11	0.006	0.0012	0.0003		20	2.99E-04	5.98E-05	1.47E-05
Coxendale from Intersection of LAP Entrance to BU Building	12	0.020	0.0039	0.0010		37	5.28E-04	1.06E-04	2.59E-05
CCR Dropoff in BU Bldg	13	4.15	1.18	0.12		6	6.91E-01	1.97E-01	1.97E-02
CCR Dropoff to BU Truck Wash	14	4.15	1.18	0.12		6	6.91E-01	1.97E-01	1.97E-02
From BU Building to Coxendale	15	0.01	0.0030	0.0007		24	6.20E-04	1.24E-04	3.04E-05



#8 = 0.15 mi (unpaved/packed)
#7 = 0.43 mi (unpaved/gravel)
#11 = 0.08 mi (paved)
#6 = 0.89 mi (paved)
FFCP LANDFILL
Truck Wash
#9 = 0.12 mi (unpaved/packed)
#10 = 0.45 mi (unpaved/gravel)
#13 = 0.03 mi (unpaved/ packed)
#14 = 0.03 mi (unpaved/ packed)
#12 = 0.21 mi (paved)
Truck Wash
#4 = 0.80 mi (paved)
BU Building
LOWER ASH POND
#5 = 0.48 mi (paved)
#15 = 0.16 mi (paved)
Truck Wash
#1 = 0.45 mi (unpaved/packed)
#3 = 0.20 mi (paved)
UPPER ASH POND
#2 = 0.15 mi (paved/packed)
N
Bensley
Bellwood
Chester
Chesterfield
LEGEND
Truck Wash
Henricus to LAP Entrance Point
LAP Ash Pickup Point
Henricus to LAP Entrance
LAP Ash Pickup
Rail Carloading
Truck Wash Building
Road Segments:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Overview Map of CCR Management Areas and Road Segment Locations
Dominion
AECOM
Date: 1/18/2021
0 0.225 0.45 0.9 1.35 1.8 Miles
Sources: ESRI, MAXAR, AECOM, USGS, Garmin

Calculation of Uncontrolled Paved Road Total PM Emission Factors
Dominion Chesterfield CCR Project

Paved Road Surface

E = k (sL)^0.91*(W)^1.02
AP-42, 13.2.1.3, equation 1 (1/11)

Particle size multiplier (k)
AP-42, Table 13.2-1.1

Particle Size Range	lb/VMT
PM-2.5	0.00054
PM-10	0.0022
PM-15	0.0027
PM-30	0.0110

1) Ash hauling UAP to FFCP

	0.91 and 1.02 are exponents
E =	emission factor (lb/VMT)
k =	particle size multiplier
sL =	surface silt loading (g/m2)
W =	average weight (tons) of the vehicles traveling the road

Road type	Silt Loading (g/m2)	
paved (low ADT)	0.6	<500 ADT
paved (med ADT)	0.2	500 - 5000 ADT

Paved Road (low ADT) - Loaded Truck (Ash)

k =	0.011
sL =	0.6
W =	31.5
E (lb/VMT) =	0.233

Paved Road (med ADT) - Loaded Truck (Ash)

k =	0.011
sL =	0.2
W =	31.5
E (lb/VMT) =	0.086

Paved Road (low ADT) - Unloaded Truck (Ash)

k =	0.011
sL =	0.6
W =	19.35
E (lb/VMT) =	0.142

Paved Road (med ADT) - Unloaded Truck (Ash)

k =	0.011
sL =	0.2
W =	19.35
E (lb/VMT) =	0.052

Paved Road (low ADT) - Water Truck

k =	0.011	
sL =	0.6	
W =	15.74	(Average)
E (lb/VMT) =	0.115	

Paved Road (med ADT) - Water Truck

k =	0.011	
sL =	0.2	
W =	15.74	(Average)
E (lb/VMT) =	0.042	

Date of last update: 1/29/2001

Calculation of Uncontrolled Paved Road PM-10 Emission Factors
Dominion Chesterfield CCR Project

Paved Road Surface

E = k (sL)^0.91*(W)^1.02
AP-42, 13.2.1.3, equation 1 (1/11)

Particle size multiplier (k)
AP-42, Table 13.2-1.1

Particle Size Range	lb/VMT
PM-2.5	0.00054
PM-10	0.0022
PM-15	0.0027
PM-30	0.0110

1) Ash hauling UAP to FFCP

	0.91 and 1.02 are exponents
E =	emission factor (lb/VMT)
k =	particle size multiplier
sL =	surface silt loading (g/m2)
W =	average weight (tons) of the vehicles traveling the road

Road type	Silt Loading (g/m2)	
paved (low ADT)	0.6	<500 ADT
paved (med ADT)	0.2	500 - 5000 ADT

Paved Road (low ADT) - Loaded Truck (Ash)	
k =	0.0022
sL =	0.6
W =	31.5
E (lb/VMT) =	0.047

Paved Road (med ADT) - Loaded Truck (Ash)	
k =	0.0022
sL =	0.2
W =	31.5
E (lb/VMT) =	0.017

Paved Road (low ADT) - Unloaded Truck (Ash)	
k =	0.0022
sL =	0.6
W =	19.35
E (lb/VMT) =	0.028

Paved Road (med ADT) - Unloaded Truck (Ash)	
k =	0.0022
sL =	0.2
W =	19.35
E (lb/VMT) =	0.010

Paved Road (low ADT) - Water Truck		
k =	0.0022	
sL =	0.6	
W =	15.74	(Average)
E (lb/VMT) =	0.023	

Paved Road (med ADT) - Water Truck		
k =	0.0022	
sL =	0.2	
W =	15.74	(Average)
E (lb/VMT) =	0.008	

Date of last update: 1/29/2001

Calculation of Uncontrolled Unpaved Packed Road Total PM Emission Factors
Dominion Chesterfield CCR Project

Unpaved Road - Packed Surface

E = k (s/12)^a)(W/3)^b)
AP-42, 13.2.2.1, equation 1a (11/06)

Particle size multiplier (k)
AP-42, Table 13.2.2-2 (Industrial Roads)

Particle Size Range	k (lb/VMT)	a	b
PM-2.5	0.15	0.90	0.45
PM-10	1.50	0.90	0.45
PM-30	4.90	0.70	0.45

	a and b are exponents
E =	emission factor (lb/VMT)
k =	particle size multiplier
s =	surface silt loading (%)
W =	mean weight (tons) of vehicles on road

Emissions adjustment due to natural mitigation
Eadj = E ((365-P)/365)
AP-42, 13.2.2.1, equation 2 (1/11)

where:

E =	emission factor for equation 1a or 1b	
P =	days in year with at least 0.01 in of rain	
P =	115	days

Overall Emissions Equation
E = k (s/12)^a)(W/3)^b)* (365-P)/365)

Road type	Silt Loading (%)
unpaved (packed)	8.4

Unpaved Road - Loaded Truck (Ash)

k =	4.90
a =	0.70
b =	0.45
W =	31.5
E (lb/VMT) =	7.533

Unpaved Road - Unloaded Truck (Ash)

k =	4.90
a =	0.70
b =	0.45
W =	19.35
E (lb/VMT) =	6.049

Unpaved Road - Water Truck

k =	4.90
a =	0.70
b =	0.45
W =	15.74 (Average)
E (lb/VMT) =	5.513

Date of last update: 1/29/2001

Calculation of Uncontrolled Paved Road PM-2.5 Emission Factors
Dominion Chesterfield CCR Project

Paved Road Surface

E = k (sL)^0.91*(W)^1.02
AP-42, 13.2.1.3, equation 1 (1/11)

Particle size multiplier (k)
AP-42, Table 13.2-1.1

Particle Size Range	lb/VMT
PM-2.5	0.00054
PM-10	0.0022
PM-15	0.0027
PM-30	0.0110

0.91 and 1.02 are exponents
E = emission factor (lb/VMT)
k = particle size multiplier
sL = surface silt loading (g/m2)
W = average weight (tons) of the vehicles traveling the road

Road type	Silt Loading (g/m2)	
paved (low ADT)	0.6	<500 ADT
paved (med ADT)	0.2	500 - 5000 ADT

Paved Road (low ADT) - Loaded Truck (Ash)	
k =	0.00054
sL =	0.6
W =	31.5
E (lb/VMT) =	0.0114

Paved Road (med ADT) - Loaded Truck (Ash)	
k =	0.00054
sL =	0.2
W =	31.5
E (lb/VMT) =	0.0042

Paved Road (low ADT) - Unloaded Truck (Ash)	
k =	0.00054
sL =	0.6
W =	19.35
E (lb/VMT) =	0.0070

Paved Road (med ADT) - Unloaded Truck (Ash)	
k =	0.00054
sL =	0.2
W =	19.35
E (lb/VMT) =	0.0026

Paved Road (low ADT) - Water Truck		
k =	0.001	
sL =	0.6	
W =	15.74	(Average)
E (lb/VMT) =	0.0056	

Paved Road (med ADT) - Water Truck		
k =	0.001	
sL =	0.2	
W =	15.74	(Average)
E (lb/VMT) =	0.0021	

Date of last update: 1/29/2001

Calculation of Uncontrolled Unpaved Packed Road PM-10 Emission Factors
Dominion Chesterfield CCR Project

Unpaved Road - Packed Surface

E = k (s/12)^a)(W/3)^b)
AP-42, 13.2.2.1, equation 1a (11/06)

a and b are exponents

E =	emission factor (lb/VMT)
k =	particle size multiplier
s =	surface silt loading (%)
W =	mean weight (tons) of vehicles on road

Particle size multiplier (k)
AP-42, Table 13.2.2-2 (Industrial Roads)

Particle Size Range	k (lb/VMT)	a	b
PM-2.5	0.15	0.90	0.45
PM-10	1.50	0.90	0.45
PM-30	4.90	0.70	0.45

Emissions adjustment due to natural mitigation
Eadj = E ((365-P)/365)
AP-42, 13.2.2.1, equation 2 (1/11)

where:

E =	emission factor for equation 1a or 1b	
P =	days in year with at least 0.01 in of rain	
P =	115	days

Overall Emissions Equation
E = k (s/12)^a)(W/3)^b)* (365-P)/365)

Road type	Silt Loading (%)
unpaved (packed)	8.4

Unpaved Road - Loaded Truck (Ash)

k =	1.50
a =	0.90
b =	0.45
W =	31.5
E (lb/VMT) =	2.147

Unpaved Road - Unloaded Truck (Ash)

k =	1.50
a =	0.90
b =	0.45
W =	19.35
E (lb/VMT) =	1.724

Unpaved Road - Water Truck

k =	1.50	
a =	0.90	
b =	0.45	
W =	15.74	(Average)
E (lb/VMT) =	1.571	

Date of last update: 1/29/2001

Calculation of Uncontrolled Unpaved Packed Road $PM_{2.5}$ Emission Factors
Dominion Chesterfield CCR Project

Unpaved Road - Packed Surface

E = k (s/12)^a)(W/3)^b)
AP-42, 13.2.2.1, equation 1a (11/06)

Particle size multiplier (k)
AP-42, Table 13.2.2-2 (Industrial Roads)

Particle Size Range	k (lb/VMT)	a	b
PM-2.5	0.15	0.90	0.45
PM-10	1.50	0.90	0.45
PM-30	4.90	0.70	0.45

	a and b are exponents
E =	emission factor (lb/VMT)
k =	particle size multiplier
s =	surface silt loading (%)
W =	mean weight (tons) of vehicles on road

Emissions adjustment due to natural mitigation
Eadj = E ((365-P)/365)
AP-42, 13.2.2.1, equation 2 (1/11)

where:

E =	emission factor for equation 1a or 1b	
P =	days in year with at least 0.01 in of rain	
P =	115	days

Overall Emissions Equation
E = k (s/12)^a)(W/3)^b)* (365-P)/365)

Road type	Silt Loading (%)
unpaved (packed)	8.4

Unpaved Road - Loaded Truck (Ash)

k =	0.15
a =	0.90
b =	0.45
W =	31.5
E (lb/VMT) =	0.215

Unpaved Road - Unloaded Truck (Ash)

k =	0.15
a =	0.90
b =	0.45
W =	19.35
E (lb/VMT) =	0.172

Unpaved Road - Water Truck

k =	0.15	
a =	0.90	
b =	0.45	
W =	15.74	(Average)
E (lb/VMT) =	0.157	

Date of last update: 1/29/2001

Calculation of Uncontrolled Unpaved Gravel Road Total PM Emission Factors
Dominion Chesterfield CCR Project

Unpaved Road - Gravel Surface

E = k (s/12)^a)(W/3)^b)
AP-42, 13.2.2.1, equation 1a (11/06)

Particle size multiplier (k)
AP-42, Table 13.2.2-2 (Industrial Roads)

Particle Size Range	k (lb/VMT)	a	b
PM-2.5	0.15	0.90	0.45
PM-10	1.50	0.90	0.45
PM-30	4.90	0.70	0.45

	a and b are exponents
E =	emission factor (lb/VMT)
k =	particle size multiplier
s =	surface silt loading (%)
W =	mean weight (tons) of vehicles on road

Emissions adjustment due to natural mitigation
Eadj = E ((365-P)/365)
AP-42, 13.2.2.1, equation 2 (1/11)

where:

E =	emission factor for equation 1a or 1b	
P =	days in year with at least 0.01 in of rain	
P =	115	days

Overall Emissions Equation
E = k (s/12)^a)(W/3)^b)* (365-P)/365)

Road type	Silt Loading (%)	
unpaved (gravel)	4.8	
unpaved (gravel)	8.4	From FFCP Phase 4 to Wheel Wash

Unpaved Road - Loaded Truck (Ash), gravel, 4.8% silt

k =	4.90
a =	0.70
b =	0.45
W =	31.5
E (lb/VMT) =	5.091

Unpaved Road - Unloaded Truck (Ash), 4.8% silt content

k =	4.90
a =	0.70
b =	0.45
W =	19.35
E (lb/VMT) =	4.089

Unpaved Road - Unloaded Truck (Ash), 8.4% silt content

k =	4.9
a =	0.7
b =	0.45
W =	19.35
E (lb/VMT) =	6.049

Unpaved Road - Water Truck

k =	4.90	
a =	0.70	
b =	0.45	
W =	15.74	(Average)
E (lb/VMT) =	3.726	

Date of last update: 1/29/2001

Calculation of Uncontrolled Unpaved Gravel Road PM-10 Emission Factors
Dominion Chesterfield CCR Project

Unpaved Road - Gravel Surface

E = k (s/12)^a)(W/3)^b)
AP-42, 13.2.2.1, equation 1a (11/06)

a and b are exponents

E =	emission factor (lb/VMT)
k =	particle size multiplier
s =	surface silt loading (%)
W =	mean weight (tons) of vehicles on road

Particle size multiplier (k)
AP-42, Table 13.2.2-2 (Industrial Roads)

Particle Size Range	k (lb/VMT)	a	b
PM-2.5	0.15	0.90	0.45
PM-10	1.50	0.90	0.45
PM-30	4.90	0.70	0.45

Emissions adjustment due to natural mitigation
Eadj = E ((365-P)/365)
AP-42, 13.2.2.1, equation 2 (1/11)

where:

E =	emission factor for equation 1a or 1b	
P =	days in year with at least 0.01 in of rain	
P =	115	days

Overall Emissions Equation
E = k (s/12)^a)(W/3)^b)* (365-P)/365)

Road type	Silt Loading (%)	
unpaved (gravel)	4.8	
unpaved (gravel)	8.4	From FFCP Phase 4 to Wheel Wash

Unpaved Road - Loaded Truck (Ash)

k =	1.50
a =	0.90
b =	0.45
W =	31.5
E (lb/VMT) =	1.298

Unpaved Road - Unloaded Truck (Ash), 4.8% silt content

k =	1.50
a =	0.90
b =	0.45
W =	19.35
E (lb/VMT) =	1.042

Unpaved Road - Unloaded Truck (Ash), 8.4% silt content

k =	1.5
a =	0.9
b =	0.45
W =	19.35
E (lb/VMT) =	1.724

Unpaved Road - Water Truck

k =	1.50	
a =	0.90	
b =	0.45	
W =	15.74	(Average)
E (lb/VMT) =	0.950	

Date of last update: 1/29/2001

Calculation of Uncontrolled Unpaved Gravel Road $PM_{2.5}$ Emission Factors
Dominion Chesterfield CCR Project

Unpaved Road - Gravel Surface
E = k (s/12)^a)(W/3)^b)
AP-42, 13.2.2.1, equation 1a (11/06)

Particle size multiplier (k)
AP-42, Table 13.2.2-2 (Industrial Roads)

Particle Size Range	k (lb/VMT)	a	b
PM-2.5	0.15	0.90	0.45
PM-10	1.50	0.90	0.45
PM-30	4.90	0.70	0.45

	a and b are exponents
E =	emission factor (lb/VMT)
k =	particle size multiplier
s =	surface silt loading (%)
W =	mean weight (tons) of vehicles on road

Emissions adjustment due to natural mitigation
Eadj = E ((365-P)/365)
AP-42, 13.2.2.1, equation 2 (1/11)

where:

E =	emission factor for equation 1a or 1b	
P =	days in year with at least 0.01 in of rain	
P =	115	days

Overall Emissions Equation
E = k (s/12)^a)(W/3)^b)* (365-P)/365)

Road type	Silt Loading (%)	
unpaved (gravel)	4.8	
unpaved (gravel)	8.4	From FFCP Phase 4 to Wheel Wash

Unpaved Road - Loaded Truck (Ash)

k =	0.15
a =	0.90
b =	0.45
W =	31.5
E (lb/VMT) =	0.130

Unpaved Road - Unloaded Truck (Ash), 4.8% silt content

k =	0.15
a =	0.90
b =	0.45
W =	19.35
E (lb/VMT) =	0.104

Unpaved Road - Unloaded Truck (Ash), 48.4% silt content

k =	0.15
a =	0.9
b =	0.45
W =	19.35
E (lb/VMT) =	0.172

Unpaved Road - Water Truck

k =	0.15	
a =	0.90	
b =	0.45	
W =	15.74	(Average)
E (lb/VMT) =	0.095	

Date of last update: 1/29/2001

Calculation of Emission Factors for Landfill and Upper Ash Pond Equipment Operations

Dominion Chesterfield CCR Project

Calculation Inputs

Average equipment speed		
Front End Loader	2.0	mph
Scraper	2.0	mph
	10	hrs/day
	7	days/wk
	52.0	weeks/yr

Emission Factors for Grading Operations

AP-42, 11.9 Table 11.9-1 (10/98)

E = 0.040 (S)^2.5	PM
E = 0.6(0.051)(S)^2.0	PM-10
E = 0.031(0.40)(S)^2.5	PM-2.5

where:

	2.5, 2.0 and 2.5 are exponents
S =	mean vehicle speed (mph)
E =	emission factor (lb/VMT)

Emission factors:

Front End Loader:	PM	PM-10	$PM_{2.5}$
S =	2.0	2.0	2.0
E (lb/VMT) =	0.23	0.12	0.07

Scraper:	PM	PM-10	$PM_{2.5}$
S =	2.0	2.0	2.0
E (lb/VMT) =	0.23	0.12	0.07

PM, PM-10 and $PM_{2.5}$ Emissions from Landfill Operations
Dominion Chesterfield CCR Project

Equipment utilization rate:		2.0	mph
	x	10	hrs/day
	x	7	days/wk
	x	52	wks/yr
	=	**7,280**	**VMT/yr**

PM Emissions

Equipment	Number of Units	VMT/yr	Speed (mph)	Emission Factor (lbs/VMT)	Uncontrolled Emissions (lbs/hr)	Uncontrolled Emissions (tons/yr)	Control Equipment	Control Efficiency	Controlled Emissions (lb/hr)	Controlled Emissions (tons/yr)
CAT 330L Excavator	1	7,280	2.0	0.23	0.45	0.82	Wetting	95%	0.02	0.041
Other Excavators	1	7,280	2.0	0.23	0.45	0.82	Wetting	95%	0.02	0.041
CAT 12 G Motor Grader	1	7,280	2.0	0.23	0.45	0.82	Wetting	95%	0.02	0.041
CAT D611 Bulldozer	1	7,280	2.0	0.23	0.45	0.82	Wetting	95%	0.02	0.041
CASE 580 Rubber Tire Back Hoe	1	7,280	2.0	0.23	0.45	0.82	Wetting	95%	0.02	0.041
CAT 963 Loader	1	7,280	2.0	0.23	0.45	0.82	Wetting	95%	0.02	0.041
Totals	6	43,680			**2.72**	**4.94**			**0.14**	**0.25**

PM-10 Emissions

Equipment	Number of Units	VMT/yr	Speed (mph)	Emission Factor (lbs/VMT)	Uncontrolled Emissions (lbs/hr)	Uncontrolled Emissions (tons/yr)	Control Equipment	Control Efficiency	Controlled Emissions (lb/hr)	Controlled Emissions (tons/yr)
CAT 330L Excavator	1	7,280	2.0	0.12	0.24	0.45	Wetting	95%	0.012	0.022
Other Excavators	1	7,280	2.0	0.12	0.24	0.45	Wetting	95%	0.012	0.022
CAT 12 G Motor Grader	1	7,280	2.0	0.12	0.24	0.45	Wetting	95%	0.012	0.022
CAT D611 Bulldozer	1	7,280	2.0	0.12	0.24	0.45	Wetting	95%	0.012	0.022
CASE 580 Rubber Tire Back Hoe	1	7,280	2.0	0.12	0.24	0.45	Wetting	95%	0.012	0.022
CAT 963 Loader	1	7,280	2.0	0.12	0.24	0.45	Wetting	95%	0.012	0.022
Totals	6	43,680			**1.47**	**2.67**			**0.07**	**0.13**

$PM_{2.5}$ Emissions

Equipment	Number of Units	VMT/yr	Speed (mph)	Emission Factor (lbs/VMT)	Uncontrolled Emissions (lbs/hr)	Uncontrolled Emissions (tons/yr)	Control Equipment	Control Efficiency	Controlled Emissions (lb/hr)	Controlled Emissions (tons/yr)
CAT 330L Excavator	1	7,280	2.0	0.07	0.14	0.26	Wetting	95%	0.007	0.013
Other Excavators	1	7,280	2.0	0.07	0.14	0.26	Wetting	95%	0.007	0.013
CAT 12 G Motor Grader	1	7,280	2.0	0.07	0.14	0.26	Wetting	95%	0.007	0.013
CAT D611 Bulldozer	1	7,280	2.0	0.07	0.14	0.26	Wetting	95%	0.007	0.013
CASE 580 Rubber Tire Back Hoe	1	7,280	2.0	0.07	0.14	0.26	Wetting	95%	0.007	0.013
CAT 963 Loader	1	7,280	2.0	0.07	0.14	0.26	Wetting	95%	0.007	0.013
Totals	6	43,680			**0.84**	**1.53**			**0.042**	**0.08**

PM, PM-10 and $PM_{2.5}$ Emissions from Upper Ash Pond Operations
Dominion Chesterfield CCR Project

Equipment utilization rate:		2.0	mph
	x	10	hrs/day
	x	7	days/wk
	x	52	wks/yr
	=	**7,280**	**VMT/yr**

PM Emissions

Equipment	Number of Units	VMT/yr	Speed (mph)	Emission Factor (lbs/VMT)	Uncontrolled Emissions (lbs/hr)	Uncontrolled Emissions (tons/yr)	Control Equipment	Control Efficiency	Controlled Emissions (lb/hr)	Controlled Emissions (tons/yr)
CAT 330L Excavator	2	14,560	2.0	0.23	0.45	1.65	Wetting	95%	0.02	0.082
Other Excavators	2	14,560	2.0	0.23	0.45	1.65	Wetting	95%	0.02	0.082
Compactors/Graders	2	14,560	2.0	0.23	0.45	1.65	Wetting	95%	0.02	0.082
CAT D6 Bulldozer	8	58,240	2.0	0.23	0.45	6.59	Wetting	95%	0.02	0.329
Miscellaneous	1	7,280	2.0	0.23	0.45	0.82	Wetting	95%	0.02	0.041
CAT 963 Loader	2	14,560	2.0	0.23	0.45	1.65	Wetting	95%	0.02	0.082
Totals	17	123,760			**2.72**	**14.00**			**0.14**	**0.70**

PM-10 Emissions

Equipment	Number of Units	VMT/yr	Speed (mph)	Emission Factor (lbs/VMT)	Uncontrolled Emissions (lbs/hr)	Uncontrolled Emissions (tons/yr)	Control Equipment	Control Efficiency	Controlled Emissions (lb/hr)	Controlled Emissions (tons/yr)
CAT 330L Excavator	2	14,560	2.0	0.12	0.24	0.89	Wetting	95%	0.01	0.045
Other Excavators	2	14,560	2.0	0.12	0.24	0.89	Wetting	95%	0.01	0.045
Compactors/Graders	2	14,560	2.0	0.12	0.24	0.89	Wetting	95%	0.01	0.045
CAT D6 Bulldozer	8	58,240	2.0	0.12	0.24	3.56	Wetting	95%	0.01	0.178
Miscellaneous	1	7,280	2.0	0.12	0.24	0.45	Wetting	95%	0.01	0.022
CAT 963 Loader	2	14,560	2.0	0.12	0.24	0.89	Wetting	95%	0.01	0.045
Totals	17	123,760			**1.47**	**7.57**			**0.07**	**0.38**

$PM_{2.5}$ Emissions

Equipment	Number of Units	VMT/yr	Speed (mph)	Emission Factor (lbs/VMT)	Uncontrolled Emissions (lbs/hr)	Uncontrolled Emissions (tons/yr)	Control Equipment	Control Efficiency	Controlled Emissions (lb/hr)	Controlled Emissions (tons/yr)
CAT 330L Excavator	2	14,560	2.0	0.07	0.14	0.51	Wetting	95%	0.01	0.026
Other Excavators	2	14,560	2.0	0.07	0.14	0.51	Wetting	95%	0.01	0.026
Compactors/Graders	2	14,560	2.0	0.07	0.14	0.51	Wetting	95%	0.01	0.026
CAT D6 Bulldozer	8	58,240	2.0	0.07	0.14	2.04	Wetting	95%	0.01	0.102
Miscellaneous	1	7,280	2.0	0.07	0.14	0.26	Wetting	95%	0.01	0.013
CAT 963 Loader	2	14,560	2.0	0.07	0.14	0.51	Wetting	95%	0.01	0.026
Totals	17	123,760			**0.84**	**4.34**			**0.042**	**0.22**

Appendix C Background Concentration Monitor Support Data

C1. Introduction

In order to complete the PSD modeling analyses, background concentrations for CO, $PM_{2.5}$, and Ozone were needed. The following monitors were reviewed for this data.

C2. Background CO Monitor

The Arlington County Aurora Hills Visitor Center CO monitor was selected as a conservatively representative and appropriate background monitor to represent CO background concentrations for the Project. The Arlington County monitor has the highest design value for CO in the state of Virginia and the CO emissions density and population in Arlington County are greater than in Chesterfield County. Table C-3 provides the CO background concentration.

C3. Background $PM_{2.5}$ Monitor

The Charles City County Shirley Plantation $PM_{2.5}$ monitor was selected as a conservatively representative and appropriate background monitor to represent $PM_{2.5}$ background concentrations for the Project. It is the closest monitor to the Project at approximately 8 miles east-southeast along the James River. The monitor is located directly downwind from Hopewell and as a result captures the heavy industrial impact of that area. Table C-3 provides the $PM_{2.5}$ background concentration.

C4. Background Ozone Monitor

The Charles City County Shirley Plantation ozone monitor was selected as a conservatively representative and appropriate background monitor to represent ozone background concentrations for the Project. It is the closest monitor to the Project at approximately 8 miles east-southeast along the James River. The monitor is located directly downwind from Hopewell and as a result captures the heavy industrial impact of that area. Table C-3 provides the ozone background concentration.

C5. Additional Considerations

These monitor selections are supported by consideration of the population density and the countywide emissions as follows.

C5.1 Population Density

The Project is to be located in eastern Chesterfield County, approximately 6 km northeast of the nearest census designated place (CDP) called Chester, Virginia. The population of Chester was compared to the population of the location of the monitor station or the nearest city where the proposed monitor stations are located. Table C-1 presents a comparison of population data for Chester, Arlington County, and the City of Hopewell, Virginia. As shown on Table C-1, the population size of Chester is similar to Hopewell, and smaller than the population size of Arlington County.

Air emissions associated with population density (e.g., automobile traffic) and corresponding ambient air concentrations monitored by the stations will be similar to or greater than emissions associated with population density expected to exist near the Project. Therefore, each proposed monitoring station offers a conservative estimate for emissions associated with population density.

Table C-1. Population Comparison Analysis

Location	Pollutant	Nearby City	County	City Population Estimate for Year 2020
Project Site		Chester	Chesterfield	23,414
Auro Hills Visitor Center	CO	Alexandria	Arlington	159,467
Shirley Plantation	$PM_{2.5}$, Ozone	Hopewell	Independent City	23,033

Source: https://www.census.gov/quickfacts/
Source: ECT, 2025.

C5.2 Countywide and Stationary Source Emission

Air emissions rate data for each of the counties or city of interest were obtained from EPA's National Emissions Inventory (NEI) Database through EPA's Air Emissions Inventories (https://www.epa.gov/air-emissions-inventories). The emission sources in the NEI are consolidated into four data categories: point source, nonpoint, on road mobile, and nonroad mobile emissions for 2020. Table C-2 summarizes total air emissions for each county for the pollutants of concern (CO, $PM_{2.5}$, and VOC (Ozone)). An emissions density value (ton per square mile [T/mi^2]) was calculated to assist in the comparison. For the Shirly Plantation monitor site, the emissions from the City of Hopewell were used to calculate the emissions density value as the monitoring site is located directly north of Hopewell and was sited to capture emissions, including those associated with industry, from that area.

Table C-2. Comparison of Emissions

Location	Pollutant	County	County Area (mi^2)	CO		$PM_{2.5}$		VOC (Ozone)	
				tpy	T/mi^2	tpy	T/mi^2	tpy	T/mi^2
CERC	—	Chesterfield	424	33,948	80.07	2273	5.36	14,682	34.63
Auro Hills Visitor Center	CO	Arlington	26	9,834	378.23	--	--	--	--
Shirley Plantation	$PM_{2.5}$, VOC (Ozone)	Hopewell	11	--	--	449	40.82	2,154	195.82

Note: mi^2 = square mile.
T/mi^2 = ton per square mile.
tpy = ton per year.
*Filterable and condensable
Source: ECT, 2025.

C6. Summary

For the PSD analyses, background data from the monitoring site in Arlington County (Aurora Hills Visitor Center - ID 51-013-0020) for CO and in Charles City County (Shirley Plantation - ID 51-036-0002) from $PM_{2.5}$ and Ozone were selected.

Table C-3 provides a summary of the 2022-2024 background values for each monitor.

Table C-3. Representative Monitors Concentration Values

Pollutant	Monitor Name	Monitor ID	Background Monitor Concentration (μg/m³)			
			1-Hour	8-Hour	24-hour	Annual
CO	Aurora Hills Visitor Center	51-013-0020	1,610	1,380	--	--
$PM_{2.5}$	Shirley Plantation	51-036-0002	--	--	11.5	5.8
Ozone	Shirley Plantation	51-036-0002	--	0.058 (ppm)	--	--

Source: ECT, 2025.

Appendix D PSD Air Quality Impact Analysis Modeling Protocol and VDEQ Approval

From: Lute, Robert (DEQ)
To: Thomas R Andrake (Services - 6); Kyle, James (DEQ)
Cc: Sinclair, Alison (DEQ); Jason P Ericson (Services - 6); Todd M Alonzo (Services - 6); Molly A Parker (Services - 6); Robert W Sauer (DEV Generation - 3); Bryan T Nichols (Services - 6)
Subject: [EXTERNAL] Re: PSD Modeling Protocol - CERC
Date: Thursday, January 30, 2025 11:57:57 AM
Attachments: image001.png
image002.png
Outlook-210mqkvp.png
Outlook-suhpmxar.png

T.R.,

We have no additional comments on the protocol.

Regards,
Bobby

Robert Lute
Air Quality Modeler, Office of Air Quality Assessments
Virginia Department of Environmental Quality
[deq.virginia.gov]
1111 East Main St., Suite 1400
Richmond, VA 23219
(804) 718-9970

From: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>
Sent: Friday, January 24, 2025 5:47 AM
To: Thomas.R.Andrake@dominionenergy.com <Thomas.R.Andrake@dominionenergy.com>; Kyle, James (DEQ) <james.kyle@deq.virginia.gov>
Cc: Sinclair, Alison (DEQ) <alison.sinclair@deq.virginia.gov>; jason.p.ericson@dominionenergy.com <jason.p.ericson@dominionenergy.com>; Todd.M.Alonzo@dominionenergy.com <Todd.M.Alonzo@dominionenergy.com>; Molly Parker <molly.a.parker@dominionenergy.com>; robert.w.sauer@dominionenergy.com <robert.w.sauer@dominionenergy.com>; Bryan.T.Nichols@dominionenergy.com <Bryan.T.Nichols@dominionenergy.com>
Subject: Re: PSD Modeling Protocol - CERC

Thank you, T.R. We will review it as soon as possible.

Bobby

Robert Lute
Air Quality Modeler, Office of Air Quality Assessments
[Virginia Department of Environmental Quality [deq.virginia.gov]]
1111 East Main St., Suite 1400
Richmond, VA 23219
(804) 718-9970

From: Thomas.R.Andrake@dominionenergy.com <Thomas.R.Andrake@dominionenergy.com>
Sent: Thursday, January 23, 2025 3:24 PM
To: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>; Kyle, James (DEQ) <james.kyle@deq.virginia.gov>
Cc: Sinclair, Alison (DEQ) <alison.sinclair@deq.virginia.gov>; jason.p.ericson@dominionenergy.com <jason.p.ericson@dominionenergy.com>; Todd.M.Alonzo@dominionenergy.com <Todd.M.Alonzo@dominionenergy.com>; Molly Parker <molly.a.parker@dominionenergy.com>; robert.w.sauer@dominionenergy.com <robert.w.sauer@dominionenergy.com>; Bryan.T.Nichols@dominionenergy.com <Bryan.T.Nichols@dominionenergy.com>
Subject: RE: PSD Modeling Protocol - CERC

Mr. Kyle:

Pleased find attached the revision to the PSD air quality impact analysis modeling protocol for the Chesterfield Energy Reliability Center addressing the comments received on January 17, 2025. If you have any questions regarding this submittal, please do not hesitate to contact me at (804) 839-2760 or via email at Thomas.R.Andrake@dominionenergy.com.

Regards,

T.R. Andrake
Environmental Technical Advisor
Dominion Energy Services, Inc.
DE E&S – Corporate Air Programs
(804) 839-2760
Thomas.R.Andrake@dominionenergy.com

From: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>

Sent: Friday, January 17, 2025 11:56 AM
To: Thomas R Andrake (Services - 6) <Thomas.R.Andrake@dominionenergy.com>; Kyle, James (DEQ) <james.kyle@deq.virginia.gov>
Cc: Sinclair, Alison (DEQ) <alison.sinclair@deq.virginia.gov>; Jason P Ericson (Services - 6) <jason.p.ericson@dominionenergy.com>; Todd M Alonzo (Services - 6) <Todd.M.Alonzo@dominionenergy.com>; Molly A Parker (Services - 6) <molly.a.parker@dominionenergy.com>; Robert W Sauer (DEV Generation - 3) <robert.w.sauer@dominionenergy.com>; Bryan T Nichols (Services - 6) <Bryan.T.Nichols@dominionenergy.com>
Subject: [EXTERNAL] Re: PSD Modeling Protocol - CERC

T.R.,

Attached are our comments on the modeling protocol. Please let me know if you have any questions.

Thanks.
Bobby

Robert Lute
Air Quality Modeler, Office of Air Quality Assessments
Virginia Department of Environmental Quality [deq.virginia.gov]
1111 East Main St., Suite 1400
Richmond, VA 23219
(804) 718-9970

From: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>
Sent: Tuesday, December 31, 2024 6:59 AM
To: Thomas.R.Andrake@dominionenergy.com <Thomas.R.Andrake@dominionenergy.com>; Kyle, James (DEQ) <james.kyle@deq.virginia.gov>
Cc: Sinclair, Alison (DEQ) <alison.sinclair@deq.virginia.gov>; jason.p.ericson@dominionenergy.com <jason.p.ericson@dominionenergy.com>; Todd.M.Alonzo@dominionenergy.com <Todd.M.Alonzo@dominionenergy.com>; Molly Parker <molly.a.parker@dominionenergy.com>; robert.w.sauer@dominionenergy.com <robert.w.sauer@dominionenergy.com>; Bryan.T.Nichols@dominionenergy.com <Bryan.T.Nichols@dominionenergy.com>
Subject: Re: PSD Modeling Protocol - CERC

Thanks for the submittal. We will review as soon as possible.

Bobby

Robert Lute
Air Quality Modeler, Office of Air Quality Assessments
Virginia Department of Environmental Quality [deq.virginia.gov]
1111 East Main St., Suite 1400
Richmond, VA 23219
(804) 718-9970

From: Thomas.R.Andrake@dominionenergy.com <Thomas.R.Andrake@dominionenergy.com>
Sent: Monday, December 30, 2024 11:11 AM
To: Kyle, James (DEQ) <james.kyle@deq.virginia.gov>
Cc: Sinclair, Alison (DEQ) <alison.sinclair@deq.virginia.gov>; Lute, Robert (DEQ) <robert.lute@deq.virginia.gov>; jason.p.ericson@dominionenergy.com <jason.p.ericson@dominionenergy.com>; Todd.M.Alonzo@dominionenergy.com <Todd.M.Alonzo@dominionenergy.com>; Molly Parker <molly.a.parker@dominionenergy.com>; robert.w.sauer@dominionenergy.com <robert.w.sauer@dominionenergy.com>; Bryan.T.Nichols@dominionenergy.com <Bryan.T.Nichols@dominionenergy.com>
Subject: PSD Modeling Protocol - CERC

Mr. Kyle:

Pleased find attached the Prevention of Significant Deterioration (PSD) air quality impact analysis modeling protocol for the Chesterfield Energy Reliability Center. If you have any questions regarding this submittal, please do not hesitate to contact me at (804) 839-2760 or via email at Thomas.R.Andrake@dominionenergy.com.

Regards

T.R. Andrake
Environmental Technical Advisor
Dominion Energy Services, Inc.
DE E&S – Corporate Air Programs
120 Tredegar Street, Clearinghouse Building, 4th Floor
Richmond, VA 23219
(804) 839-2760

Thomas.R.Andrake@dominionenergy.com

CONFIDENTIALITY NOTICE: This electronic message contains information which may be legally confidential and or privileged and does not in any case represent a firm ENERGY COMMODITY bid or offer relating thereto which binds the sender without an additional express written confirmation to that effect. The information is intended solely for the individual or entity named above and access by anyone else is unauthorized. If you are not the intended recipient, any disclosure, copying, distribution, or use of the contents of this information is prohibited and may be unlawful. If you have received this electronic transmission in error, please reply immediately to the sender that you have received the message in error, and delete it. Thank you.

Dominion Energy Services, Inc.
120 Tredegar Street
Richmond, VA 23219
DominionEnergy.com

BY ELECTRONIC MAIL
James.Kyle@deq.virginia.gov

January 23, 2025

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

RE: Virginia Electric & Power Company d/b/a Dominion Energy
Chesterfield Energy Reliability Center (Reg. No. 50396)
Air Quality Impact Analysis Modeling Protocol - Revision 1

Dear Mr. Kyle:

Virginia Electric and Power Company d/b/a Dominion Energy is pleased to submit a revised "PSD Air Quality Impact Analysis Modeling Protocol for the Chesterfield Energy Reliability Center" ("Protocol"), addressing the comments received from the Department on January 17, 2025. For simplicity, the comments are repeated below followed by our responses, which have been incorporated into the enclosed revised Protocol.

2.3.2.2 Combustion Turbine Startup/Shutdown Emissions

1. **Comment:** The August 1, 2023, permit application submittal states 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 H2 fuel blend."* It would be helpful to include this information in this section to avoid any speculation about the possibility of using the H2 fuel blend for startup. Also, a statement comparing the shutdown emissions for the H2 fuel blend to the natural gas SUSD emissions would be beneficial.

   Response: The above referenced sentences from the permit application have been added to the modeling protocol along with the statement regarding comparing shutdown emissions for the H2 fuel blend to the natural gas shutdown emissions.

2. **Comment:** The following statement is confusing since Table 2-3 shows the CO and PM-2.5 emissions per event during startup/shutdown are higher on fuel oil than natural gas and therefore, would require modeling of the fuel oil startup/shutdown emissions. Please clarify.

   "Emissions during SCCT startup and shutdown periods are expected to be equal to or less than the NG emissions, therefore only the NG SUSD emission will be modeled."

Response: The sentence referenced was in relation to H_2 blend, not fuel oil. Modeling will be performed on fuel oil startup/shutdown emissions (see Table 2-3). The units will not startup on an H_2 blend. The sentence has been revised to address H_2 blend and now reads as follows:

"Emissions during SCCT shutdown periods on H_2 blend are expected to be equal to or less than the shutdown emissions when operating on NG, therefore only the NG SUSD emission will be modeled to address H_2 blend."

3.2.2.1 Normal Operation

3. **Comment:** This section contains the following statement:

   "GE performance data was provided with a stack height of 150 feet, however a conservative stack height of 125 feet will be used for the air dispersion modeling analyses."

   In addition, Tables 3-1 and 3-2 also show a stack heigh of 125 feet. However, the August 1, 2023, permit application submittal indicates a stack height of 150 feet for each turbine. Please be sure the modeled stack heights match the permit application.

   Response: The stack height in the Protocol is correct and the permit application will be revised as part of the final submittal to reflect a stack height of 125 feet.

3.2.2.2 Startup/Shutdown Operation

4. **Comment:** This section states the "normal operation stack" for the turbine is *"its worst-case load identified in the load analysis runs for the balance of the averaging period when it is not in startup mode."* The "normal operation stack" PM-2.5 emission rate for fuel oil presented in Table 3-4 is based on 44.8 lb/hr per the calculations in Appendix B. However, the worst-case fuel oil PM-2.5 emission rate is 45 lb/hr (70% operating load). Please explain this discrepancy.

   Response: Completion of the load analysis will inform identification of the "normal operations stack" parameters for inclusion in the startup and shutdown analysis. The parameters provided in the protocol were based on 100% load as an example. The worst-case load for each pollutant may not be the 100% load. The sentence has been revised and now reads as follows:

   "For the "normal operation stack", the CT will be at its worst-case load identified in the load analysis runs for the balance of the averaging period when it is not in startup mode. For example, Tables 3-3 and 3-4 summarize the short-term average emissions rates at 100% load for each pollutant for all startup scenarios and included in Appendix B."

3.8.2 Class I PSD Increment Analysis

5. **Comment:** The Class I PM-2.5 24-hour and annual increments are technically 2 µg/m^3 and 1 µg/m^3, respectively, not 2.0 µg/m^3 and 1.0 µg/m^3. Please update Table 3-11.

   Response: Table 3-11 has been updated as requested.

4.1 Class II Area Visible Plume Analysis

6. **Comment:** Please revise this section to indicate the background visual range of 25 kilometers will be used in the Level 1 analysis. If a Level 2 analysis is required, please contact the DEQ modeling staff to discuss appropriate inputs.

   Response: The text has been revised such that the 25 kilometers background visual range will only be used in the level 1 analysis. Additional text has been added to clarify that if a Level 2 analysis is required, DEQ modeling staff will be contacted to discuss appropriate inputs.

General Comments

7. **Comment:** Operational restrictions specified throughout the protocol may require a permit condition.

   Response: Comment noted.

8. **Comment:** Emission rates and stack parameters presented throughout the protocol are subject to DEQ Piedmont Regional Office (PRO) approval. Please be certain the modeled emission rates and stack parameters match the permit application. The DEQ modeling staff will be verifying this data against the permit application. Any changes to these rates or parameters may require a reanalysis of air quality impacts.

   Response: Comment noted.

9. **Comment:** A complete copy of all modeling correspondence should be sent to the both the DEQ modeling staff and the DEQ regional office contact.

   Response: Comment noted.

Dominion Energy appreciates your continued assistance on this project. 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,

Jason P. Ericson
Director, Environmental Services

cc: Bobby Lute, VDEQ
Alison Sinclair, VDEQ

Enclosure

PSD Air Quality Impact Analysis Modeling Protocol for the Chesterfield Energy Reliability Center

January 2025
ECT No. 230413-0800

Revision 1

VIRGINIA ELECTRIC AND POWER COMPANY
Chesterfield County, Virginia

ECT
7208 Falls of Neuse Road, Suite 102
Raleigh, North Carolina 27615-3244
www.ectinc.com

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:

Joshua Ralph	Thomas Pritcher
Author	Peer Review
Joshua Ralph	Thomas Pritcher
Signature	Signature
January 22, 2025	January 22, 2025
Date	Date

Table of Contents

Appendices

List of Tables

List of Figures

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
AMS	American Meteorological Society
BEEST	Providence Engineering and Environmental Group, LLC, BEEST suite
Bhp	brake-horsepower
BPIP	Building Profile Input Program
BPIPPRM	BPIP for PRIME
CAQT	Critical Air Quality Threshold
CERC	Chesterfield Energy Reliability Center
CFR	Code of Federal Regulations
CO	carbon monoxide
CPS	Chesterfield Power Station
CT	Combustion turbine
Dominion	Virginia Electric and Power Company, d/b/a Dominion Energy Virginia (formerly d/b/a Dominion Virginia Power)
DLN	Dry Low NOx
ECT	Environmental Consulting & Technology, Inc.
EPA	U.S. Environmental Protection Agency
Fps	foot per second
Ft	Foot
GAQM	Guideline for Air Quality Models
GCP	Good combustion practice
GeoTIFF	geospatial tagged image file format
GEP	good engineering practice
GHG	Greenhouse gases
H_2SO_4	sulfuric acid
HAP	hazardous air pollutant
HHV	higher heating value
hr/yr	hour per year
Km	Kilometer
kWe	kilowatt-electric
lb/hr	pound per hour
MERP	Modeled Emissions Rate for Precursors
MMBtu/hr	million British thermal units per hour
MRLC	Multi-Resolution Land Characteristics Consortium
MW	Megawatt
NAAQS	national ambient air quality standards
NED	National Elevation Dataset
NEI	National Emissions Inventory

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

NERC	North American Electric Reliability Corporation
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NSR	new source review
PJM	PJM Interconnect
PM	particulate matter
PM_{10}	particulate matter less than or equal to 10 microns
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns
Ppb	part per billion
Ppm	part per million
PRIME	plume rise model enhancements
PSD	prevention of significant deterioration
RTO	Regional Transmission Operator
SCCT	simple-cycle combustion turbine
SCR	selective catalytic reduction
SER	significant emissions rate
SIP	state implementation plan
SO_2	sulfur dioxide
Tpy	ton per year
USGS	U.S. Geological Survey
VAC	Virginia Administrative Code
VDEQ	Virginia Department of Environmental Quality
VOC	volatile organic compound
Workbook	EPA's Workbook for Plume Visual Impact Screening and Analysis

1.0 Introduction

1.1 Project Overview

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 at 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).

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.

An application addressing 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 was submitted August 1, 2023 and updated on July 31, 2024.

1.2 Purpose of the Modeling Protocol

The purpose of this document is to present the proposed methodology for the air dispersion modeling analyses that will be performed in support of the air permit application for the project. The reason for the analyses is to demonstrate that the project will not cause or contribute to air pollution in violation of any national ambient air quality standards (NAAQS) or PSD increments. Modeling methods and assumptions, including model selection and options, meteorological data, and source parameters to be used in the modeling analyses, are presented in this document for review and approval by VDEQ.

1.3 Contents of the Modeling Protocol

This protocol document consists of seven sections. Section 1.0 provides an introductory presentation. Section 2.0 contains a project description, including information regarding the plant's equipment, location, and expected air pollutant emissions. Sections 3.0 through 4.0 present a detailed description of the modeling approach proposed to be used in evaluating air quality impacts of the proposed project, including model selection criteria, good engineering practice (GEP) stack height determination, refined modeling analyses, ambient air quality standards (AAQS) compliance, and additional impacts analyses. Section 5.0 presents a description of the results analysis that will be submitted to VDEQ in support of the PSD permit application. Section 6.0 documents references that were used in preparing this document.

Appendix A contains the site plans of the plant. Appendix B provides a summary of the turbine manufacturer operating cases which includes hourly emission data at various ambient temperatures and loads. Appendix C provides communication from the Federal Land Managers and VDEQ with respect to the Class I Air Quality Related Values (AQRV) analysis.

2.0 Project Description

This section describes several aspects of the proposed project that are relevant for the proposed air quality modeling analysis.

2.1 Project Location

The proposed CERC project will be constructed in Chesterfield County approximately 4 miles northeast of Chester, Virginia, at the existing CPS, which is located at 500 Coxendale Road, as shown in Figure 2-1. The approximate central location of the proposed project is 288,719.92 mE, 4,140,193.24 mN NAD 83 datum and in Zone 18 (37°23'3.98"N, 77°23' 11.25"W). Figure 2-2 presents a topographical map of the site region. Appendix A contains a site plan showing the plant property, adjacent roadways, and source locations.

2.2 Process Description and Major Facility Components

As stated previously, Dominion plans to construct CERC with four SCCTs. The plant will be fueled primarily by 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). The project will also include seven (7) nominally rated 3,500 kilowatt-electric (kWe) emergency generators operating on fuel oil and one (1) nominally rated 18.8 MMBtu/hr natural gas-fired fuel gas heater. The following subsections provide brief descriptions of the major components of the proposed project.

Site

N

0 750 1,500
Feet

Base Layer: Esri Basemap Imagery, 2024

Figure 2-1
Site Location Map

Chesterfield County, Virginia

Date: 9/24/2024

ECT

★ Site

3-km Radius

N

0 1.5 3

Kilometers

Base Layer: USGS Topographic Quad Drewrys Bluff, Chester, Dutch Gap, & Hopewell, 2022

Figure 2-2
Topographic Map

Chesterfield County, Virginia

Date: 9/24/2024

ECT

2.2.1 Simple-cycle Turbine

The proposed project includes the construction and operation of four GE Vernova 7F.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 an H_2 fuel blend.

The SCCTs will operate between two normal operating modes, high load normal operation and low load normal operation. For natural gas-firing, high load normal operation is defined as steady-state operation between 50% and 100% load and low load normal operation is defined as steady-state operation between minimum emission compliance load (MECL) and 50% load. For fuel oil-firing, high load normal operation is defined as steady-state operation between 70% and 100% load and low load normal operation is defined as steady-state operation between MECL and 70% 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. Any operation below the low load normal operating mode is considered either start-up or shutdown mode.

The SCCT annual operating profile will be limited to 3,240 hours per year (hr/yr) of normal operation per turbine, with up to a maximum of 750 hours per year per turbine while combusting fuel oil. Normal operation is considered either high load normal operation or low load normal operation. Normal operation does not include startup or shutdown events. In addition to the normal operation, each SCCT will be capable of 500 startups/shutdowns (SUSD) with up to 120 SUSD while firing fuel oil resulting in an additional approximately 375 hr/yr per SCCT of operation due to SUSD events.

2.2.2 Diesel-fired Emergency Generator

The proposed project will include seven (7) nominally rated 3,500-kWe emergency generators that will be powered by diesel engines operating on fuel oil. Each emergency generator will be operated up to 100 hr/yr for non-emergency operation including maintenance checks and readiness testing. Potential emissions for each emergency generator have been based on operating 500 hours per year based on U.S. Environmental Protection Agency (EPA) and VDEQ guidance.

2.2.3 Fuel Gas Heater

Dominion proposes to utilize one (1) 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.

2.3 Applicable Pollutants

2.3.1 Regulated Pollutant Emissions

As a modification to an existing major PSD source, the total net emissions were compared to the PSD significant emission rates (SERs) to determine which pollutants are subject to PSD review. Based on these potential emissions, the proposed project will be subject to PSD review for CO, $PM_{2.5}$, VOC, and GHG.

Table 2-1 summarizes the total net emissions changes over the contemporaneous period for NO_x, CO, VOC, PM, PM_{10}, $PM_{2.5}$, H_2SO_4, SO_2, 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}, SO_2, and H_2SO_4. As such, the project is not subject to PSD for these pollutants.

Table 2-1. Contemporaneous Netting Analysis

Emission Source Description	Parameters (tpy)								
	NO_x	CO	VOC	PM	PM_{10}	$PM_{2.5}$	SO_2[1]	H_2SO_4	GHG (CO_2e)
Total project emissions	353.28	825.27	162.46	81.96	153.96	153.39	27.81	17.92	2,214,420
Boiler 5 & 6 Shutdown	(453.55)	(165.28)	(19.29)	(277.75)	(221.96)	(43.99)	N/A	(427.97)	(1,700,338)
Pond Closure Project	N/A	N/A	N/A	42.39	12.08	1.49	N/A	N/A	N/A
Beneficial Use Proc. Equip.	3.74	18.41	3.07	4.46	2.48	2.07	N/A	0.02	2,317
Gas Tech Pipeline Heater	3.50	2.94	0.19	0.01	0.02	0.02	N/A	0.02	3,819
Net Emissions Increase	**(93)**	**681**	**146**	**(149)**	**(53)**	**114**	27.81	**(410)**	**520,218**
PSD SER	40	100	40	25	15	10	40	7	75,000
Project Exceeds SER?	No	**Yes**	**Yes**	No	No	**Yes**	No	No	**Yes**

[1] A netting analysis was not performed for SO_2 since emissions from the project itself are less than the PSD SER.

Source: ECT, 2024.

2.3.2 Short-Term Emissions

2.3.2.1 Combustion Turbine Normal Emissions

Although the SCCTs will be capable of operating on a gaseous fuel blend consisting of natural gas with up to 10% hydrogen, all cases with operation on natural gas result in higher emissions than the cases with natural gas with hydrogen. Therefore, only the natural gas and fuel oil scenarios will be modeled. Table 2-2 lists the expected maximum hourly emissions rates of CO and $PM_{2.5}$ from the proposed SCCTs for natural gas and backup fuel oil. The SCCT data shown in Table 2-2 reflects maximum hourly emissions during normal, steady-state operations for the proposed project during normal operations.

Table 2-2. Maximum Hourly Emissions Rates of Criteria Pollutants during normal operation from Each Simple-cycle Turbine (per Turbine)

Pollutant	Maximum Hourly Emissions Rates Natural Gas (lb/hr)*†	Maximum Hourly Emissions Rates Fuel Oil (lb/hr)*†
CO	11.30	11.70
$PM_{2.5}$	19.70	45.00

*Hourly emissions rates/calculations based on vendor information. $PM_{2.5}$ rates are based on natural gas containing 1.0 grain Sulfur/100scf.

†Pollutant emissions rates shown represent maximum emission rate for all proposed operating loads and ambient temperatures.

Source: ECT, 2024.

2.3.2.2 Combustion Turbine Startup/Shutdown Emissions

Short-term emissions during SCCT startup and shutdown periods, especially CO, are generally higher than emissions during normal steady-state operations, as combustion conditions require time to stabilize. 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. Section 3.2.2.2 provides further discussion on development of stack parameters for startup and shutdown operations. Table 2-3 presents the duration of startup and shutdown events in minutes and maximum CT emissions during those periods expressed in pounds per event (lb/event). Emissions during SCCT shutdown periods on H_2 blend are expected to be equal to or less than the shutdown emissions when operating on NG, therefore only the NG SUSD emission will be modeled to address H_2 blend.

Table 2-3. SCCT Startup and Shutdown Durations and Emissions (Per Turbine)

Scenario	CO (lb/event)	$PM_{2.5}$ (lb/event)	Duration (minutes)
Natural Gas			
Startup	366	4	30
Shutdown	152	2	15
Fuel Oil			
Startup	1,036	21	30
Shutdown	246	10	15

Sources: Dominion, 2024.
ECT, 2024.

2.3.2.3 Auxiliary Equipment

Table 2-4 lists the maximum hourly emissions rates from an emergency diesel generator and fuel gas heater.

Table 2-4. Maximum Hourly Emissions Rates of Criteria Pollutants for Auxiliary Equipment (Per Unit)

Equipment	Pollutant (lb/hr)	
	CO	$PM_{2.5}$
Emergency diesel generator*	27.01	1.80
Fuel Gas Heater	0.70	0.13

*Hourly emissions rate/calculation based on vendor information, NSPS and AP-42 emissions factors.

Source: ECT, 2024.

2.3.3 Annual Emissions

Table 2-1 presented potential annual emissions of criteria pollutants from CERC that are subject to PSD review. The potential annual emissions are based on the following:

- Annual emissions for the simple-cycle turbine are based on the worst-case annual emissions assuming each SCCT operates 3,240 hours per year; 2,490 hr/yr on natural gas and 750 hr/yr on fuel oil and includes 500 SUSD events; 380 on natural gas and 120 on fuel oil.
- The emergency diesel generators will be operated for no more than 500 hr/yr per unit of total usage (nonemergency use plus emergency use). Therefore, for modeling associated with these units, modeled emissions rates will be based on 500 hr/yr for annual modeling.
- The 18.8-MMBtu/hr fuel gas heater will operate up to a maximum of 8,760 hr/yr.

2.4 Secondary Source Emissions

In addition to the project source described above, the modeling will include emissions from secondary sources. Although these sources will not be owned and operated by Dominion, they will be constructed to support the project. Specifically, one (1) 4 MMBtu/hr and two (2) 22 MMBtu/hr natural gas fired fuel gas heaters will be installed to support the project. Table 2-5 lists the maximum emissions rates from the secondary sources.

Table 2-5. Secondary Source Emissions

Fuel Gas heater	Emissions		
	CO (lb/hr)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ (tpy)
4 MMBtu/hr	0.15	0.03	0.12
22 MMBtu/hr	0.81	0.15	0.68

Source: ECT, 2024.

3.0 Air Quality Impact Assessment Methodology

The dispersion modeling analyses conducted for this project will adhere to the EPA Guideline on Air Quality Models (GAQM) (40 CFR Part 51, Appendix W) (EPA, 2024), and direction received from VDEQ's Modeling Section. The following subsections present the source data to be modeled, proposed procedure for assessing ambient air impacts from the proposed project's emissions, and standards to which the predicted impacts will be compared.

3.1 Background Discussion

The proposed project will be subject to PSD for the criteria pollutants CO, $PM_{2.5}$, and VOC (ozone) as discussed in Section 2.3; therefore, PSD review and associated air quality analysis will be required for these pollutants. Modeling analyses will be performed for CO and direct $PM_{2.5}$ to demonstrate that the emissions from CERC will not cause or contribute to an exceedance of any NAAQS or PSD increment. Dominion will use EPA's "Guidance on the Development of MERPs as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program" for the secondary $PM_{2.5}$ NAAQS and PSD increment analysis as discussed in Section 3.8.3 and the ozone NAAQS analysis as discussed in Section 3.9.

Based on the current project design, the four CTs are the primary sources of pollutant emissions for the project. Much smaller quantities of criteria pollutants are emitted from the emergency diesel generators, the fuel gas heater, and the secondary source fuel gas heaters.

As will be discussed in the following sections of this protocol, dispersion modeling for this project will be conducted in a manner that uses the CTs' worst-case operating conditions associated with the ambient temperature range for which emissions were evaluated to predict the highest impact for each pollutant and averaging period.

3.2 Source Data

3.2.1 Overall Methodology

The air dispersion modeling analysis will be conducted with emissions rates and flue gas exhaust characteristics (flow rate and temperature) expected to represent the worst-case parameters among the range of possible values for each of the proposed operating scenarios considered for the project. Appendix B provides a summary of all turbine manufacturer operating cases which includes hourly emission data at various ambient temperatures, and loads.

The following subsections present stack parameters and emissions for the CTs, emergency generator and fuel gas heaters.

3.2.2 Simple-Cycle Combustion Turbine

3.2.2.1 __Normal Operation__

Based on current project design parameters, Dominion has applied for a permit that will allow annual operation of 3,240 hours, of which 750 hours may be on fuel oil per turbine. Since turbine emissions rates and flue gas characteristics for a given CT load vary as a function of ambient temperature, data was derived for the following ambient temperatures and load scenarios for the proposed GE CT:

- Natural gas:
  - Five operating loads (100 percent (with and without evaporative cooling), 80 percent, 70 percent, 50 percent, and MECL).
  - Ambient temperatures (107, 98, 59, 29, and -10°F).
- Fuel oil:
  - Four operating loads (100 percent (with and without evaporative cooling), 80 percent, 70 percent, and MECL).
  - Ambient temperatures (107, 98, 59, 29, and -10°F).

For each CT load in the initial modeling, the highest pollutant-specific emissions rate coupled with the lowest exhaust temperature and exhaust flow rate will be selected. If the conservative assumptions need to be refined in additional modeling, Dominion will proceed to that step.

Tables 3-1 and 3-2 summarize worst-case emissions parameters for the GE CT over the five operating loads for natural gas and four operating loads for fuel oil. Appendix B provides a summary of all turbine manufacturer operating cases (including MECL) which includes hourly emission data at various ambient temperatures, and loads. GE performance data was provided with a stack height of 150 feet, however a conservative stack height of 125 feet will be used for the air dispersion modeling analyses.

Table 3-1. Worst-Case Data* for Proposed Natural Gas-Fired Simple-cycle Turbine Operation

Parameter		100%	80%	70%	50%	MECL
Stack height (ft)		125	125	125	125	125
Stack diameter (ft)		24.5	24.5	24.5	24.5	24.5
Exit temperature (°F)		850.0	850.0	850.0	850.0	850.0
Exit velocity (fps)		117.32	99.66	92.43	81.33	67.52
Pollutant emissions per CT (lb/hr)						
	CO	11.30	9.30	8.40	6.90	5.00
	$PM_{2.5}$‡	19.70	16.50	16.40	15.40	14.40

Note: MECL = Minimum Emission Compliance Level

*Table values represent worst-case parameters and emissions rates for each of the five operating loads enveloped across ambient temperatures.

‡ Based on maximum natural gas short-term sulfur content of 1.0 gr S/100 scf

Appendix B provides a summary of all turbine manufacturer operating cases which includes hourly emission data at various ambient temperatures, and loads.

Source: ECT, 2024.

Table 3-2. Worst-Case Data* for Proposed Fuel Oil-Fired GE 7F.05 Simple-cycle Turbine Operation

Parameter		100%	80%	70%	MECL
Stack height (ft)		125	125	125	125
Stack diameter (ft)		24.5	24.5	24.5	24.5
Exit temperature (°F)		850.0	850.0	850.0	850.0
Exit velocity (fps)		127.01	110.83	105.20	94.81
Pollutant emissions per CT (lb/hr)					
	CO	11.70	9.70	8.90	7.40
	$PM_{2.5}$	44.80	44.80	45.00	44.60

*Table values represent worst-case parameters and emissions rates for each of the four operating loads enveloped across ambient temperatures.

Appendix B provides a summary of all turbine manufacturer operating cases which includes hourly emission data at various ambient temperatures, and loads.

Source: ECT, 2024.

3.2.2.2 Startup/Shutdown Operation

Startup/shutdown modeling will be conducted for the short-term pollutants and averaging periods that will have elevated emissions combined with lower plume rise during startup/ shutdown conditions. The pollutants and averaging periods to be evaluated include 1-hour and 8-hour CO and $PM_{2.5}$ 24-hour.

For the startup and shutdown scenarios, two stacks (same stack location) are used in the model to represent each scenario and the associated averaging period. One stack represents the SUSD event, which is less than an hour (30 minutes), and the other stack represents normal operation emissions during the balance of time for the associated averaging period. Emission rates were calculated for each stack (SUSD and Normal operation) and then source grouped to get a total impact for both stacks for the full averaging period. SUSD emissions are based on the SUSD emissions (lb/event) provided by the turbine vendor. Since emissions are higher for startup operations than for shutdown, the more conservative startup cases will be modeled. For the "normal operation stack," the CT will be at its worst-case load identified in the load analysis runs for the balance of the averaging period when it is not in startup mode. For example, Tables 3-3 and 3-4 summarize the short-term average emissions rates at 100% load for each pollutant for all startup scenarios and included in Appendix B.

Table 3-3. Summary of Modeled Stack Parameters and Emissions Rates for Natural Gas- Fired Simple-cycle Turbine

Scenario	Units	Startup			Maximum Base Load		
		1-hour Average Period Parameters	8-hour Average Period Parameters	24-hour Average Period Parameters	1-hour Average Period Parameters	8-hour Average Period Parameters	24-hour Average Period Parameters
Estimated average flow rate*	ACFM	2,681,806	2,681,806	2,681,806	3,592,619	3,592,619	3,592,619
Estimated average stack temperature	°F	850.0	850.0	850.0	850.0	850.0	850.0
CO	lb	366.00	45.75	--	5.65	10.59	--
$PM_{2.5}$	lb	--	--	0.17	--	--	19.29

Note: ACFM = actual cubic feet per minute.
*Estimated flow rates provided by GE.

Source: Dominion, 2023.
ECT, 2024.

Table 3-4. Summary of Modeled Stack Parameters and Emissions Rates for Fuel Oil -Fired Simple-cycle Turbine

Scenario	Units	Startup			Maximum Base Load		
		1-hour Average Period Parameters	8-hour Average Period Parameters	24-hour Average Period Parameters	1-hour Average Period Parameters	8-hour Average Period Parameters	24-hour Average Period Parameters
Estimated average flow rate*	ACFM	2,681,806	2,681,806	2,681,806	3,592,619	3,592,619	3,592,619
Estimated average stack temperature	ºF	850.0	850.0	850.0	850.0	850.0	850.0
CO	lb	1036.00	129.50	--	5.85	10.97	
$PM_{2.5}$	lb	--	--	0.88	--	--	43.87

Note: ACFM = actual cubic feet per minute.
*Estimated flow rates provided by GE.

Source: Dominion, 2023.
ECT, 2024.

3.3 Auxiliary Sources

Since the performance data for the auxiliary equipment are not affected by ambient conditions, only one set of parameters will be modeled (e.g., stack parameters and emissions rates associated with 100-percent load).

The emergency diesel generators are expected to operate under non-emergency conditions no more than 1 hour in a 24 hour period per unit and 100 hr/yr per unit (operability testing) and no more than 500 hr/yr total. Therefore, the modeled short-term emissions (24 hours or less) will be based on operating 1 hour within the averaging period for the assessment of short-term modeled averaging periods. The modeled annual emissions rates will be based on 500 hr/yr for the assessment of annual modeled averaging periods. Table 3-5 provides stack parameters and criteria pollutant emissions rates for the emergency diesel generators.

The fuel gas heater will be in operation any time the turbines are operating on natural gas. The 18.8-MMBtu/hr fuel gas heater is expected to operate up to 8,760 hr/yr. Table 3-5 presents short-term and annual emissions rates.

Table 3-5. Source Parameters and Criteria Pollutant Emissions Rates for Emergency Equipment

Fuel oil-Fired Source	Stack Height (ft)	Stack Diameter (ft)	Exit Temperature (°F)	Exit Velocity (fps)	Emissions			
					CO		$PM_{2.5}$	
					1-Hour (lb/hr)	8-Hour (lb/hr)	24-Hour (lb/hr)	Annual (tpy)
Emergency generators (per unit)	18	2	862.8	479.6	27.01	3.38‡	0.08§	0.45*
Fuel Gas Heater (per stack)	30	2	823.0	12.2	0.35	0.35	0.066	0.29

* Based on 500 hours per year
‡ Emission rate based on operating 1-hour in an 8-hour period
§ Emission rate based on operating 1-hour in a 24-hour period

Source: ECT, 2024.

3.3.1 Secondary Sources

The fuel gas heaters will be in operation any time the turbines are operating on natural gas. Each heater will consist of two burners, with a separate exhaust stack for each burner. The heaters will fire natural gas exclusively and use low-NO_x burners to control NO_x emissions. All three heaters expected to operate up to 8,760 hr/yr. Table 3-6 presents short-term and annual emissions rates.

Table 3-6. Source Parameters and Criteria Pollutant Emissions Rates for Secondary Fuel Gas Heaters (Per Stack)

Fuel Gas Heater	Stack Height (ft)	Stack Diameter (ft)	Exit Temperature (°F)	Exit Velocity (fps)	Emissions			
					CO		$PM_{2.5}$	
					1-Hour (lb/hr)	8-Hour (lb/hr)	24-Hour (lb/hr)	Annual (tpy)
4 -MMBtu/hr	30	1	300.0	8.1	0.074	0.074	0.014	0.061
22 -MMBtu/hr	30	2	823.0	12.2	0.41	0.41	0.077	0.34

Source: ECT, 2024.

3.4 Model Selection

The suitability of an air quality dispersion model for a particular application is dependent on several factors:

- Stack height relative to nearby structures.
- Dispersion environment.
- Local terrain.
- Representative meteorological data.

EPA's GAQM prescribes a set of approved models for regulatory applications for a wide range of source types and dispersion environments. Based on a review of the factors discussed in the following subsections, the latest version of American Meteorological Society (AMS)/EPA Regulatory Model Improvement Committee (AERMIC) model (AERMOD) (24142) is proposed to assess air quality impacts for the project. AERMOD will be run using the most recent version of the Providence Engineering and Environmental Group, LLC, BEEST suite (BEEST), currently Version 12.12, interface for EPA's AERMOD. An equivalency demonstration using the standard EPA version of the AERMOD code and the BEEST version of the AERMOD code provided by the Providence Engineering and Environmental Group, LLC, will be included in the air quality report.

3.5 Meteorological Data for AERMOD

Guidance for air quality modeling recommends the use of one year of onsite meteorological data or five years of representative off-site meteorological data. Dominion is proposing to use meteorological data available from the National Weather Service in this analysis. Surface meteorological data collected at the NWS station at the Richmond International Airport, which is approximately 9 miles NNE from the site, and upper air data from Sterling, Virginia for the period 2019-2023; generated using the most recent version of AERMET (24142) has been acquired from VA DEQ. As part of the preparation of the meteorological data files, the EPA tool, AERSURFACE (24142) was used to determine characteristics required by AERMET based on digitized 2021 land cover data from the National Land Cover Database (NLCD). Table 3-7 summarizes identifying and location information for the Richmond and Sterling stations.

US EPA guidance specifies a completeness requirement of 90% on a quarterly basis. The 90% requirement applies to each of the variables wind direction, wind speed, stability, and temperature and to the joint recovery of wind direction, wind speed, and stability. Table 3-8 summarizes the quarterly joint data completeness by year which shows that for all quarters the data capture is above 90%. A wind rose of the extracted meteorological data provided by VA DEQ is presented in Figure 3-1.

Table 3-7. Meteorological Data Used in Running AERMET

Meteorological Site	Latitude	Longitude	Base Elevation (meters)
Richmond International Airport	37.5115	- 77.3234	50
Sterling Virginia	38.9800	-77.4700	85

Source: ECT, 2024.

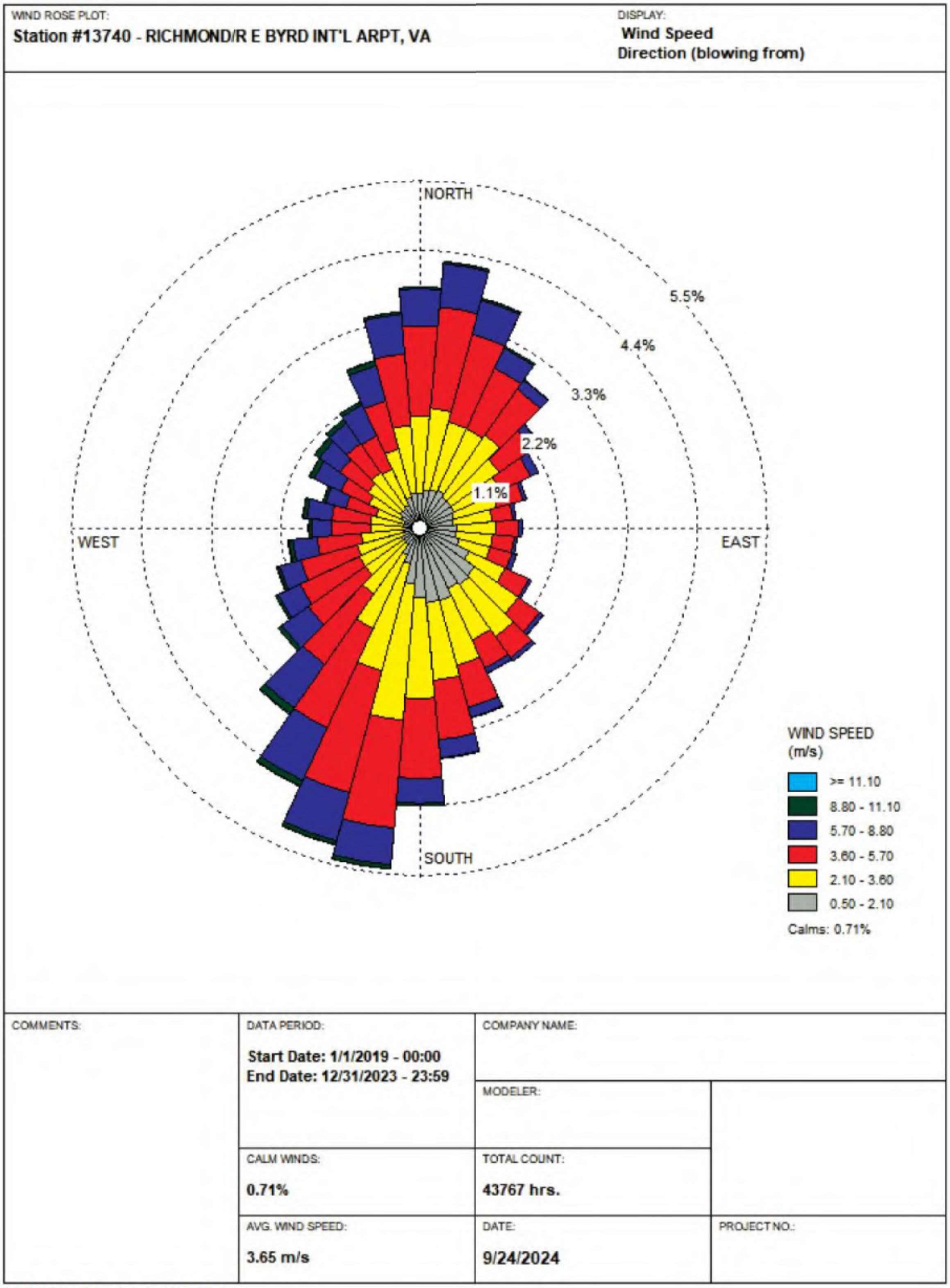
Table 3-8. Meteorological Data Completeness Percentage per Quarter

Quarter*	Year (percent)				
	2019	2020	2021	2022	2023
1	99.95	99.44	98.84	94.49	99.63
2	100.00	99.86	99.63	96.84	99.91
3	99.73	99.41	100.00	99.86	99.82
4	99.95	98.87	98.55	98.87	99.86

*Quarter 1 = Jan, Feb, Mar;
Quarter 2 = April, May, June;
Quarter 3 = July, Aug, Sept; and
Quarter 4 = Oct, Nov, Dec

Source: ECT, 2024.

Figure 3-1. Wind Rose – Richmond International Airport (2019-2023)



WRPLOT View - Lakes Environmental Software

3.6 Good Engineering Practice Stack Height Analysis

The Clean Air Act Amendments of 1990 require the degree of emissions limitation required for control of any pollutant not be affected by a stack height that exceeds GEP or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (40 CFR 51). The stack heights for project emissions sources will comply with EPA stack height regulations.

While the GEP stack height rules address the maximum stack height that can be employed in a dispersion modeling analysis, stacks having heights lower than GEP stack height can potentially result in higher downwind concentrations due to building downwash effects. AERMOD evaluates the effects of building downwash based on the plume rise model enhancements (PRIME) building downwash algorithms. For the project ambient impact analysis, the complex downwash analysis implemented by AERMOD will be performed using the current version of EPA's Building Profile Input Program (BPIP) for PRIME (BPIPPRM) (Version 04274 dated September 30, 2004). The EPA BPIPPRM program will be used to determine the area of influence for each building/structure, whether a particular stack is subject to building downwash, the area of influence for directionally dependent building downwash, and to generate the specific building dimension data required by the model. BPIPPRM output consists of an array of 36 direction-specific (10- to 360-degree) building heights (BUILDHGT keyword), lengths (BUILDLEN keyword), widths (BUILDWID keyword), and along-flow (XBADJ keyword) and across-flow (YBADJ keyword) distances for each stack suitable for use as input to AERMOD.

3.7 Receptor Grid and AERMAP Processing

Receptors will be placed at locations considered to be ambient air, which is defined as "that portion of the atmosphere, external to buildings, to which the general public has access" (40 CFR § 50.1(e)). The entire perimeter of the project site will be fenced. Therefore, the nearest locations of general public access will be at the project fence line.

Consistent with GAQM and VDEQ guidance, the project's ambient impact analysis will use the following receptor grids:

- Fence Line Receptors—Receptors placed on the project fence line spaced 25 meters apart.

- Extra Fine Receptors— Receptors at 50meter spacings starting at the fence line and extending to approximately 1,000 meters.
- Fine Receptors—Receptors at 100meter spacings starting 1,000 meters from the project fence line receptors and extending to approximately 3,000 meters.
- Medium Receptors—Receptors at 250meter spacings starting at 3,000 meters and extending to approximately 10,000 meters.
- Coarse Receptors (***if needed***)—Receptors at 500meter spacings starting at 10,000 meters and extending to approximately 20,000 meters. If receptors are required beyond 20,000 then, receptors at 2,000-meter spacings will be used.

As per the AERMOD terrain preprocessing program (AERMAP) (Version 24142) User's Guide, the domain is considered sufficiently large to accommodate all significant nodes such that all terrain features that exceed a 10-percent elevation slope from any given receptor were considered. The "calculate domain" feature of BEEST, an AERMOD system graphical user interface, was used to determine the domain and quads required to ensure all terrain that exceeds the 10-percent slope is included.

Receptor grids used for the ambient impact analysis will be refined following preliminary modeling, as necessary, to ensure the highest ambient impacts for each pollutant and averaging period have been identified using a receptor spacing of no more than 50 meters.

Terrain elevations at each of the receptor points will be specified by importing NED geospatial tagged image file format (GeoTIFF) terrain data files covering the modeling domain into the BEEST interface. The 1/3 arc-second (10-meter spatial resolution) NED elevation GeoTIFF files are obtained for the modeling domain from the National Map Viewer website (https://apps.nationalmap.gov/downloader/#/). The receptor grid used in the modeling analysis will be based on NAD 83 datum and in Zone 18.

3.8 PSD Modeling Analyses

A refined modeling analysis for CO and $PM_{2.5}$ will be conducted using AERMOD (Version 24142). The analysis will be conducted to demonstrate compliance with NAAQS and PSD increments.

3.8.1 NAAQS and Class II Area PSD Increments

The impacts to be compared against the NAAQS and PSD increments would include the sum of the following:

- Modeled impacts attributable to the project.
- Modeled impacts from nearby sources.
- Calculated impacts from secondary emissions (i.e., NOx and SO_2 for $PM_{2.5}$) addressed in Section 3.8.3
- Representative ambient background concentration (NAAQS only).

Impacts attributable to the project and nearby sources will be estimated using AERMOD.

An inventory of nearby sources will be obtained from DEQ for each pollutant that will be consistent with GAQM. Two classes of facilities will be included. For the evaluation of PSD increments, only sources that have been designated by DEQ as PSD increment-consuming sources will be included. Also, any sources that expand PSD increment could be included in the analysis but will require a discussion with DEQ modeling staff prior to conducting the analysis. For the evaluation of NAAQS, all sources of the applicable pollutant will be evaluated for potential inclusion into the modeled NAAQS inventory.

For the NAAQS analysis, a conservative background concentration will be added to modeled design short-term and annual impacts to determine compliance. Secondary $PM_{2.5}$ emissions from the nearby sources are presumed to be included in the background concentrations. Section 3.10 provides more detail on the use of representative monitored ambient background concentrations.

The modeled concentrations for the PSD increment and NAAQS compliance modeling will be calculated based on guidance from VDEQ and the applicable form of the NAAQS or PSD increment as appropriate.

Tables 3-9 and 3-10 present the standards.

Table 3-9. Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Form (Design)
CO	1-hour	40,000	Not to be exceeded more than once per year
	8-hour	10,000	Not to be exceeded more than once per year
$PM_{2.5}$	24-hour	35	98th percentile; not to be exceeded as averaged over 3 years
	Annual	9	Annual mean never to be exceeded as averaged over 3 years

Sources: 9VAC5-30.
40 CFR 50.

Table 3-10. PSD Increments

Pollutant	Averaging Period	Class II PSD ($\mu g/m^3$)	Form (Design)
$PM_{2.5}$	24-hour	9	Not to be exceeded more than once per year
	Annual	4	Annual mean never to be exceeded

Sources: 9VAC5-80-1635.
75 Federal Register 64864 (Oct. 20, 2010).

3.8.2 Class I PSD Increment Analysis

For the Class I area PSD increment analyses, receptors, placed on 1-degree radials at 50 km from the Project, will serve as a conservative check on the predicted pollutant concentrations at the Class I area. Table 3-11 presents the PSD Class I area Increment.

Table 3-11. Criteria Pollutant Class I Increment

Pollutant	Averaging Time ($\mu g/m^3$)	
	24-hour	Annual
$PM_{2.5}$	2	1

Source: ECT, 2024.

3.8.3 Secondary $PM_{2.5}$

Secondary $PM_{2.5}$ is formed from gaseous emissions of NO_x and SO_2. These gases can form fine particulates through chemical reactions in the atmosphere. EPA has issued *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone*

and $PM_{2.5}$ under the PSD Permitting Program (April 2024). The Guidance provides a Tier 1 demonstration tool for $PM_{2.5}$ PSD sources in a $PM_{2.5}$ attainment or unclassifiable area.
The secondary impacts for $PM_{2.5}$ on a daily and annual basis in Class II areas will be calculated in accordance with the Tier 1 assessment in the Guidance memo and based on guidance provided by VDEQ. The appropriate MERP values for NO_x and SO_2 will be obtained from the EPA MERPs View Qlik website (https://www.epa.gov/scram/merps-view-qlik) and their impacts calculated using the equation below. The results for NO_x and SO_2 will then be summed to calculate a total impact that will be added to modeled impacts from the direct $PM_{2.5}$ emissions.

$$Project\ Air\ Quality\ Impact\ (\mu g/m3) = Project\ emissions\ (tpy)\ x\ (\frac{hypothetical\ source\ modeled\ impact\ (\mu g/m3)}{hypothetical\ source\ emissions\ (tpy)})$$

For the Class I PSD increment analysis, following EPA's Guidance, the MERPs may be adjusted to account for the distance from CERC to the Class I areas. As EPA explains in the Guidance, the MERPs represent the maximum impact within 50 km of the source and impacts at greater distances would be less. The distance between the closest Class I area (Shenandoah National Park) and CERC is approximately 144 km. Dominion will use the MERPs for the Class I PSD increment analysis obtained from EPA's MERPs View Qlik website at a distance of 140 km.

3.9 Ozone NAAQS Analysis

Table 3-12. Presents the Ozone NAAQS

Pollutant	Averaging Period	NAAQS (ppm)	Form (Design)
Ozone	8-hour	0.070	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years

Sources: 9VAC5-30.
40 CFR 50.

Dominion proposes to use EPA's *Guidance on the Development of MERPs as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program* to evaluate the project's NOx and VOC emissions impacts on ozone. EPA has generated empirical relationships between single sources and ozone impacts for hundreds of hypothetical sources that vary in stack height, emission rate, and geographic location. The MERPs VIEW Qlik provides easy access to EPA's hypothetical single source modeled impacts of ozone and these values will be used in the following equation to estimate the total ozone impacts from CERC.

$$Project\ Air\ Quality\ Impact\ (ppb) = Project\ emissions\ (tpy)\ x\ (\frac{MERP\ (\text{ppb})}{hypothetical\ source\ emissions\ (tpy)})$$

3.10 Background Air Quality Concentrations

Appropriately representative background concentrations of CO, $PM_{2.5}$, and Ozone will be used to characterize existing air quality in the region of the Project. These background concentrations will also be added to the relevant model design values for CO, $PM_{2.5}$, and Ozone for comparison to the NAAQS. The Project will use representative background concentration values provided by VA DEQ from the existing air quality monitoring network.

4.0 Additional Impact Analysis

In accordance with 9VAC5-80-1755, additional impacts must be addressed for projects subject to PSD review. The various components of the additional impact analyses are discussed in the following subsections.

4.1 Class II Area Visible Plume Analysis

There is a requirement, as part of the PSD additional impacts analysis, for a visibility analysis to be performed within the area affected by the facility. In that regard, VDEQ will be consulted to identify a nearby state park or other sensitive area in the project vicinity for which a visible plume analysis will be conducted.

If a nearby state park or other sensitive area is identified by VDEQ or the applicant only then will the visible plume analysis be conducted with the most current version of EPA's screening model, VISCREEN, to determine if project emissions during normal operations have the potential to cause visibility impairment. VISCREEN will be applied with guidance provided in EPA's Workbook for Plume Visual Impact Screening and Analysis (1992) (Workbook). As such, the VISCREEN model will be applied to estimate two visual impact parameters, plume perceptibility (ΔE) and plume contrast (Cp). Screening-level guidance indicates values above 2.0 for ΔE and +/-0.05 for Cp are considered perceptible. The Workbook offers two levels of screening analysis. Level 1 is the most simplified and conservative approach, employing default meteorological data with no site-specific conditions. Level 2 takes into account representative meteorological data and site-specific conditions. According to Figure 9 in the Workbook, the background visual range recommended for the project area is 25 km. This background visual range will be used for the Level 1 screening analysis. If a Level 2 analysis is required, DEQ modeling staff will be contacted for appropriate inputs.

Initially, a Level 1 analysis will be conducted, and if the VISCREEN results are less than ΔE and Cp screening values, no further analysis will be required. If necessary, a Level 2 analysis will be conducted in accordance with the recommendations in the Workbook.

4.2 Associated Growth Analysis

Project impacts attributed to associated growth will evaluate, in qualitative terms, potential air quality impacts resulting from project construction, increase in vehicle miles traveled resulting from project construction and operation, and any secondary growth. An evaluation of the change in regional air quality due to growth will also be provided.

4.3 Vegetation and Soils Impact Analysis

The vegetation and soils impact analysis will be conducted by comparing projected ambient concentrations for the pollutants of concern with applicable susceptibility data from air pollution literature. For most types of vegetation and soils, ambient air concentrations of criteria pollutants below the secondary NAAQS will not result in harmful effects. If sensitive vegetation is determined to be present based on a review of available databases, a more extensive assessment of potential adverse effects will be conducted.

4.4 Class I AQRV Analysis

A Class I air quality related value (AQRV) analysis (including visibility) is not being requested for this Project. Appendix C contains communications from the Federal Land Managers and VDEQ regarding their intentions not to request an AQRV analysis or comment any further on the permitting of this proposed Project.

5.0 Submittal of Analysis Results

The findings of the air quality impact analyses will be submitted to VDEQ in a formal report for review and approval. The report will address the following:

- Source Data—Source data required for evaluation of project impacts will be provided, including criteria pollutant emissions rates and stack exhaust parameters.
- Choice of Models—The chosen models, including version numbers and selected options, will be discussed.
- Receptor Data—A plot of the receptor grid used in the AERMOD analysis will be provided with the final application document.
- Meteorology—Meteorological conditions used in the analysis will be documented. The use of National Weather Service data from the Richmond International Airport along with upper air data from Sterling, Virginia, will be discussed.
- Modeling Summary—Results of the modeling analyses for all operating scenarios will be documented and summarized.
- NAAQS and PSD Increments—A demonstration that the source will not cause or contribute to violations or exceedances of these standards will be presented and supported in the report in text, tabular, and/or graphical format.
- Additional Impacts—The additional impacts analysis will consist of an analysis of visible plume impacts, a secondary growth analysis, an analysis on impacts of soils and vegetation, and air toxics modeling.
- Model Output and Databases—The model input and output files will be provided to VDEQ. Also, BPIPPRM input and output files will be provided. The final modeling report will also include graphics (e.g., contour maps) that show the extent of air quality impacts for the worst-case year for each pollutant and averaging period for each CT. The figures will use a base map readily understandable by the general public. Each map will clearly identify the proposed plant location relative to these air quality impacts.

6.0 References/Bibliography

U.S. Environmental Protection Agency (EPA). 1985. Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations [Revised]). EPA-450/4-80-023R. Research Triangle Park, North Carolina.

———. 1988. Workbook for Plume Visual Impact Screening and Analysis. EPA-450/4-88-015.

———. 1992. Workbook for Visual Impact Screening and Analysis (Revised). EPA-450/R-92-023.

———. 2024a. Guideline on Air Quality Models (Revised). Codified in 40 CFR 51, Appendix W. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. November.

———. 2024b. User's Guide for the AMS/EPA Regulatory Model (AERMOD). EPA-454/B-24-007 (November 2024). Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

———. 2024c. User's Guide for the AERMOD Meteorological Preprocessor (AERMET). (EPA-454/B-24-004, November 2024). Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

———. 2024d. User's Guide for the AERMOD Terrain Preprocessor (AERMAP). (EPA-454/B-24-008, November 2024). Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

———. 2024e. Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program

———. 2024f. Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program

Appendix A Site Plan

N
CERC PLANT NORTH

NOTES:

1. CERC POWER ISLAND EQUIPMENT BASED ON GE DRAWING SET – IPS1646562-7F05-H35
2. OPTION PRICING UTILITY RACK – PIPE AND CABLE TRAY RACK CONNECTING THE CERC POWER ISLAND TO THE UNIT 7 & 8 TRUCK ENTRANCE. SEE PIPE RACK SECTION DETAIL FOR RACK LOADING AND ROAD CROSSING DETAILS.
3. FOR CLARITY – NOT ALL EXISTING STRUCTURES IN CLOSE PROXIMITY TO THE PROJECT ARE IDENTIFIED.
4. INFORMATION ONLY – NOT IN EPC SCOPE
5. EXISTING UNIT 7 & 8 FUEL OIL FORWARDING PUMPS TO REMAIN. SUCTION PIPING CAN REMAIN UNDISTURBED BUT THE DISCHARGE PIPING SHALL BE RELOCATED TO ACCOMMODATE THE NEW DEMINERALIZED WATER TANK. NEW PIPING CAN BE INSTALLED ON THE NEW PIPE RACK OR OTHER.

LEGEND:

——— EXISTING STRUCTURE TO REMAIN (NOTE 3)

- - - - SETBACK FOR WORK ZONE OR EQUIPMENT REQUIRED SETBACKS

PRELIMINARY NOT FOR CONSTRUCTION
11/05/2024

0 120' 240'
SCALE: 1"=120'

Dominion Energy

REV	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE
F	ISSUED FOR REVIEW	PMD	AC		11/05/2024
E	ISSUED FOR BID	PMD	AC		07/19/2024
D	ISSUED FOR REVIEW	PMD	AC		06/27/2024
C	ISSUED FOR REVIEW	PMD	AC		06/18/2024
B	ISSUED FOR REVIEW	PMD	AC		03/27/2024
A	ISSUED FOR REVIEW	PMD	AC		03/13/2024

DRAWING REVISIONS

Stantec

Stantec Consulting Services Inc.
50 Derby Street, Suite 260
Hingham, MA 02902
Tel. 617.786.7960
Fax. 617.786.7962
www.stantec.com

FILE NAME: 2057318100-M-001-f.dwg

COA #
SEAL

DRAWN: P. DEFAZIO	CHECKED: A. CELLA	IND. REVIEW
DESIGNED: P. DEFAZIO	CHECKED: A. CELLA	APPROVED: A. CELLA
PROJECT NO: 2057318100		SCALE: 1"=120'

CLIENT/PROJECT:
DOMINION ENERGY
CHESTERFIELD ENERGY RELIABILTY CENTER (CERC)
CHESTERFIELD, VIRGINIA

TITLE:
OVERALL SITE PLAN
1000 MW SIMPLE CYCLE PLANT

SHT 1 OF 1 | DWG NO: 2057318100-M-001 | REV: F

Appendix B Turbine Manufacturer Operating Cases

Table B-1: Natural Gas Performance Data

ESTIMATED PERFORMANCE	Units	Case 1	Case 8	Case 2	Case 9	Case 15	Case 3	Case 10	Case 16	Case 21	Case 26
Case Comments											
Load Condition	%	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE
Ambient Temperature	deg F	107	98	107	98	59	107	98	59	29	-10
Ambient Relative Humidity	%	35	43	35	43	60	35	43	60	57	57
Evap. Cooler Status		On	On	On	On	On	Off	Off	Off	Off	Note
Fuel HHV	BTU/lb	23,296	23,296	23,296	23,296	23,296	23,296	23,296	23,296	23,296	23,296
Output	kW	242,533	243,359	227,072	229,536	241,505	201,160	214,073	239,024	247,813	250,000
Heat Rate (HHV)	BTU/kWh	10,016	9,987	10,069	10,075	9,852	10,147	10,068	9,878	9,768	9,781
Heat Cons. (HHV)	MMBTU/hr	2,429	2,430	2,286	2,313	2,379	2,041	2,155	2,361	2,421	2,445
Output - Net	kW	236,076	236,902	220,801	223,265	235,234	194,914	207,827	232,778	241,567	242,466
Heat Rate (HHV) - Net	BTU/kWh	10,291	10,260	10,355	10,358	10,116	10,472	10,370	10,143	10,021	10,085
Exhaust Energy	MMBTU/hr	1269.2	1277.1	1244	1264.6	1297	1134.8	1193.7	1295.7	1321.3	1338.5
Stack Exit Conditions (includes Tempering Air)											
Exhaust vol flow	acfm	3694690	3677090	3631610	3650390	3574250	3316830	3448600	3572250	3514710	3401560
[redacted]											
Stack Temperature	°F	850	850	850	850	850	850	850	850	850	850
Stack Diameter	ft	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Stack Height Above Grade	ft	150	150	150	150	150	150	150	150	150	150
Stack Exit Emissions (per unit)											
NOx mass flow rate (as NO2)	lb/hr	23.10	23.10	21.70	22.00	22.60	19.40	20.50	22.40	23.00	23.30
CO mass flow rate	lb/hr	11.20	11.30	10.60	10.70	11.00	9.40	10.00	10.90	11.20	11.30
VOC mass flow rate (as methane)	lb/hr	3.20	3.20	3.00	3.10	3.20	2.70	2.90	3.10	3.20	3.20
0.4 grains/100 SCF											
SOx mass flow rate (as SO2)	lb/h	3.40	3.40	3.20	3.20	3.30	2.80	3.00	3.30	3.40	3.40
Sulfur Mist as H2SO4	lb/h	2.30	2.30	2.10	2.20	2.20	1.90	2.00	2.20	2.30	2.30
Filterable Particulates	lb/h	7.48	7.46	7.27	7.29	7.26	6.95	7.08	7.24	7.24	7.08
Total Particulates	lb/h	14.30	14.20	14.00	14.00	13.70	13.60	13.70	13.70	13.50	13.00
PM10/2.5	lb/h	14.30	14.20	14.00	14.00	13.70	13.60	13.70	13.70	13.50	13.00
1.0 grains/100 SCF											
SOx mass flow rate (as SO2)	lb/h	8.20	8.20	7.70	7.80	8.00	6.90	7.30	7.90	8.10	8.20
Sulfur Mist as H2SO4	lb/h	5.50	5.50	5.20	5.30	5.40	4.60	4.90	5.40	5.50	5.60
Filterable Particulates	lb/h	11.90	11.90	11.40	11.50	11.50	10.70	11.00	11.50	11.50	11.30
Total Particulates	lb/h	19.70	19.60	19.10	19.10	18.90	18.10	18.50	18.80	18.70	18.00
PM10/2.5	lb/h	19.70	19.60	19.10	19.10	18.90	18.10	18.50	18.80	18.70	18.00
20.0 grains/100 SCF											
[redacted]											

ESTIMATED PERFORMANCE	Case 4	Case 11	Case 17	Case 22	Case 27	Case 5	Case 12	Case 18	Case 23	Case 28
Case Comments										
Load Condition	80.0%	80.0%	80.0%	80.0%	80.0%	70.0%	70.0%	70.0%	69.0%	69.0%
Ambient Temperature	107	98	59	29	-10	107	98	59	29	-10
Ambient Relative Humidity	35	43	60	57	57	35	43	60	57	57
Evap. Cooler Status	Off	Off	Off	Off	Note	Off	Off	Off	Off	Note
Fuel HHV	23,296	23,296	23,296	23,296	23,296	23,296	23,296	23,296	23,296	23,296
Output	160,928	171,259	191,219	198,250	200,000	140,812	149,851	167,317	170,991	172,500
Heat Rate (HHV)	10,584	10,395	10,042	9,931	9,996	11,000	10,791	10,399	10,337	10,460
Heat Cons. (HHV)	1,703	1,780	1,920	1,969	1,999	1,549	1,617	1,740	1,768	1,804
Output - Net	154,682	165,013	184,973	192,004	192,466	134,566	143,605	161,071	164,745	164,966
Heat Rate (HHV) - Net	11,011	10,789	10,380	10,254	10,387	11,511	11,261	10,802	10,729	10,938
Exhaust Energy	969.2	1003.3	1062.6	1084	1107.7	899.5	930.2	982.7	996.5	1026.7
Stack Exit Conditions (includes Tempering Air)										
Exhaust vol flow	2833560	2899670	2930220	2885270	2817480	2631750	2690870	2710530	2652390	2613050
[redacted]										
Stack Temperature	850	850	850	850	850	850	850	850	850	850
Stack Diameter	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Stack Height Above Grade	150	150	150	150	150	150	150	150	150	150
Stack Exit Emissions (per unit)										
NOx mass flow rate (as NO2)	16.20	16.90	18.30	18.70	19.00	14.70	15.40	16.50	16.80	17.20
CO mass flow rate	7.90	8.20	8.90	9.10	9.30	7.20	7.50	8.10	8.20	8.40
VOC mass flow rate (as methane)	2.30	2.40	2.50	2.60	2.70	2.10	2.10	2.30	2.30	2.40
0.4 grains/100 SCF										
SOx mass flow rate (as SO2)	2.40	2.50	2.70	2.70	2.80	2.10	2.20	2.40	2.50	2.50
Sulfur Mist as H2SO4	1.60	1.70	1.80	1.80	1.90	1.50	1.50	1.60	1.70	1.70
Filterable Particulates	6.44	6.46	6.43	6.36	6.35	6.32	6.38	6.31	6.25	6.26
Total Particulates	12.80	12.70	12.20	11.90	11.80	12.80	12.80	12.30	12.00	11.90
PM10/2.5	12.80	12.70	12.20	11.90	11.80	12.80	12.80	12.30	12.00	11.90
1.0 grains/100 SCF										
SOx mass flow rate (as SO2)	5.70	6.00	6.50	6.60	6.70	5.20	5.40	5.90	5.90	6.10
Sulfur Mist as H2SO4	3.90	4.00	4.40	4.50	4.50	3.50	3.70	4.00	4.00	4.10
Filterable Particulates	9.52	9.63	9.74	9.69	9.71	9.14	9.32	9.36	9.31	9.35
Total Particulates	16.50	16.50	16.10	15.70	15.60	16.20	16.40	15.90	15.60	15.50
PM10/2.5	16.50	16.50	16.10	15.70	15.60	16.20	16.40	15.90	15.60	15.50
20.0 grains/100 SCF										
[redacted]										

ESTIMATED PERFORMANCE	Case 6	Case 13	Case 19	Case 24	Case 29	Case 7	Case 14	Case 20	Case 25	Case 30
Case Comments										
Load Condition	50.0%	50.0%	50.0%	50.0%	50.0%	MECL	MECL	MECL	MECL	MECL
Ambient Temperature	107	98	59	29	-10	107	98	59	29	-10
Ambient Relative Humidity	35	43	60	57	57	35	43	60	57	57
Evap. Cooler Status	Off	Off	Off	Off	Note	Off	Off	Off	Off	Note
Fuel HHV	23,296	23,296	23,296	23,296	23,296	23,296	23,296	23,296	23,296	23,296
Output	100,580	107,037	119,512	123,907	125,000	67,300	68,400	67,700	66,400	65,900
Heat Rate (HHV)	13,074	12,589	11,855	11,754	11,884	15,845	15,702	15,716	16,408	16,537
Heat Cons. (HHV)	1,315	1,348	1,417	1,456	1,485	1,066	1,074	1,064	1,090	1,090
Output - Net	94,334	100,791	113,266	117,661	117,466	61,054	62,154	61,454	60,154	58,366
Heat Rate (HHV) - Net	13,940	13,370	12,510	12,379	12,646	17,464	17,280	17,314	18,111	18,671
Exhaust Energy	827.1	834.7	856.1	878	902.1	717.5	721	715.7	744.1	747.4
Stack Exit Conditions (includes Tempering Air)										
Exhaust vol flow	2423830	2416380	2364210	2340570	2299240	2104320	2090670	1980290	1987620	1908780
[redacted]										
Stack Temperature	850	850	850	850	850	850	850	850	850	850
Stack Diameter	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Stack Height Above Grade	150	150	150	150	150	150	150	150	150	150
Stack Exit Emissions (per unit)										
NOx mass flow rate (as NO2)	12.50	12.80	13.50	13.80	14.10	10.10	10.20	10.10	10.30	10.30
CO mass flow rate	6.10	6.20	6.60	6.70	6.90	4.90	5.00	4.90	5.00	5.00
VOC mass flow rate (as methane)	1.70	1.80	1.90	1.90	2.00	1.40	1.40	1.40	1.40	1.40
0.4 grains/100 SCF										
SOx mass flow rate (as SO2)	1.80	1.90	2.00	2.00	2.10	1.50	1.50	1.50	1.50	1.50
Sulfur Mist as H2SO4	1.20	1.30	1.30	1.40	1.40	1.00	1.00	1.00	1.00	1.00
Filterable Particulates	6.01	6.04	6.07	6.08	6.06	5.69	5.69	5.62	5.61	5.56
Total Particulates	12.40	12.40	12.30	12.20	12.10	12.00	12.00	11.80	11.70	11.50
PM10/2.5	12.40	12.40	12.30	12.20	12.10	12.00	12.00	11.80	11.70	11.50
1.0 grains/100 SCF										
SOx mass flow rate (as SO2)	4.40	4.50	4.80	4.90	5.00	3.60	3.60	3.60	3.70	3.70
Sulfur Mist as H2SO4	3.00	3.10	3.20	3.30	3.40	2.40	2.40	2.40	2.50	2.50
Filterable Particulates	8.41	8.49	8.62	8.68	8.69	7.63	7.64	7.53	7.55	7.49
Total Particulates	15.30	15.40	15.40	15.40	15.30	14.40	14.30	14.10	14.00	13.80
PM10/2.5	15.30	15.40	15.40	15.40	15.30	14.40	14.30	14.10	14.00	13.80
20.0 grains/100 SCF										
[redacted]										

Table B-2: Natural Gas with 10% Hydrogen
Performance Data

ESTIMATED PERFORMANCE	Units	Case 1	Case 7	Case 2	Case 8	Case 13	Case 3	Case 9	Case 14	Case 18	Case 22	Case 4	Case 10	Case 15	Case 19	Case 23	Case 5	Case 11	Case 16	Case 20	Case 24	Case 6	Case 12	Case 17	Case 21	Case 25
Case Comments																										
Load Condition	%	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE	80.0%	80.0%	80.0%	80.0%	80.0%	70.0%	70.0%	70.0%	70.0%	69.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Ambient Temperature	deg F	107	98	107	98	59	107	98	59	29	-10	107	98	59	29	-10	107	98	59	29	-10	107	98	59	29	-10
Ambient Relative Humidity	%	35	43	35	43	60	35	43	60	57	57	35	43	60	57	57	35	43	60	57	57	35	43	60	57	57
Evap. Cooler Status		On	On	On	On	On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Fuel HHV	BTU/lb	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777	23,777
Output	kW	242,829	243,660	227,404	229,857	241,796	201,469	214,406	239,315	248,102	250,000	161,175	171,525	191,452	198,482	200,000	141,028	150,084	167,520	173,672	172,500	100,734	107,203	119,657	124,051	125,000
Heat Rate (HHV)	BTU/kWh	10,031	10,002	10,085	10,091	9,867	10,161	10,082	9,893	9,783	9,795	10,598	10,409	10,056	9,946	10,015	11,014	10,805	10,414	10,304	10,481	13,088	12,603	11,871	11,770	11,909
Heat Cons. (HHV)	MMBTU/hr	2,436	2,437	2,293	2,319	2,386	2,047	2,162	2,367	2,427	2,449	1,708	1,785	1,925	1,974	2,003	1,553	1,622	1,745	1,789	1,808	1,318	1,351	1,420	1,460	1,489
Output - Net	kW	236,372	237,203	221,133	223,586	235,525	195,223	208,160	233,069	241,856	242,466	154,929	165,279	185,206	192,236	192,466	134,782	143,838	161,274	167,426	164,966	94,488	100,957	113,411	117,805	117,466
Heat Rate (HHV) - Net	BTU/kWh	10,312	17,501	10,376	10,281	13,398	10,494	10,380	17,315	10,825	10,275	11,034	10,392	10,137	12,536	10,751	11,535	10,811	10,164	17,350	12,405	13,969	11,284	10,402	10,041	18,149
Exhaust Energy	MMBTU/hr	1269.6	1277.4	1244.7	1265.3	1297.3	1135.2	1194.2	1296	1321.6	1337.2	969.5	1003.6	1062.8	1084.2	1107.3	899.8	930.5	982.8	1003.7	1026.4	827.1	834.7	856.1	878.1	902.1
Stack Exit Conditions (Includes Tempering Air)																										
Exhaust vol flow	acfm	3696340	3678760	3634340	3653090	3575710	3318790	3450630	3573700	3516680	3400080	2835650	2901740	2932000	2886950	2816420	2632870	2690300	2711890	2671180	2612200	2423440	2417090	2365180	2340600	2299250
Exhaust Gas Stack Velocity, ft/sec	ft/sec	130.74	130.11	128.55	129.21	126.48	117.39	122.05	126.41	124.39	120.26	100.30	102.64	103.73	102.11	99.62	93.13	95.16	95.92	94.48	92.40	85.72	85.49	83.66	82.79	81.33
Stack Temperature	°F	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850
Stack Diameter	ft	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Stack Height Above Grade	ft	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Stack Exit Emissions (per unit)																										
NOx mass flow rate (as NO2)	lb/hr	22.9	22.9	21.6	21.8	22.5	19.2	20.3	22.3	22.9	23	16.1	16.8	18.1	18.6	18.8	14.6	15.3	16.4	16.8	17	12.4	12.7	13.3	13.7	14
CO mass flow rate	lb/hr	11.2	11.2	10.5	10.6	10.9	9.4	9.9	10.9	11.1	11.2	7.8	8.2	8.8	9.1	9.2	7.1	7.4	8	8.2	8.3	6	6.2	6.5	6.7	6.8
VOC mass flow rate (as methane)	lb/hr	3.2	3.2	3	3	3.1	2.7	2.8	3.1	3.2	3.2	2.2	2.3	2.5	2.6	2.6	2	2.1	2.3	2.3	2.4	1.7	1.8	1.9	1.9	2
0.4 grains/100 SCF																										
SOx mass flow rate (as SO2)	lb/h	3.3	3.3	3.1	3.2	3.2	2.8	2.9	3.2	3.3	3.3	2.3	2.4	2.6	2.7	2.7	2.1	2.2	2.4	2.4	2.5	1.8	1.8	1.9	2	2
Sulfur Mist as H2SO4	lb/h	2.2	2.2	2.1	2.1	2.2	1.9	2	2.2	2.2	2.3	1.6	1.6	1.8	1.8	1.8	1.4	1.5	1.6	1.6	1.7	1.2	1.2	1.3	1.3	1.4
Filterable Particulates	lb/h	7.4	7.4	7.2	7.2	7.2	6.9	7.0	7.2	7.2	7.0	6.4	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.0	6.0	6.0	6.1	6.0
Total Particulates	lb/h	14.2	14.1	13.9	13.9	13.7	13.5	13.6	13.6	13.5	12.9	12.8	12.6	12.2	11.8	11.7	12.8	12.8	12.2	12	11.9	12.4	12.4	12.3	12.2	12.1
PM10/2.5	lb/h	14.2	14.1	13.9	13.9	13.7	13.5	13.6	13.6	13.5	12.9	12.8	12.6	12.2	11.8	11.7	12.8	12.8	12.2	12	11.9	12.4	12.4	12.3	12.2	12.1
1.0 grains/100 SCF																										
SOx mass flow rate (as SO2)	lb/h	8.0	8.0	7.6	7.6	7.9	6.7	7.1	7.8	8.0	8.1	5.6	5.9	6.3	6.5	6.6	5.1	5.3	5.8	5.9	6.0	4.3	4.5	4.7	4.8	4.9
Sulfur Mist as H2SO4	lb/h	5.4	5.4	5.1	5.2	5.3	4.6	4.8	5.3	5.4	5.5	3.8	4	4.3	4.4	4.5	3.5	3.6	3.9	4	4	2.9	3	3.2	3.3	3.3
Filterable Particulates	lb/h	11.8	11.8	11.3	11.4	11.4	10.6	10.9	11.3	11.4	11.2	9.42	9.54	9.64	9.59	9.61	9.06	9.23	9.26	9.24	9.26	8.34	8.42	8.54	8.6	8.61
Total Particulates	lb/h	19.5	19.5	18.9	18.9	18.7	18	18.3	18.6	18.5	17.8	16.4	16.4	16	15.6	15.5	16.1	16.3	15.8	15.5	15.4	15.2	15.3	15.3	15.3	15.2
PM10/2.5	lb/h	19.5	19.5	18.9	18.9	18.7	18	18.3	18.6	18.5	17.8	16.4	16.4	16	15.6	15.5	16.1	16.3	15.8	15.5	15.4	15.2	15.3	15.3	15.3	15.2
SOx mass flow rate (as SO2), 20 gr S	lb/h	165.00	165	155	160	160	140	145	160	165	165	115	120	130	135	135	105	110	120	120	125	90	90	95	100	100
SOx	lb/MMBtu	0.0677	0.0677	0.0676	0.0690	0.0671	0.0684	0.0671	0.0676	0.0680	0.0674	0.0675	0.0672	0.0675	0.0686	0.0674	0.0676	0.0678	0.0686	0.0671	0.0691	0.0681	0.0666	0.0669	0.0685	0.0672

Table B-3: Fuel Oil Performance Data

ESTIMATED PERFORMANCE	Units	Case 1	Case 6	Case 11	Case 2	Case 7	Case 12	Case 16	Case 20	Case 3	Case 8	Case 13	Case 17	Case 21	Case 4	Case 9	Case 14	Case 18	Case 22	Case 5	Case 10	Case 15	Case 19	Case 23
Case Comments																								
Load Condition	%	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE	80.0%	80.0%	80.0%	80.0%	80.0%	70.0%	70.0%	70.0%	70.0%	70.0%	MECL	MECL	MECL	MECL	MECL
Ambient Temperature	deg F	107	98	59	107	98	59	29	-10	107	98	59	29	-10	107	98	59	29	-10	107	98	59	29	-10
Ambient Relative Humidity	%	35	43	60	35	43	60	57	57	35	43	60	57	57	35	43	60	57	57	35	43	60	57	57
Evap. Cooler Status		On	On	On	Off	Off	Off	Off	Note	Off	Off	Off	Off	Note	Off	Off	Off	Off	Note	Off	Off	Off	Off	Note
Fuel HHV	BTU/lb	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572	20572
Output	kW	204,902	207,863	225,603	185,693	193,389	222,839	232,191	234,377	148,554	154,711	178,271	185,753	187,502	129,985	135,372	155,987	162,533	164,064	103,000	107,000	112,000	117,000	118,000
Heat Rate (HHV)	BTU/kWh	10642	10614	10527	10836	10737	10552	10421	10461	11512	11347	10846	10691	10839	12197	11982	11313	11147	11390	13716	13419	13157	13030	13242
Heat Cons. (HHV)	MMBTU/hr	2180.6	2206.4	2375.0	2012.1	2076.5	2351.5	2419.7	2451.7	1710.3	1755.5	1933.3	1985.8	2032.2	1585.4	1622.1	1764.7	1811.8	1868.6	1412.8	1435.8	1473.6	1524.5	1562.6
Output - Net	kW	197,741	200,702	218,442	178,557	186,253	215,703	225,055	225,741	141,418	147,575	171,135	178,617	178,866	122,849	128,236	148,851	155,397	155,428	95,864	99,864	104,864	109,864	109,364
Heat Rate (HHV) - Net	BTU/kWh	11028	10994	10873	11269	11149	10901	10752	10861	12094	11896	11298	11118	11362	12905	12649	11855	11660	12022	14737	14378	14053	13876	14288
Exhaust Energy	MMBTU/hr	1096.8	1113.1	1204.1	1045.4	1072.4	1200.1	1230.9	1255.5	911.9	931.6	1008.4	1031.2	1067.2	865.7	880.4	938.6	960.1	1007.2	806.7	814	833.1	862.8	896.1
Stack Exit Conditions (Includes Tempering Air)																								
Exhaust vol flow	acfm	3757960	3770710	3892970	3590930	3640610	3882510	3840780	3746470	3133390	3164760	3265880	3220930	3186070	2974170	2990470	3041090	3001580	3011220	2774700	2766670	2701470	2701350	2680550
Exhaust Gas Stack Velocity, ft/sec	ft/sec	132.92	133.37	137.70	127.01	128.77	137.33	135.85	132.52	110.83	111.94	115.52	113.93	112.69	105.20	105.78	107.57	106.12	106.51	98.14	97.86	95.55	95.55	94.81
Stack Temperature	°F	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850	850
Stack Diameter	ft	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Stack Height Above Grade	ft	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Stack Exit Emissions (per unit)																								
NOx mass flow rate (as NO2)	lb/hr	42.6	43.1	46.4	39.3	40.5	45.9	47.3	47.9	33.4	34.3	37.7	38.8	39.7	30.9	31.6	34.4	35.4	36.5	27.6	28	28.7	29.8	30.5
CO mass flow rate	lb/hr	10.4	10.5	11.3	9.6	9.9	11.2	11.5	11.7	8.1	8.3	9.2	9.4	9.7	7.5	7.7	8.4	8.6	8.9	6.7	6.8	7	7.2	7.4
VOC mass flow rate (as methane)	lb/hr	5.9	6	6.5	5.5	5.7	6.4	6.6	6.7	4.7	4.8	5.3	5.4	5.5	4.3	4.4	4.8	4.9	5.1	3.8	3.9	4	4.2	4.3
SOx mass flow rate (as SO2)	lb/h	4	4.1	4.4	3.7	3.8	4.3	4.4	4.5	3.1	3.2	3.5	3.6	3.7	2.9	3	3.2	3.3	3.4	2.6	2.6	2.7	2.8	2.9
Sulfur Mist as H2SO4	lb/h	2.7	2.7	2.9	2.5	2.6	2.9	3	3	2.1	2.2	2.4	2.5	2.5	2	2	2.2	2.2	2.3	1.8	1.8	1.8	1.9	1.9
Filterable Particulates	lb/h	23.9	23.9	24.0	23.7	23.8	24.0	24.0	23.9	23.6	23.6	23.6	23.4	23.3	23.6	23.6	23.4	23.3	23.2	23.3	23.3	23.2	23.2	23.0
Total Particulates	lb/h	44.8	44.8	44.8	44.7	44.7	44.8	44.7	44.5	44.8	44.7	44.4	44.1	43.9	45	44.9	44.3	44	43.8	44.6	44.6	44.4	44.2	43.8
PM10/2.5	lb/h	44.8	44.8	44.8	44.7	44.7	44.8	44.7	44.5	44.8	44.7	44.4	44.1	43.9	45	44.9	44.3	44	43.8	44.6	44.6	44.4	44.2	43.8

GE - Natural Gas

	Exit Temperature	Exit Velocity	CO 1-hour	
			Turbine 1	
	F	fps		
Startup				
Start[1,2]	850.000	67.52	366.00	
Normal Operation[3]	850.000	117.32	5.65	
			371.65	

1. Exhaust velocity for the MECL load from performance data provided by vendor and/or Dominion
2. Exit temperature for the MECL load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the 100% load from performance data provided by vendor and/or Dominion

	Exit Temperature	Exit Velocity	CO 8–hour		PM2.5 24-hour	
			Turbine 1		Turbine 1	
	F	fps				
Startup						
Start[1,2]	850.000	67.52	45.75		0.17	
Normal Operation[3]	850.000	117.32	10.59		19.29	
			56.34		19.46	

1. Exhaust velocity for the MECL load from performance data provided by vendor and/or Dominion
2. Exit temperature for the MECL load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the 100% load from performance data provided by vendor and/or Dominion

CO-Startup/Shutdown Modeling Calculations

	Startup
Total emission per event (lbs)	366.00
Maximum 1-hour rolling average rate during startup (lb/hr)	366.00
Time (min)	30
Maximum CO during normal operation - MECL (lb/hr)	11.30

	Number of startups
1-hour	1
8-hour	1

CO 1-hr

	Turbine 1
	Startup
CO 1-hour (min)	60
Startup/Shutdown (min)	30.0
emissions (lbs/hr)	**366.00**
Remaining Time (min)	30.0
emissions (lbs/hr)	**5.65**

CO 8-hr

	Turbine 1
CO 8-hour (min)	480
Startup/Shutdown (min)	30.0
emisisons (lb/event)	366.0
Remaining Time for Normal Operation for Turbine 1 after hot start (min)	450.0
emissions (lb/8-hr)	**84.75**
Remaining Time for Normal Operation for Turbine 1 after warm start (min)	
emissions (lb/8-hr)	
Remaining Time for Normal Operation for Turbine 1 after cold start (min)	
emissions (lb/8-hr)	

Scenarios

CO 1 - hour

	Turbine 1
Startup	366.00
Normal Operation 100% with Duct burner	11.30

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	366.00
Remaining time in Normal Operation	5.65

CO 8 hour

	Turbine 1
Startup	450.75
Normal Operation 100% with Duct burner	90.40

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	45.75
Remaining time in Normal Operation	10.59

PM2.5-Startup/Shutdown Modeling Calculations

	Startup **Turbine 1**	Number of starts
Total emission per event	4	
Maximum 1-hour rolling average rate during startup (lb/hr)	4.00	1
Time (min)	30	
Maximum PM2.5 during normal operation - 100% (lb/hr)	19.70	

	Turbine 1 **Startup**
PM2.5- 24hour (min)	1440
Startup/Shutdown (min)	30
Startup/Shutdown (hrs)	0.50
emissions	**4.00**

Remaining Time for Normal Operation for Turbine 1 in sequence (min)	1410
hours	23.50
emissions (lb/event)	**462.95**

Scenarios

PM2.5 24-hr

	Turbine 1
PM2.5 24-hour (min)	1440
Startup/Shutdown (min)	30.0
emisisons (lb/event)	4.0

Remaining Time for Normal Operation for Turbine 1 after startup (min)	1410.0
emissions (lb/24-hr)	**462.95**

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	0.17
Remaining time in Normal Operation	19.29

GE - Fuel Oil

	Exit Temperature	Exit Velocity	CO 1-hour	
			Turbine 1	
	F	fps		
Startup				
Start[1,2]	850.00	94.81	1036.00	
Normal Operation[3]	850.00	127.01	5.85	
			1041.85	

1. Exhaust velocity for the 50% load from performance data provided by vendor and/or Dominion
2. Exit temperature for the 50% load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the Max Power load from performance data provided by vendor and/or Dominion

	Exit Temperature	Exit Velocity	CO 8–hour		PM2.5 24-hour	
			Turbine 1		Turbine 1	
	F	fps				
Startup						
Start[1,2]	850.00	94.81	129.50		0.88	
Normal Operation[3]	850.00	127.01	10.97		43.87	
			140.47		44.74	

1. Exhaust velocity for the 50% load from performance data provided by vendor and/or Dominion
2. Exit temperature for the 50% load from performance data provided by vendor and/or Dominion
3. Exit velocity and temperature for the Max Power load from performance data provided by vendor and/or Dominion

CO-Startup/Shutdown Modeling Calculations

	Startup
Total emission per event (lbs)	1036.00
Maximum 1-hour rolling average rate during startup (lb/hr)	1036.00
Time (min)	30
Maximum CO during normal operation - Max Power (lb/hr)	11.70

	Number of startups
1-hour	1
8-hour	1

CO 1-hr

	Turbine 1 Startup
CO 1-hour (min)	60
Startup/Shutdown (min)	30.0
emissions (lbs/hr)	**1036.00**
Remaining Time (min)	30.0
emissions (lbs/hr)	**5.85**

CO 8-hr

	Turbine 1
CO 8-hour (min)	480
Startup/Shutdown (min)	30.0
emisisons (lb/event)	1036.0
Remaining Time for Normal Operation for Turbine 1 after hot start (min)	450.0
emissions (lb/8-hr)	**87.75**
Remaining Time for Normal Operation for Turbine 1 after warm start (min)	
emissions (lb/8-hr)	
Remaining Time for Normal Operation for Turbine 1 after cold start (min)	
emissions (lb/8-hr)	

Scenarios

CO 1 - hour

	Turbine 1
Startup	1036.00
Normal Operation 100% with Duct burner	11.70

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	1036.00
Remaining time in Normal Operation	5.85

CO 8 hour

	Turbine 1
Startup	1123.75
Normal Operation 100% with Duct burner	93.60

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	129.50
Remaining time in Normal Operation	10.97

PM2.5-Startup/Shutdown Modeling Calculations

	Startup **Turbine 1**	Number of starts
Total emission per event	21	
Maximum 1-hour rolling average rate during startup (lb/hr)	21.00	1
Time (min)	30	
Maximum PM2.5 during normal operation - Max Power (lb/hr)	44.80	

	Turbine 1 **Startup**
PM2.5- 24hour (min)	1440
Startup/Shutdown (min)	30
Startup/Shutdown (hrs)	0.50
emissions	**21.00**

Remaining Time for Normal Operation for Turbine 1 in sequence (min)	1410
hours	23.50
emissions (lb/event)	**1052.80**

<u>Scenarios</u>

PM2.5 24-hr

	Turbine 1
PM2.5 24-hour (min)	1440
Startup/Shutdown (min)	30.0
emisisons (lb/event)	21.0

Remaining Time for Normal Operation for Turbine 1 after startup (min)	1410.0
emissions (lb/24-hr)	**1052.80**

Separate SU and normal operation Stacks

	Turbine 1
Startup	
Startup	0.88
Remaining time in Normal Operation	43.87

Appendix C Federal Land Manager Class I Area Communication

From:	Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>
Sent:	Wednesday, August 9, 2023 12:07 PM
To:	Stacy, Andrea; thomas.r.andrake@dominionenergy.com; Shepherd, Don; Kenney, Patrick; Schaberl, James P; Salazer, Holly; King, Kirsten L; Collins, Catherine; Thomas Pritcher; Josh Ralph; Taylor, Ksienya A.; Pitrolo, Melanie -FS; Ash, Jeremy - FS; Mcneel, Pleasant - FS
Cc:	Kyle, James (DEQ); Sinclair, Alison (DEQ); Thompson, Tamera (DEQ); Todd.M.Alonzo@dominionenergy.com; Bryan.T.Nichols@dominionenergy.com
Subject:	Re: [EXTERNAL] Re: Updated FLM Information - Dominion Chesterfield Power Station

We have heard back from the NPS on this project, and they have indicated that they will not be requiring an AQRV analysis. DEQ presumes that this is also the case for the USFS and FWS Class I areas since these are farther away from the project location than the NPS Class I area (Shenandoah National Park) and nobody has expressed interest in a meeting. Please verify with me at your earliest convenience.

DEQ and Dominion Energy will proceed with the Class I and Class II NAAQS and PSD increment modeling requirements.

Best regards,
Bobby

Robert Lute
Air Quality Modeler, Office of Air Quality Assessments
Virginia Department of Environmental Quality
1111 East Main St., Suite 1400
Richmond, VA 23219
(804) 718-9970

From: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>
Sent: Monday, August 7, 2023 11:40 AM
To: Stacy, Andrea <Andrea_Stacy@nps.gov>; thomas.r.andrake@dominionenergy.com <thomas.r.andrake@dominionenergy.com>; Shepherd, Don <Don_Shepherd@nps.gov>; Kenney, Patrick <Pat_Kenney@nps.gov>; Schaberl, James P <Jim_Schaberl@nps.gov>; Salazer, Holly <Holly_Salazer@nps.gov>; King, Kirsten L <kirsten_king@nps.gov>; Collins, Catherine <Catherine_Collins@fws.gov>; Thomas Pritcher (tpritcher@ectinc.com) <tpritcher@ectinc.com>; Josh Ralph - Environmental Consulting & Technology, Inc. (jralph@ectinc.com) <jralph@ectinc.com>; Taylor, Ksienya A. <Ksienya_Taylor@nps.gov>; Pitrolo, Melanie -FS <melanie.pitrolo@usda.gov>; Ash, Jeremy - FS <jeremy.ash@usda.gov>; Mcneel, Pleasant - FS <pleasant.mcneel@usda.gov>
Cc: Kyle, James (DEQ) <James.Kyle@deq.virginia.gov>; Sinclair, Alison (DEQ) <Alison.Sinclair@deq.virginia.gov>; Thompson, Tamera (DEQ) <Tamera.Thompson@deq.virginia.gov>; Todd.M.Alonzo@dominionenergy.com <Todd.M.Alonzo@dominionenergy.com>; Bryan.T.Nichols@dominionenergy.com <Bryan.T.Nichols@dominionenergy.com>
Subject: Re: [EXTERNAL] Re: Updated FLM Information - Dominion Chesterfield Power Station

Andrea,

Thank you for the NPS response.

Best regards,
Bobby

Robert Lute
Air Quality Modeler, Office of Air Quality Assessments
Virginia Department of Environmental Quality
1111 East Main St., Suite 1400
Richmond, VA 23219
(804) 718-9970

From: Stacy, Andrea <Andrea_Stacy@nps.gov>
Sent: Friday, August 4, 2023 5:20 PM
To: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>; thomas.r.andrake@dominionenergy.com <thomas.r.andrake@dominionenergy.com>; Shepherd, Don <Don_Shepherd@nps.gov>; Kenney, Patrick <Pat_Kenney@nps.gov>; Schaberl, James P <Jim_Schaberl@nps.gov>; Salazer, Holly <Holly_Salazer@nps.gov>; King, Kirsten L <kirsten_king@nps.gov>; Collins, Catherine <Catherine_Collins@fws.gov>; Thomas Pritcher (tpritcher@ectinc.com) <tpritcher@ectinc.com>; Josh Ralph - Environmental Consulting & Technology, Inc. (jralph@ectinc.com) <jralph@ectinc.com>; Taylor, Ksienya A. <Ksienya_Taylor@nps.gov>; Pitrolo, Melanie -FS <melanie.pitrolo@usda.gov>; Ash, Jeremy - FS <jeremy.ash@usda.gov>; Mcneel, Pleasant - FS <pleasant.mcneel@usda.gov>
Cc: Kyle, James (DEQ) <James.Kyle@deq.virginia.gov>; Sinclair, Alison (DEQ) <Alison.Sinclair@deq.virginia.gov>; Thompson, Tamera (DEQ) <Tamera.Thompson@deq.virginia.gov>; Todd.M.Alonzo@dominionenergy.com <Todd.M.Alonzo@dominionenergy.com>; Bryan.T.Nichols@dominionenergy.com <Bryan.T.Nichols@dominionenergy.com>
Subject: RE: [EXTERNAL] Re: Updated FLM Information - Dominion Chesterfield Power Station

Hi Bobby,

I appreciate the reminder & the responses to my previous questions. I want to confirm that based on the information provided, including the PowerPoint and the proposed state BACT limits for NOx, the NPS will not be requesting a Class I AQRV analysis for Shenandoah National Park. Unless you or the applicant would like to discuss this further, I don't think a preapplication call with the NPS will be necessary and we have not filled out the doodle poll.

We agree that the 2.5 ppmvd NOx limit is in line with other SCCTs equipped with DLN + SCR. We are aware of one other proposed facility with six SCCTs equipped with SCR that were permitted at 2.0 ppmvd NOx, the Alaska Gasline Development Corporation's proposed Liquefaction plant (AK LNG), located on Alaska's Kenai Peninsula. I understand from conversations with the permit authority (AK DEC) that the AK LNG permit limits are based on a vendor guarantee. I have attached the final permit and Technical Analysis Report for your reference. Dave Jones with AK DEC is the permit engineer contact for the AK LNG facility (907-465-5122).

Please let us know if anything changes with respect to this proposal or if you would like to discuss this further. Finally, we would appreciate a copy of the final permit application as well as the draft and final permits and staff analysis when these documents are available—we retain this information for our records. Thank you again for the opportunity to comment on the proposed modification at the Dominion Chesterfield Power Station.

Regards,
Andrea

From: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>
Sent: Friday, August 4, 2023 8:42 AM
To: thomas.r.andrake@dominionenergy.com; Stacy, Andrea <Andrea_Stacy@nps.gov>; Shepherd, Don <Don_Shepherd@nps.gov>; Kenney, Patrick <Pat_Kenney@nps.gov>; Schaberl, James P <Jim_Schaberl@nps.gov>; Salazer, Holly <Holly_Salazer@nps.gov>; King, Kirsten L <kirsten_king@nps.gov>; Collins, Catherine <Catherine_Collins@fws.gov>; Thomas Pritcher (tpritcher@ectinc.com) <tpritcher@ectinc.com>; Josh Ralph - Environmental Consulting & Technology, Inc. (jralph@ectinc.com) <jralph@ectinc.com>; Taylor, Ksienya A. <Ksienya_Taylor@nps.gov>; Pitrolo, Melanie -FS <melanie.pitrolo@usda.gov>; Ash, Jeremy - FS <jeremy.ash@usda.gov>; Mcneel, Pleasant - FS <pleasant.mcneel@usda.gov>
Cc: Kyle, James (DEQ) <James.Kyle@deq.virginia.gov>; Sinclair, Alison (DEQ) <Alison.Sinclair@deq.virginia.gov>; Thompson, Tamera (DEQ) <Tamera.Thompson@deq.virginia.gov>; Todd.M.Alonzo@dominionenergy.com; Bryan.T.Nichols@dominionenergy.com
Subject: [EXTERNAL] Re: Updated FLM Information - Dominion Chesterfield Power Station

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

All,

This is just a reminder to complete the Doodle poll by COB today if possible.

Thanks for your help.
Bobby

Robert Lute
Air Quality Modeler, Office of Air Quality Assessments
Virginia Department of Environmental Quality
1111 East Main St., Suite 1400
Richmond, VA 23219
(804) 718-9970

From: thomas.r.andrake@dominionenergy.com <thomas.r.andrake@dominionenergy.com>
Sent: Friday, July 28, 2023 9:41 AM
To: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>; Stacy, Andrea <Andrea_Stacy@nps.gov>; Shepherd, Don <Don_Shepherd@nps.gov>; Kenney, Patrick <Pat_Kenney@nps.gov>; Schaberl, James P <Jim_Schaberl@nps.gov>; Salazer, Holly <Holly_Salazer@nps.gov>; King, Kirsten L <kirsten_king@nps.gov>; Collins, Catherine <Catherine_Collins@fws.gov>; Thomas Pritcher (tpritcher@ectinc.com) <tpritcher@ectinc.com>; Josh Ralph - Environmental Consulting & Technology, Inc. (jralph@ectinc.com) <jralph@ectinc.com>; Taylor, Ksienya A. <Ksienya_Taylor@nps.gov>; Melanie -FS Pitrolo (melanie.pitrolo@usda.gov) <melanie.pitrolo@usda.gov>; Ash, Jeremy - FS, NC <jeremy.ash@usda.gov>; pleasant.mcneel@usda.gov <pleasant.mcneel@usda.gov>
Cc: Kyle, James (DEQ) <James.Kyle@deq.virginia.gov>; Sinclair, Alison (DEQ) <Alison.Sinclair@deq.virginia.gov>; Thompson, Tamera (DEQ) <Tamera.Thompson@deq.virginia.gov>; Todd.M.Alonzo@dominionenergy.com <Todd.M.Alonzo@dominionenergy.com>; Bryan.T.Nichols@dominionenergy.com <Bryan.T.Nichols@dominionenergy.com>
Subject: RE: Updated FLM Information - Dominion Chesterfield Power Station

Hi Stacy

Here are the responses to your questions:

1. **Slide 22 notes that the Turbines will be equipped with Dry Low NOx Burners/Water Injection (during fuel oil use) and SCR. What is the proposed associated NOx limit in ppm?**
   The proposed NOx emission limit for CERC project is 2.5 ppm when firing natural gas and 5 ppm when firing fuel oil.

1. **Slides 3 and 7 note that the SCCTs will be capable of combusting Hydrogen blended with natural gas. Does Dominion have a proposed timeframe for hydrogen fuel use? Will the SCRs be designed to accommodate hydrogen fuel blends (e.g., will they be designed to accommodate any potential NOx emission and volumetric flow increases associated with hydrogen fuel combustion)?**
   The design of turbines will be capable of combusting up to a 10% hydrogen blend with the natural gas upon installation and the backend control systems (SCR and oxidation catalyst) will be able to effectively operate with the SCR capable of reducing NOx emissions to meet a 2.5 ppm limit. At this time Dominion does not have a timeline of when the supply of hydrogen would be available for use at the site. As part of this permitting process, we are looking to include this alternative hydrogen blended fuel within the permit.

Additionally as indicated below, the CERC project is a revision to the air permit application that had previously been submitted in December 2019 which was paused in 2021. The CERC project is essentially updating that application with new simple cycle turbine technology (GE Frame 7FA.05) with backend controls. We look forward to meeting with you during this permitting process.

Thanks!!!

T.R. Andrake
Environmental Consultant
Dominion Energy Services, Inc.
DEES – Corporate Air Programs
Cell: (804) 839-2760
Thomas.R.Andrake@dominionenergy.com

From: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>
Sent: Thursday, July 27, 2023 12:04 PM
To: Stacy, Andrea <Andrea_Stacy@nps.gov>; Shepherd, Don <Don_Shepherd@nps.gov>; Kenney, Patrick <Pat_Kenney@nps.gov>; Schaberl, James P <Jim_Schaberl@nps.gov>; Salazer, Holly <Holly_Salazer@nps.gov>; King, Kirsten L <kirsten_king@nps.gov>; Collins, Catherine <Catherine_Collins@fws.gov>; Thomas R Andrake (Services - 6) <thomas.r.andrake@dominionenergy.com>; Thomas Pritcher (tpritcher@ectinc.com) <tpritcher@ectinc.com>; Josh Ralph - Environmental Consulting & Technology, Inc. (jralph@ectinc.com) <jralph@ectinc.com>; Taylor, Ksienya A. <Ksienya_Taylor@nps.gov>; Melanie -FS Pitrolo (melanie.pitrolo@usda.gov) <melanie.pitrolo@usda.gov>; Ash, Jeremy - FS, NC <jeremy.ash@usda.gov>; pleasant.mcneel@usda.gov
Cc: Kyle, James (DEQ) <James.Kyle@deq.virginia.gov>; Sinclair, Alison (DEQ) <Alison.Sinclair@deq.virginia.gov>; Thompson, Tamera (DEQ) <Tamera.Thompson@deq.virginia.gov>
Subject: [EXTERNAL] Re: [EXTERNAL] Updated FLM Information - Dominion Chesterfield Power Station

TR,

Please respond to the FLM's request for additional information.

Please send the reply to the list of recipients contained in this email because some of the email addresses in the original email were updated.

Thanks.
Bobby

Robert Lute
Air Quality Modeler, Office of Air Quality Assessments
Virginia Department of Environmental Quality
1111 East Main St., Suite 1400
Richmond, VA 23219
(804) 718-9970

From: Stacy, Andrea <Andrea_Stacy@nps.gov>
Sent: Wednesday, July 26, 2023 6:06 PM
To: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>; Shepherd, Don <Don_Shepherd@nps.gov>; Kenney, Patrick <Pat_Kenney@nps.gov>; Schaberl, James P <Jim_Schaberl@nps.gov>; Salazer, Holly <Holly_Salazer@nps.gov>; King, Kirsten L <kirsten_king@nps.gov>; Clyde N. Thompson (cnthompson@fs.fed.us) <cnthompson@fs.fed.us>; Melanie Caudle Pitrolo - USDA Forest Service (mpitrolo@fs.fed.us) <mpitrolo@fs.fed.us>; Joby Timm (jtimm@fs.fed.us) <jtimm@fs.fed.us>; Pleasant McNeel (pmcneel@fs.fed.us) <pmcneel@fs.fed.us>; Charles E -FS Sams (csams@fs.fed.us) <csams@fs.fed.us>; Jeremy - FS Ash (jash@fs.fed.us) <jash@fs.fed.us>; Collins, Catherine <Catherine_Collins@fws.gov>; Thomas R Andrake (thomas.r.andrake@dominionenergy.com) <thomas.r.andrake@dominionenergy.com>; Thomas Pritcher (tpritcher@ectinc.com) <tpritcher@ectinc.com>; Josh Ralph - Environmental Consulting & Technology, Inc. (jralph@ectinc.com) <jralph@ectinc.com>; Taylor, Ksienya A. <Ksienya_Taylor@nps.gov>
Cc: Kyle, James (DEQ) <James.Kyle@deq.virginia.gov>; Sinclair, Alison (DEQ) <Alison.Sinclair@deq.virginia.gov>; Thompson, Tamera (DEQ) <Tamera.Thompson@deq.virginia.gov>
Subject: RE: [EXTERNAL] Updated FLM Information - Dominion Chesterfield Power Station

Hi Bobby,
I took a quick look at the PowerPoint you provided—we appreciate the detailed information. Before we determine whether a pre-application call is necessary, I have just a couple of clarifying questions:

1. Slide 22 notes that the Turbines will be equipped with Dry Low NOx Burners/Water Injection (during fuel oil use) and SCR. What is the proposed associated NOx limit in ppm?
2. Slides 3 and 7 note that the SCCTs will be capable of combusting Hydrogen blended with natural gas. Does Dominion have a proposed timeframe for hydrogen fuel use? Will the SCRs be designed to accommodate hydrogen fuel blends (e.g., will they be designed to accommodate any potential NOx emission and volumetric flow increases associated with hydrogen fuel combustion)?

I appreciate your help, responses to these questions will assist us in determining whether a pre-application meeting is necessary. Thanks!

From: Lute, Robert (DEQ) <Robert.Lute@deq.virginia.gov>
Sent: Tuesday, July 25, 2023 12:20 PM
To: Stacy, Andrea <Andrea_Stacy@nps.gov>; Shepherd, Don <Don_Shepherd@nps.gov>; Kenney, Patrick <Pat_Kenney@nps.gov>; Schaberl, James P <Jim_Schaberl@nps.gov>; Salazer, Holly <Holly_Salazer@nps.gov>; King, Kirsten L <kirsten_king@nps.gov>; Clyde N. Thompson (cnthompson@fs.fed.us) <cnthompson@fs.fed.us>; Melanie Caudle Pitrolo - USDA Forest Service (mpitrolo@fs.fed.us) <mpitrolo@fs.fed.us>; Joby Timm (jtimm@fs.fed.us) <jtimm@fs.fed.us>;

Pleasant McNeel (pmcneel@fs.fed.us) <pmcneel@fs.fed.us>; Charles E -FS Sams (csams@fs.fed.us) <csams@fs.fed.us>; Jeremy - FS Ash (jash@fs.fed.us) <jash@fs.fed.us>; Collins, Catherine <Catherine_Collins@fws.gov>; Thomas R Andrake (thomas.r.andrake@dominionenergy.com) <thomas.r.andrake@dominionenergy.com>; Thomas Pritcher (tpritcher@ectinc.com) <tpritcher@ectinc.com>; Josh Ralph - Environmental Consulting & Technology, Inc. (jralph@ectinc.com) <jralph@ectinc.com>
Cc: Kyle, James (DEQ) <James.Kyle@deq.virginia.gov>; Sinclair, Alison (DEQ) <Alison.Sinclair@deq.virginia.gov>; Thompson, Tamera (DEQ) <Tamera.Thompson@deq.virginia.gov>
Subject: [EXTERNAL] Updated FLM Information - Dominion Chesterfield Power Station

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

FLM Contacts,

We originally e-mailed you in November 2019 to solicit feedback on the need for a Class I area AQRV analysis for a proposed major modification project at the existing Dominion Chesterfield Power Station in Chester, Virginia. Since then, the design of the project has changed. In addition, the existing coal/oil fired Units 5 and 6 at the facility have been permanently shutdown. As a result, there will be a PSD net emissions decrease for some pollutants. The attached presentation provides specific information. The emission calculations in the attached presentation are draft and DEQ will inform you if the applicability status of any pollutant changes when the calculations are finalized.

Below are the approximate distances to each Class I area within 300 kilometers of the facility.

Shenandoah National Park, 144 km
James River Face Wilderness Area, 178 km
Swanquarter Wilderness Area, 239 km
Dolly Sods Wilderness Area, 246 km
Otter Creek Wilderness Area, 262 km

I've included a Doodle poll link below for those of you who are interested in a meeting. In addition, let us know if your agency does not require an AQRV analysis for this project. Please enter your schedule **no later than close of business on Friday, August 4, 2023**.

https://doodle.com/meeting/participate/id/aKQBlPRd

Please forward this e-mail to anyone that needs to be copied that I may have inadvertently left off the distribution list. Thanks in advance for your help.

Best regards,
Bobby

Robert Lute
Air Quality Modeler, Office of Air Quality Assessments
Virginia Department of Environmental Quality
1111 East Main Street
Richmond, VA 23219
(804) 718-9970