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Harold D. Ward, Cabinet Secretary
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Pursuant to §45-14-17.2

PRELIMINARY DETERMINATION/FACT SHEET

for the

Construction of Major Source

Mountain State Clean Energy LLC

Unit 2 Project

located near

Maidsville, Monongalia County, West Virginia

Permit Application Number: R14-0038

Facility Identification Number 061-00134

Date: September 29, 2021

Promoting a healthy environment.

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SUMMARY

Mountain State Clean Energy LLC (MSCE) proposed to construct an additional electricity generation unit (EGUs) at the Longview Power LLC Maidsville Facility in West Virginia. This project will consist of two combustion turbines (CT) with individual duct burners to provide additional heat energy for the respective heat recovery steam generator (HRSG); fuel heaters, and two emergency engines, and cooling towers. With these emission sources, MSCE expects to be capable of generating 1,200 megawatts (MWe) of electricity.

This project requires MSCE to obtain a major source permit in accordance with Rule 14 prior to constructing the proposed emission units in this application.[1] As part of complying with the requirements of Rule 14, Best Available Control Technology (BACT) will be applied to these emission units.[2] A summary of these technologies is provided in the following table.

Table 1 Summary of Technologies as BACT for the MSCE's EGU Project

Pollutant	Combustion Turbines	Duct Burners	Fuel Gas Heaters	Emergency Engines	Cooling Towers
NO_x	DLN Burners w/SCR	GCP/SCR	Low NO_x Burners	GCP	N/A
CO	Ox Cat with GCP	Ox Cat with GCP	GCP	GCP & Ox Cat	N/A
$PM/PM_{10}/PM_{2.5}$	Clean Fuel & Combustion Optimization			GCP & Clean Fuel	Drift Eliminators
VOCs	Ox Cat with GCP		GCP	GCP	N/A
GHGs[1]	Low Carbon Fuel & Combustion Optimization				N/A

[1]GHGs – Greenhouse gases, which consist of carbon dioxide, methane, nitrous oxides, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride.
DLN Burners – Dry low-NO_x burners.
SCR – Selective Catalytic Reduction
Ox Cat – Oxidation Catalysis

With these control technologies as BACT for this project, these controls will reduce the permitted emissions to the rates summarized in the table below:

[1] 45 CSR §14-3.1.
[2] 45 CSR §14-8.2.

Table 2 Summary of the Numerical BACT Limits

Emission Unit	Pollutant	Emission Limit	BACT
Combustion Turbines/ HRSG Duct Burners	NO_x	2.0 ppmvd	Dry Low NO_x Burners with SCR
	VOC	1.0 ppmvd w/o duct firing 2.0 ppmvd w/ duct firing	Oxidation catalyst and good combustion practice
	PM/PM10/PM2.5	0.006 lb/MMBtu	Clean fuels and good combustion practice
	CO	2.0 ppmvd	Oxidation catalyst and good combustion practice
	H2SO4	NG w/ sulfur content 0.4 gr/100scf	Combustion of low sulfur fuel
	GHG	852 lb/MWh for 7HA.03 824 lb/MWh for M501JAC	Thermal efficiency/combustion air cooling and use of lower carbon fuels.
Emergency Generator/ Fire Water Pump	NO_x	4.8 g/hp-hr/3.0 g/hp-hr	Combustion control (Retarded Timing and/or lean burn)
	VOC	1.2 lb/hr/1.0 lb/hr	Good combustion practice
	PM/PM10/PM2.5	0.15 g/hp-hr	Clean fuels and good combustion practices
	CO	0.3 g/hp-hr/ 0.44 g/hp-hr (respectively)	Good combustion practices with Ox Cat
Fuel Gas Heaters	NO_x	0.036 lb/MMBtu	Low NO_x Burner and good combustion practices
	VOC	0.007 lb/MMBtu	Good combustion practice
	PM/PM10/PM2.5	0.008 lb/MMBtu	Good combustion practice
	CO	0.039 lb/MMBtu	Good combustion practice
Cooling Tower	PM/PM10/PM2.5	2.16 lb/hr	Drift Eliminators

ENGINEERING EVALUATION/FACT SHEET

B ACKGROUND INFORMATION

Application No.:	R14-0038
Plant ID No.:	061-00134
Applicant:	Mountain State Clean Energy LLC
Facility Name:	Longview Power Unit 2
Location:	Maidsville
NAICS Code:	221112
Application Type:	PSD Major Source Construction
Received Date:	December 10, 2019
Revised Application Received:	March 14, 2020, and September 21, 2021
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	$14,500.00
Fee Deposit Date:	January 10, 2020
1st Complete Date:	May 5, 2020
2nd Complete Date:	September 21, 2021
Due Date:	March 20, 2022
Applicant Ad Date:	December 12, 2019
Applicant 2nd Ad Date:	March 12, 2021
Newspaper:	*Dominion Post*
UTM's:	Easting: 542.78 km Northing: 4,377.20 km Zone: 17
Description:	The application is for the construction of an EGU facility, consisting of two natural gas fired combustion turbines with heat recovery steam generation for the purpose of generating 1,200 MW of electricity for sale.

PUBLIC REVIEW PROCEDURES

45CSR13 and 45CSR14 require action items at the time of application submission and at the time a draft permit is prepared by the DAQ. The following details compliance with the statutory and accepted procedures for public notification with respect to permit application R14-0038.

Actions Taken at Application Submission

Pursuant to §45-13-8.3 and §45-14-17.1, MSCE placed a Class I legal advertisement in the Dominion Post on December 12, 2019. On January 13, 2020, Mr. Joseph Kessler, P.E., the DAQ's PSD Coordinator, notified the respective Federal Land Mangers for the Wilderness Areas of Dolly Sods and Otter Creek, James River Face, and the Shenandoah National Park by email of this proposed project. On February 14, 2020, Mr. Jeremy Ash, Air Quality Specialist for the U.S. Forest Service, notified the DAQ by email that the U.S. Forest Service will not be requesting any additional modeling to determine the Air Quality Related Values (AQRVs) for the affected Class I Area due to this proposed project. On February 15, 2020, Ms. Andrea Stacy of National Park Service notified the DAQ that an analysis to determine the Class I AQRV for the Shenandoah National Park would not be necessary for this proposed project.

Due to changes with regards to the project from the December 10, 2019, submittal with the March 14, 2021, submittal, MSCE published another ad on March 12, 2021. On April 6, Mr. Kessler, P.E. notified the respective Federal Land Managers of these changes to the project as requested in their earlier responses. On April 14, 2021, Mr. Ralph Perron, an Air Quality Specialist with the U.S. Forest Service, notified the DAQ that the U.S. Forest Service would not be requesting an assessment of the AQRVs for this project. Ms. Stacy confirmed with the DAQ that the proposed changes in the March 14 Submittal did not affect the National Parks Service's determination that assessment of the AQRV's is not required for this application.

A copy of the application and all relevant documents are available for review at the DAQ Headquarters in Charleston (Kanawha City) and online at:

https://dep.wv.gov/daq/permitting/Pages/NSR-Permit-Applications.aspx

Actions Taken at Completion of *Preliminary Determination*

Pursuant to §45-13-8.5 and §45-14-17.4, upon completion (and approval) of the preliminary determination and draft permit documents, a Class I legal advertisement will be placed in the Dominion Post stating the DAQ's preliminary determination regarding permit application R14-0038 and providing notice for a virtual public meeting on Tuesday, October 19, 2021, from 6:00 pm to 8:00 pm.

This action will limit the emissions of sulfur dioxide from the emission units in this application to a level below the PSD major source significance threshold of 40 tons per year, which allows the applicant to avoid PSD review for SO_2 with respect to the project. The application is following the Notice Level C requirements by posting a sign and publishing a commercial display advertisement in *The Dominion Post.*[3]

FACILITY DESRIPTION

The proposed Project will be constructed on property located adjacent to the existing Longview Power site in Maidsville, Monongalia County, West Virginia. The site is situated approximately 2,500 feet south of the Pennsylvania border, 3,000 feet west of the Monongahela River, and approximately one mile north of Morgantown, West Virginia.

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[3] 45 CSR §§13-8.5, 8.4.a and 8.5.a.

PROCESS DESCRIPTION

MSCE has submitted this PSD Major Construction Permit Application for their Unit 2 Project at the Maidsville Facility to comply with the prevention of significant deterioration (PSD) permitting requirements of 45 CSR 14. The Project will be designed to achieve peak electrical output during the summer season of approximately 1,200 MW without duct firing and approximately 1,300 MW with duct firing. Electricity generated by the Project will be supplied to the PJM power grid and connect to the grid via the existing interconnection used by the existing unit at the site.

The major components of the proposed power plant include: one combined-cycle power train consisting of two combustion turbines, two heat recovery steam generators (HRSG) with duct burners, and one steam turbine; one diesel fuel-fired firewater pump; one diesel fuel-fired emergency generator; two fuel gas heaters; and one mechanical draft cooling tower.

To enhance the plant's overall efficiency and increase the amount of electricity generated by the project, the hot exhaust gases from each combustion turbine will be routed to a downstream heat recovery steam generator. Each HRSG contains a series of heat exchangers designed to recover the heat in the exhaust gases from combustion turbines to produce steam. The project includes the installation of duct burners to produce additional steam in the HRSGs for additional power output from the steam turbine generator. The duct burners will only fire natural gas. MSCE has not proposed to utilize oil as a back-up fuel supply for these EGUs.

Combustion Turbines (CT)

MSCE has developed the application around two different model combustion turbines which are General Electric (GE) 7HA.02 or .03 and Mitsubishi Hitachi Power System (MHPS) M501JAC. MSCE is considering both these model CTs with the combined cycle option. A combined cycle option is adding the HRSG to the combustion turbine train.

These combustion turbines include a compressor, combustor, and turbine/generator. Combustion air is compressed using a multi-stage compressor. Fuel is injected with the compressed combustion air in the combustor. MSCE proposes to only use pipeline quality natural gas as the only fuel for these turbines. Igniting these mixtures of natural gas and combustion air in the combustor, the mixture, which is now combustion exhaust has high velocity that is directed to the blades of the turbine. The potential energy of the combustion exhaust is transferred by spinning the blades on the turbine. These blades are connected to a shaft at one end. At the other end of this shaft is a generator. As this shaft rotates, the generator is generating electricity.

Heat Recovery Steam Generators (HRSG) with Duct Burners

As the exhaust gases exit the turbine, the stream is routed to the HRSG through insulated ductwork. The purpose of the HRSG is to capture residual heat energy from the turbine exhaust to generate steam. Heat is transferred by primary convection from the hot CT exhaust gas to the feed water and steam systems. The feed water and steam will flow inside the vertically oriented finned tubes, and the gas flow will be directed horizontally across the tube rows.

For maximum flexibility, the bottoming cycle portion of a combined cycle is "oversized" to allow for higher output of the steam turbine (ST) than what could otherwise be achieved using the exhaust energy produced by the CT alone. Exhaust gases leaving the CT contain enough oxygen to support additional combustion of fuels (e.g., combustion from the duct burner). Additional heat is added to the bottoming cycle using Low NOx duct burners with a maximum rated heat capacity of approximately 590 MMBtu/hr higher heating value (HHV) per HRSG. This additional heat produces additional steam, which is passed through the ST flow path for additional electrical output (approximately 60 MW). The supplemental HRSG duct firing system consists of the duct burners, duct burner management system, duct burner fuel metering and regulation skid, and fuel supply. MSCE has proposed to supply these duct burners with only pipeline quality natural gas.

Each HRSG will be equipped with an SCR system to limit NOx emissions, and an oxidation catalyst control system to limit CO and VOC emissions. The duct burners will not operate independently of the combustion turbine.

No auxiliary boiler will be constructed for this project. Instead, via an interconnect with the existing Longview Power Plant, steam will be provided via the existing Longview Unit 1 Auxiliary Boiler and allow for bi-directional steam flow between Longview Unit 1 and MSCE Units 1 & 2. The purpose/need of this auxiliary steam is for preheating the HRSG and ST during startup events.

Steam Turbine/Generator (ST)

The steam turbine/generator will utilize steam developed in both HRSGs to generate electricity. A single steam turbine generator will receive steam from the HRSGs and will discharge the low-pressure exhaust steam to the condenser. The steam turbine generator will be designed to achieve a maximum rating of approximately 430 MW.

Mechanical Draft Cooling Tower

The steam from the ST exhausts directly into the condenser, where the steam is condensed by the circulating water passing through the condenser tubes. Condensate formed in the condenser is collected in the hot well. Recoverable steam and condensate from cycle drains and other reclaimable steam are also routed to the condenser hot well. The steam surface condenser relies on the circulating water system to provide cooling water for heat exchange. The circulating water system rejects the waste heat to atmosphere via a wet mechanical draft cooling tower by sensible heat transfer (increasing the temperature of the air passing across the tower) and latent heat transfer (evaporating a portion of the circulating water into the air passing across the tower). The cooling tower is designed to reject heat returned from the steam surface condenser and the plant auxiliary cooling water system. The cooled circulating water is collected in the cooling tower basin, and pumped back to the condenser water boxes, repeating the process. A circulating water chemical feed system will be included.

During the cooling process, small water droplets, known as cooling tower drift, escape to the atmosphere through the cooling tower exhaust. To minimize this effect, the cooling tower will be equipped with drift eliminators. Drift eliminators provide multiple directional changes of airflow which helps prevent the escape of water droplets and reduce particulate matter emissions from the cooling tower.

Firewater Pump (FWP)

A 240 hp output (179 kW) standby firewater pump will be used to supply water during emergency conditions. The fire water pump will use ultra-low sulfur diesel (ULSD) fuel, with a sulfur content no greater than 0.0015% by weight. The fire water pump will also be periodically operated for short periods per the manufacturer's maintenance instructions to ensure operational readiness in the event of an emergency. The fire water pump is expected to operate less than 100 hours per year.

Emergency Generator (EG)

An emergency generator (2,100 bhp) will be used for emergency backup electric power. The fuel for the emergency generator will be ULSD with a sulfur content no greater than 0.0015% by weight. The emergency generator will be periodically operated for short periods per the manufacturer's maintenance instructions to ensure operational readiness in the event of an emergency. MSCE expects to operate this emergency generator less than 100 hours per year.

Fuel Gas Heater (FGH)

Two (2) fuel gas heaters (7 MMBtu/hr, approximate) will be used to preheat the pipeline natural gas received by the plant. Preheating the fuel prior to combustion in the CTs increases their efficiency, safeguards the fuel pipelines from icing, and protects the CTs from condensates (liquid droplets) in the pipeline quality natural gas.

The fuel supply for the Project will be provided via a 6.2 mile 20" pipeline interconnecting onto both the Columbia 1804 and 10240 interstate pipelines located near Greensboro, PA. At this interconnection, there will be a metering station allowing connection with the dual supply lines that are integral to the Columbia pipeline. Electric gas compression equipment will be added to this line and will have those facilities located on the Unit 2 site. The facility will have the ability to obtain natural gas from Hope Gas, Inc. (dba Dominion Energy West Virginia), the local natural gas retailer.

Pipeline Gas Compressors

The initial project includes two pipeline gas compressor units. The compressors are electric-driven, 2,750 HP (Toshiba J2758, or equivalent) with a 4-throw reciprocating fluid end (Ariel JGC/4, or equivalent). The manufacturer states that there are no GHG/VOC emissions associated with the operation of the units. Additionally, the manufacturer states that there will be no GHG/VOC emissions associated with the startup and shutdown of compressor units during normal operation since no purge will be necessary. MSCE is currently evaluating the need for these compressors to support the operation of the proposed EGU.

SITE INSPECTION

On February 13, 2020, the writer conducted a site visit of the proposed site for MSCE's project. Mr. Brian Hoyt , Compliance and Environmental Manager for Longview Power LLC, and Mr. Steve Nelson, from Longview Power LLC. accompanied the writer during this site visit. This visit included a visit to the existing EGU at the Maidsville Facility.

The following is a photograph taken from observation deck of the existing unit facing due North towards the proposed site. The proposed site is beyond the road and on the left side of the powerline.

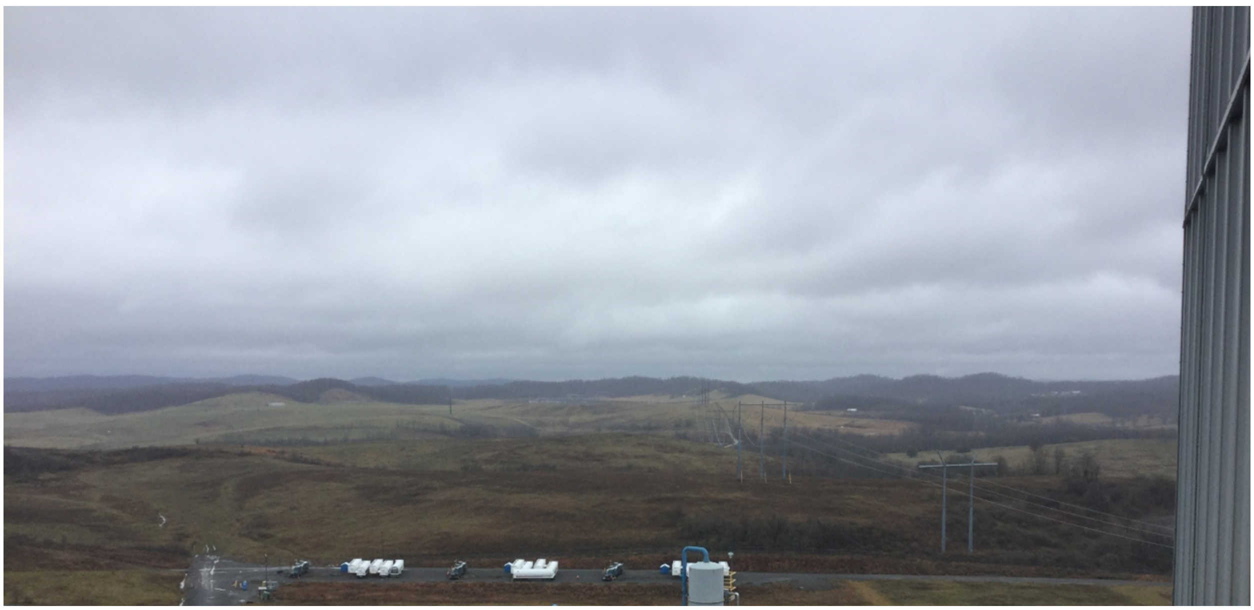

Figure 1Photograph of MSCE's Proposed Site on February 13, 2020.

There are several structures across from the closest access road to the site, including Fort Martin United Methodist Church. The nearest dwelling to the proposed site is approximately 3,300 feet away at a heading of east from the site. The writer determined that the proposed location is appropriate for these emission sources.

The proposed EGUs and Longview Power's existing coal fired EGU will be sharing the same switch yard, which is located north of the proposed site in Pennsylvania.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Combustion Turbines & Duct Burners

MSCE proposed to install two CT at the proposed site. These two CT will be equipped with either GE or MHPS technology, which is a lean pre-mix combustion technology, and selective catalytic reduction (SCR) to reduce oxidizes of nitrogen (NO_x) and an add-on oxidation catalyst to reduce carbon monoxide (CO) and volatile organic compound (VOCs) emissions. The two manufacturer's technologies optimize performance of the turbine while minimizing the formation of NO_x, CO, and VOC emissions at typical conditions during normal operations. These technologies as well as the proposed add-on controls are not capable of reducing emissions of NOx, CO, or VOCs during startup and shutdown events.

MSCE proposed no operating limitations on the two CTs or for the duct burners in the permit application. To determine which operating case could yield the greatest hourly mass emission rate, MSCE with the assistance of two CT manufacturers developed 34 different normal operating cases. These cases include different seasons of the year (summer, winter), operating load of CT, status of the duct burner, and whether the evaporator is operating or not. MSCE determined the hourly potential emissions from each of the two models of CT over these 34 normal operating cases.

The controlled emission rates during these cases were based on the following concentrations in terms of part per million dry volumes (ppmvd) corrected to 15% oxygen (O_2) content.

- 2 ppmvd for NO_x
- 2 ppmvd for CO
- 1 ppmvd without duct firing and 2 ppmvd with duct firing for VOCs

Both CT manufacturers anticipate that their combustion control technologies can minimize NOx formation during normal operation to 25 ppm of NOx at 15% oxygen before the SCR.

Sulfur dioxide (SO_2), particulate matter (PM), PM less than 10 microns (PM_{10}), PM less than 2.5 microns ($PM_{2.5}$), and sulfuric acid mist (H_2SO_4) were based on functions using maximum sulfur loading in the natural gas of 0.4 grains per 100 scf of gas. SO_2 was determined on a mass balance approach and assumed 100% of the sulfur in the natural gas is converted into these pollutants. PM, PM_{10}, and $PM_{2.5}$ emissions were determined using a 100% conversion of the sulfur in the fuel into ammonium sulfate ($(NH_4)_2SO_4$).

Normal Operation: MSCE developed 34 operating cases, which are grouped into two main categories which are 2x1 and 1x1 configurations. 2x1 configuration represents both combustion turbines operating, while 1x1 configuration represents one combustion turbine. These cases/modes are divided based on ambient conditions for the time of year, loading of the unit, and operating status of the evaporative coolers and duct burners. The following table lists these operating modes and conditions.

Table 3 Operating Modes and Conditions for the CTs

Case No.	Case Description	CT Load	Ambient Dry Bulb Temp, Relative Humidity		Evaporative Coolers	Duct Burners
			M501JAC	GE 7HA.03		
2 x 1 Configuration						
1	Winter, 100% Load	100%	12.9 / 71.8	12.9 / 75	Off	Off
2	Winter, 100% Load,	100%	12.9 / 71.8	12.9 / 75	Off	On
3	Winter, 75% Load	75%	12.9 / 71.8	12.9 / 75	Off	Off
4	Winter, 50% Load	50%	12.9 / 71.8	12.9 / 75	Off	Off
5	Winter, MECL	MECL	12.9 / 71.8	12.9 / 75	Off	Off
6	Average, 100% Load	100%	53.7 / 69.6	53.7 / 69	Off	Off
7	Average, 100% Load	100%	53.7 / 69.6	53.7 / 69	Off	On
8	Average, 75% Load	75%	53.7 / 69.6	53.7 / 69	Off	Off
9	Average, 50% Load	50%	53.7 / 69.6	53.7 / 69	Off	Off
10	Average, MECL	MECL	53.7 / 69.6	53.7 / 69	Off	Off
11	Summer, 100% Load	100%	87.0 / 46.4	87.0 / 46.5	On	Off
12	Summer, 100% Load	100%	87.0 / 46.4	87.0 / 46.5	On	On
13	Summer, 100% Load	100%	87.0 / 46.4	87.0 / 46.5	Off	Off
14	Summer, 100% Load	100%	87.0 / 46.4	87.0 / 46.5	Off	On
15	Summer, 75% Load	75%	87.0 / 46.4	87.0 / 46.5	Off	Off
16	Summer, 50% Load	50%	87.0 / 46.4	87.0 / 46.5	Off	Off
17	Summer, MECL	MECL	87.0 / 46.4	87.0 / 46.5	Off	Off
1 x 1 Configuration						
18	Winter, 100% Load	100%	12.9 / 71.8	12.9 / 75	Off	Off
19	Winter, 100% Load	100%	12.9 / 71.8	12.9 / 75	Off	On
20	Winter, 75% Load	75%	12.9 / 71.8	12.9 / 75	Off	Off
21	Winter, 50% Load	50%	12.9 / 71.8	12.9 / 75	Off	Off
22	Winter, MECL	MECL	12.9 / 71.8	12.9 / 75	Off	Off
23	Average, 100% Load	100%	53.7 / 69.6	53.7 / 69	Off	Off
24	Average, 100% Load	100%	53.7 / 69.6	53.7 / 69	Off	On
25	Average, 75% Load	75%	53.7 / 69.6	53.7 / 69	Off	Off
26	Average, 50% Load	50%	53.7 / 69.6	53.7 / 69	Off	Off
27	Average, MECL	MECL	53.7 / 69.6	53.7 / 69	Off	Off
28	Summer, 100% Load	100%	87.0 / 46.4	87.0 / 46.5	On	Off
29	Summer, 100% Load	100%	87.0 / 46.4	87.0 / 46.5	On	On
30	Summer, 100% Load	100%	87.0 / 46.4	87.0 / 46.5	Off	Off
31	Summer, 100% Load	100%	87.0 / 46.4	87.0 / 46.5	Off	On
32	Summer, 75% Load	75%	87.0 / 46.4	87.0 / 46.5	Off	Off
33	Summer, 50% Load	50%	87.0 / 46.4	87.0 / 46.5	Off	Off
34	Summer, MECL	MECL	87.0 / 46.4	87.0 / 46.5	Off	Off

Note 1. The Duct Firing cases will be designed to provide an increased output of approximately 15% over the corresponding STG unfired output case.
Note 2. CTG = Combustion Turbine Generator: MECL – Minimum Emissions Compliant Load

The load cases that yielded the highest emission rate for all pollutants for the models from both CT manufacturers, was at 100% load with duct burners firing in the summer for the GE model CT and winter for the MHPS model CT.

Table 4 Summary of the Highest Hourly between the Turbine Manufacturers

CT Manufacturer	CT Model	Pollutant (lb/hr)							
		Case No.	NO_x	CO	VOC	PM	SO_2	H_2SO_4	CO_2
GE	7HA.03	19	**34.09**	**20.76**	**11.89**	23.36	**6.02**	**4.28**	**607,982**
MHPS	M501JAC	12/29	32.09	19.54	11.19	24.99	5.00	2.91	519,619
MHPS	M501JAC	14/31	31.37	19.10	10.94	**25.32**	4.89	2.10	507,911

Startup/Shut Down (SUSD): MSCE obtained emission characteristics from both manufacturers for startup and shutdown events. Startup events were defined as three different sub-events: hot starts, warm starts, and cold starts. These sub-events are defined based on the duration from the previous shutdown. Hot starts are defined as 8 hours or less from previous shutdown. Warm starts are defined after 8 hours but no longer than 72 hours from previous shutdown and cold starts are restarts after 72 hours from the previous shutdown.

The two CT manufacturers have different durations from ignition, or standstill, to minimum emission-compliant load (MECL), which results in different emission rates during these events. To minimize these emissions, the startup duration must be reduced. Also, MSCE wants to minimize the time that the units are operating at MECL and waiting to be dispatched by the grid operator (PJM) to minimize fuel cost. Thus, the timing (duration) for successful startups is key.

The following tables are the individual manufacturers' provided emission rates and other key parameters during startup and shutdown events.

Table 5 MHPS M501JAC SUSD Emissions and Parameters

Parameter	Cold Start	Warm Start	Hot Start	Shutdown
Duration, minutes	40	35	35	15
Heat Input, MMBtu/event	1,219	993	993	348
Stack Exhaust Flowrate (average), acfm	1,023,454	1,009,146	1,009,146	1,001,349
Stack Temperature (average), deg F	209.6	209.6	209.6	209.6
NO_X Emissions, lb/event	85.8	79.2	70.4	**113.3**
CO Emissions, lb/event	**552.2**	436.7	160.6	198.0
VOC Emissions, lb/event	143.0	127.6	104.5	**182.6**
PM Emissions, lb/event	**3.3**	2.2	2.2	1.1
SO_2 Emissions, lb/event	**1.37**	1.12	1.12	0.39

Table 6 GE 7HA.03 SUSD Emissions and Parameters

Parameter	Cold Start	Warm Start	Hot Start	Shutdown
Duration, minutes	70	60	30	14
Heat Input, MMBtu/event	2,640	2,244	946	220
Stack Exhaust Flowrate (average), acfm	817,787	782,149	674,174	941,044
Stack Temperature (average), deg F	138.2	138.2	138.2	138.2
NO_X Emissions, lb/event	**319.0**	242.0	137.5	44.0
CO Emissions, lb/event	**1782.0**	726.0	583.0	126.5
VOC Emissions, lb/event	**572.0**	154.0	148.5	99.0
PM Emissions, lb/event	**27.5**	23.1	11.0	5.5
SO_2 Emissions, lb/event	**2.96**	2.52	1.06	0.25

The following table summarizes the highest emitting situation, per pollutant, between the two manufacturers during startup and shutdown events.

Table 7 Summary of the SUSD Emissions

Pollutant		Hot Start	Warm Start	Cold Start	Shutdown	Annual tpy
NO_x	lb/event	137.5	242.0	319.0	113.3	
	tons/year	12.9	4.36	1.75	13.2	32.2
CO	lb/event	583.0	726.0	1,782	198.0	
	tons/year	54.5	13.1	9.8	23.2	100.5
VOC	lb/event	148.5	154.0	572.0	182.6	
	tons/year	13.9	2.77	3.15	21.4	41.2
Total PM	lb/event	11.0	23.1	27.5	5.5[3]	
	tons/year	1.03	0.416	0.151	0.644	2.24
SO_2	lb/event	2.96	2.52	2.96	0.39	
	tons/year	0.28	0.05	0.02	0.05	0.4
Duration	minutes	30	60	70	15	
No of events per year	No. per year	187	36	11	234	
Annual	Hours per year	94	36	13	55	

MSCE used 234 complete events per year for each CT, which tallies to 197 hours of SUSD events per year, per CT, to determine the annual potential to emit for the CTs.

MSCE estimated emissions of Hazardous Air Pollutants using emission factors from AP-42 for natural gas fired turbines and external combustion devices (duct burners) except for formaldehyde.[4] Formaldehyde emissions, before the oxidation catalyst, were based on an August 21, 2021, USEPA Memo and a control efficiency of 90% was applied.[5] The maximum hourly rate of formaldehyde was estimated to be 0.85 pounds per hour, per CT. MSCE did not apply any control efficiency to any of the other volatile organic HAPs. MSCE estimated total HAPs from each CT, including duct firing, at 2.67 pounds per hour and 11.7 tons per year with no limitation of operation of the CT or duct burner firing.

[4] AP-42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources, Chapter 1.4, July 1998, Tables 1.4-3 and 1.4.-4., Chapter 3.1, April 2000, Tables 3.1.3.

[5] Roy Sims, US EPA Emission Standards Division, Memorandum on Hazardous Air Pollutant (HAP) Emission Control Technology for New Stationary Combustion Turbines, August 21, 2001.

Fuel Gas Heaters (FGH-1 & FGH-2)

MSCE obtained emission factors from potential vendors to determine emissions from the two natural gas fired fuel gas heaters for the criteria pollutants, except for sulfur dioxide and sulfuric acid. Sulfur dioxide emissions were determined using the maximum sulfur loading in the natural gas of 0.4 grains per 100 scf on a lower heating value basis. Sulfuric acid emissions were based on assuming no more than 5% of sulfur dioxide emissions would be converted into sulfuric acid. HAP emissions were developed using emission factors from AP-42.[6] Each of these heaters will have a maximum heat input of 7 MMBtu/hr, which was used in determining the potential emissions from these heaters. The following table is a summary of the potential emissions from the heaters.

Table 8 Emissions from the Fuel Gas Heaters

Pollutant	Emission Factor	Short-Term Emissions (1 FGH)	Annual Emissions (1 FGH)	Annual Emissions (2 FGHs)
	(lb/MMBtu)	(lb/hr)	(tons/yr)	(tons/yr)
NO_x	0.0360	0.25	1.10	2.21
CO	0.0388	0.27	1.19	2.38
VOC	0.00700	0.05	0.21	0.43
$PM_{10}/PM_{2.5}$	0.00777	0.05	0.24	0.48
SO_2	0.00130	0.01	0.04	0.08
H_2SO_4	0.00010	0.00	0.00	0.01
GHG	131.4	919.77	4,029	8,057
CH_4	0.0066	0.05	0.20	0.41
N_2O	0.00132	0.01	0.04	0.08
Total HAPs	0.00206	0.01	0.06	0.13

Fire Water Pump (FWP-1)

The applicant used emissions data provided from the manufacturer and emission factors in Table 3.2-1 of AP-42 to determine the potential emissions from the 240 hp engine. CO_2e emissions were determined in accordance with 40 CFR 98, Subpart C. Annual emissions were based on the engine operating for 100 hours per year.

Table 9 Emissions from the Fire Water Pump (FWP-1)

Pollutant	Hourly Rate (lb/hr)	Annual Rate tpy
Oxides of Nitrogen (NO_x)	1.59	0.83
Carbon Monoxide (CO)	1.38	0.70
Volatile Organic Compounds (VOCs)	1.59	0.19
Sulfur Dioxide (SO_2)	<0.01	<0.01
$PM/PM_{10}/PM_{2.5}$	0.08	<0.01
Carbon Dioxide Equivalence (CO_2e)	417.8	20.9
Total Hazardous Air Pollutants (HAPs)	0.01	<0.01
Formaldehyde (HAP)	3.2E-3	1.6E-4

[6] AP-42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources, Chapter 1.4, July 1998, Tables 1.4-3 and 1.4.-4.

Emergency Generator (EG-1)

The applicant used emissions data provided from the manufacturer and emission factors in Table 3.2-1 of AP-42 to determine the potential emissions from the 2,100 hp engine. CO_2e emissions were determined in accordance with 40 CFR 98, Subpart C. Annual emissions were based on the engine operating for 100 hours per year.

Table 10 Emissions from the Emergency Generator (EG-01)

Pollutant	Hourly Rate(lb/hr)	Annual Rate tpy
Oxides of Nitrogen (NO_x)	24.6	1.23
Carbon Monoxide (CO)	1.94	0.10
Volatile Organic Compounds (VOCs)	0.46	0.02
Sulfur Dioxide (SO_2)	0.04	<0.01
$PM/PM_{10}/PM_{2.5}$	0.23	0.01
Carbon Dioxide Equivalence (CO_2e)	1,961.00	98.05
Total Hazardous Air Pollutants (HAPs)	0.03	0.01
Formaldehyde (HAP)	<0.01	<0.01

Tanks

The proposed project will include the operation of four above-ground storage vessels to support operational activities. DT-1 and DT-2 are 300-gallon and 125-gallon vessels which will store diesel fuel for the emergency generator and fire water pump. The applicant calculated the breathing and working losses from both vessels of VOCs to be less than 0.01 pounds per hour due to the size of the vessel, type of liquid being stored, and volume throughput needed to support 100 hours per year for the operation of the emergency generator and fire water pump.

Cooling Tower (WCT-1)

MSCE estimated the particulate matter emissions from the cooling towers using water droplet size distribution data published in "Calculating Realistic PM10 Emissions from Cooling Towers" by Reisman and Frisbie.[7] No limitation of operation was used in determining the potential emissions from the new cooling towers.

Table 11 Particulate Matter Emissions from the Cooling Tower

Parameter	Units	PM	PM10	PM2.5
Flow	gal/min	270000	270000	270000
Drift	%	0.0005	0.0005	0.0005
Maximum TDS	ppm	400	400	400

[7] Joel Reisman and Gordon Frisbie, Graystone Environmental Consultants, Calculating Realistic PM10 Emissions from Cooling Towers, http://arapenv.com/doc/calc-pm-from-cooling-towers.pdf

Cycles of Concentration		8	8	8
Minutes per Hour Conversion	min/hr	60	60	60
Pound Per Gallon Conversion	lb/gal	8.34	8.34	8.34
Cooling Tower Availability	%	100%	100%	100%
PM10 to PM2.5 Conversion		1	1	0.5
lb/hr		2.16	2.16	1.08
tons/yr		9.47	9.47	4.73
PM (lb/hr) = Flow*[(Drift%)/100]*[TDS/10^6]*CoC*60*8.34				

Project Summary

Emissions from the proposed new sources are listed in the following table.

Table 12 Summary of Emissions by Source for the Project

Source	**NO_x (tpy)**	**CO (tpy)**	**PM_{10} (tpy)**	**$PM_{2.5}$ (tpy)**	**VOC (tpy)**	**SO_2 (tpy)**	**CO_2e (tpy)**	**HAPs (tpy)**
CT-01w/DB	158.5	136.9	100.2	100.2	70.2	19.9	2,563,571.2	11.70
CT-02 w/DB	158.5	136.9	100.2	100.2	70.2	19.9	2,563,571.2	11.70
FGH-01	1.11	1.19	0.24	0.24	0.21	0.04	4,028.50	0.06
FGH-02	1.11	1.19	0.24	0.24	0.21	0.04	4,028.50	0.06
FWP-1	0.08	0.07	0.01	0.01	0.08	0.0001	20.9	>0.01
EG-1	1.23	0.10	0.01	0.01	0.02	0.002	98.00	0.01
Cooling Tower	0.00	0.00	9.47	4.73	0.00	0.00	0.00	0.00
Totals	320.53	276.35	210.37	205.63	140.92	39.88	5,135,318.30	23.54

REGULATORY APPLICABLILITY

West Virginia State Implementation Program (SIP) Rules

There are eight West Virginia State Rules that apply to this proposed project.

45 CSR 2 - TO PREVENT AND CONTROL PARTICULATE MATTER AIR POLLUTION COMBUSTION OF FUEL IN INDIRECT HEAT EXCHANGERS

45 CSR 10 - TO PREVENT AND CONTROL AIR POLLUTION FROM THE EMISSION OF SULFUR OXIDES

45 CSR 13 - PERMITS FOR CONSTRUCTION, MODIFICATION, RELOCATION AND OPERATION OF STATIONARY SOURCES OF AIR POLLUTANTS, NOTIFICATION REQUIREMENTS, ADMINISTRATIVE UPDATES, TEMPORARY PERMITS, GENERAL PERMITS, PERMISSION TO COMMENCE CONSTRUCTION, AND PROCEDURES FOR EVALUATION

45 CSR 14 - PERMITS FOR CONSTRUCTION AND MAJOR MODIFICATION OF MAJOR STATIONARY SOURCES FOR THE PREVENTION OF SIGNIFICANT DETERIORATION OF AIR QUALITY

45 CSR 16 – STANDARDS OF PREFORMANCE FOR NEW STATIONARY SOURCES

45 CSR 30 – REQUIREMENTS FOR OPERATING PERMITS

45 CSR 34 – EMISSION STANDARD FOR HAZARDOUS AIR POLLUTANTS

45 CSR 33 - ACID RAIN PROVISIONS AND PERMITS

45 CSR 43 - CROSS-STATE AIR POLLUTION RULE TO CONTROL ANNUAL NITROGEN OXIDES EMISSIONS, ANNUAL SULFUR DIOXIDE EMISSIONS, AND OZONE SEASON NITROGEN OXIDES EMISSIONS

45 CSR 2 and 45 CSR 10 (Rules 2 & 10) establish emission standards and applicable requirements for certain types of stationary sources located in West Virginia. Rule 10 sets an allowable SO_2 emission rate for fuel burning units (boilers), manufacturing processes, and other process gas streams.

The proposed heat recovery steam generators (HRSGs) and fuel gas heaters (FGHs) are potentially subject to Rules 2 & 10. 45 CSR §2-11.1 and 45 CSR §10-10.1 excludes units with a heat input of less than 10 MMBtu/hr from Sections 4, 5, 6, 8 and 9. of Rule 2 and Sections 3 and 6 of Rule 10, which would apply to the fuel gas heaters (FGH-1 & FGH-2).

The combustion turbines do not meet the definition of either fuel burning unit or manufacturing process under Rule 10. When the duct burners are firing, the steam generated in the HRSG is specifically going to be used to generate electricity for sale and would meet the definition of type "A" fuel burning unit.[8] The rule does not establish an SO_2 standard for new electric generating units. It is implied a new unit would be subject to permitting rules that would establish a more stringent limit (e.g. Best Available Control Technology) or to a federal regulation that establishes an SO_2 standard.[9] The duct burners for each of the combined cycle combustion turbines will have a design heat input of greater than 10 MMBtu/hr and are subject to the limitations under Rule 2 as a fuel burning unit.[10] The duct burners are excluded from the testing and monitoring requirements in Rule 2[11] since the duct burners will be limited to consuming natural gas only.

Thus, the proposed fuel gas heaters and duct burners would be subject to the visible emission standard of 45 CSR §2-3.1., which is a 10 percent opacity limit. The duct burners are subject to the 0.05 lb/MMBtu PM standard of Rule 2[12]

Using the design heat input of each duct burner, Rule 2 would establish a PM limit of 29.3 pounds per hour for each unit. The applicant proposed a maximum PM rate of 25.32 lb per hour for the CTs. Utilizing natural gas for the CTs and associated duct burners, the proposed CTs can comply with the standards in Rule 2 without the use of any additional control devices.

The proposed combustion turbines and emergency generator have substantive federal requirements under 45 CSR §13-2.24.a. that makes these units "stationary sources" under Rule 13. 45 CSR §13-5.1 requires stationary sources to obtain a permit pursuit to this rule prior to installing the emission units.

The applicant submitted a complete application, paid the Rule 13 permit application filing fee, which includes the New Source Performance Standard (NSPS), National Emission Standard for Hazardous Air Pollutants (NESHAPs) and the major construction fees, and published a legal ad in the *Dominion Post* (local newspaper in Monongalia County, WV) on March 12, 2021.

West Virginia adopted the U.S. EPA Prevention of Significant Deterioration (PSD) program by establishing 45 CSR 14. The main function of this program is to allow economic growth while ensuring that the local ambient air quality and Class I Areas (Wilderness Areas and National Parks) are not adversely affected from major sources of air pollution. Under the Clean Air Act, a Class I Area is one in which visibility is protected more stringently than under the National Ambient Air Quality Standards; includes national parks, wilderness areas, monuments, and other areas of special national and cultural significance.

This program requires construction of major sources and major modifications of major sources to undergo review to ensure that the Best Available Control Technology (BACT) is installed, and used to limit emissions of criteria pollutants, as well as to conduct a scientific analysis to ensure that the impact from such growth does not adversely affect the subject areas.

Rule 14 defines a "major stationary source" as any of the following stationary sources of air pollution which emits or has the potential to emit 100 tons per year or more of any regulated

[8] 45 CSR §10-2.8.a.
[9] 45 CSR 13, 45 CSR 14, and 45 CSR 19.
[10] 45 CSR §2-3.1 and 4.1.a.
[11] 45 CSR §2-8.4.b.
[12] 45 CSR 2-4.1.a.

NSR pollutant: Fossil Fuel-fired Steam Electric Plant of More than 250 MMBtu/hr Heat Input,…

MSCE has proposed emission units that are classified as a "major stationary source" under Rule 14. MSCE then determined which pollutants emitted by the proposed project represents a significant increase in emissions, which is summarized in the following table.

Table 13 Summary of Project with Respect to the Significance Threshold Levels

Pollutant	**PTE of Expansion Project (tpy)**	**PSD Significance Threshold Level (tpy)**	**Does the Project Represent a Significant Increase in Emissions (Yes /No)**
PM[1]	210	25	**Yes**
PM_{10}	210	15	**Yes**
$PM_{2.5}$	210	10	**Yes**
NO_x[2]	320	40	**Yes**
CO	276	100	**Yes**
SO_2	39.9	40	No
VOCs[2]	99.3	40	**Yes**
H_2SO_4	35.8	7	**Yes**

1 – PM emissions includes only filterable particulate matter.
2 – Theses pollutants are precursors of ozone and has the same trigger level.

Because the project represents a "significant emission increase and significant net emissions increase" of one or more NSR Pollutants, then MSCE is required to determine if the project is significant for greenhouse gases (GHGs). The project by itself represents an increase of 5,135,327 tons per year of carbon dioxide equivalents. This potential to emit of GHGs is greater than the significance threshold of 75,000 tons per year of CO_2e and therefore the project is significant for GHG.[13]

Under PSD, a major source permit application requires an analysis to ensure implementation of Best Available Control Technology (BACT) is established and justified for each pollutant with a significant net emissions increase. A technical review has been performed to review BACT decisions, for the each of the pollutants, that have been determined by

[13] 45 CSR §14-2.80.d.

permitting authorities across the U.S. to satisfy BACT requirements. The applicant's BACT will be discussed later in this determination.

Rule 14, the major source permitting regulation, requires a demonstration that the project will not cause or contribute to a projected exceedance of the National Ambient Air Quality Standard or of the Class I or II Area Increment Levels for the NSR pollutants that the project is significant and a standard or increment level had been establish by the Clean Air Act. A summary of these demonstrations will be presented later in this determination and a detailed memo of the agency's review of these demonstrations is attached as Appendix A.

The facility is subject to the Title IV Acid Rain Program.[14] This is because the facility will contain new utility units (CT-01 & CT02) that will generate electricity for sale.[15] MSCE is required to submit a complete Acid Rain permit application to the agency at least 24 months before the date on which the unit commences operation.[16] The CTs are not subject to 40 CFR Part 76 – Acid Rain Nitrogen Oxides Emission Reduction Program because the proposed units can only be fired on natural gas, not coal.

The Cross-State Air Pollution Rule (CSAPR) was established by the EPA for EGUs rated greater than 25 MW to reduce the NO_x, SO_2 and Ozone emissions that could be transported downwind to other states to help in establishing attainment with the 8-hour National Ambient Air Quality Standards (NAAQS) for these air pollutants, which WV has adopted.[17] MSCE has determined that the proposed CTs are subject to the requirements of 40 CFR Part 97 Subparts AAAAA, BBBBB, CCCCC, and GGGGG.

CSAPR is a trading program with three sub-programs that requires sources to hold allowances to cover their actual emissions for each of the programs, which are NO_x Annual, NO_x Ozone Season Group 3, and SO_2 Group 1 Trading Programs. MSCE will be required to hold allowances for each of these trading programs based on the CTs actual NO_x and SO_2 emissions for surrender at the end of the respective control period (calendar year or ozone season) of the trading program.

CSAPR requires sources to monitor emissions of NO_x and SO_2 using methods and specifications outlined in the monitoring section of the Acid Rain Rule.[18]

Federal Regulations

New Source Performance Standards (NSPS)

New Source Performance Standards (NSPS) apply to new, modified, or reconstructed sources meeting the criteria established in Part 60.[19]

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[14] 45 CSR §33-4.1. & 40 CFR §72.6(a)(3)(i)
[15] 45 CSR §33-4.1. & 40 CFR §72.2
[16] 45 CSR 33-4.1., 40 CFR §72.9(a)(1)(i) & §72.30(b)(2)(ii)
[17] 40 CFR Part 97 & 45 CSR 43.
[18] 40 CFR Part 75, Subpart H.
[19] 40 CFR 60

Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

The proposed fuel gas heaters are rated with a maximum design heat input of 7 MMBtu/hr. The definition of affected source in Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units) is units between 10 MMBtu/hr and up to 100 MMBtu/hr. Thus, the proposed heaters are not affected sources and are not subject to the standards under Subpart Dc.

Subpart Da - Standards of Performance for Electric Utility Steam Generating Units

The duct burners for the two combustion turbines are designed with a heat input rating greater than 250 MMBtu/hr using a fossil fuel supply to generate steam for the purpose of generating electricity, which satisfy the criteria of Subpart Da of Part 60 of an affected source.[20] However, the heat recovery steam generators that are associated with a combustion turbine subject to Subpart KKKK are excluded as an affected source in Subpart Da.[21] The applicability of the two CT with HRSG under Subpart KKKK will be discussed later in this section.

Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

MSCE proposes the use of compression ignition (CI), four (4) stroke, reciprocating internal combustion engines (RICE) to provide emergency electric power and firewater service for the site. These engines will be manufactured after April 6, 2006, for the engines that are not fire pumps and fire pump engines after July 1, 2006. The proposed engines (EG-01 & FWP-1) will meet the applicability criteria of an affected source under Subpart IIII of Part 60 and will be subject to emission standards and requirements of this subpart.[22]

MSCE intends to operate these engines as emergency stationary CI engines under Subpart IIII, which limits operation of the engine to no more than 100 hours per year for non-emergency purposes (e.g., maintenance and readiness checks).[23][24]

Beside the type of operation/application of the stationary CI engine (non-emergency, emergency, fire pump), the regulation established the emission standard based on model year of the engine, maximum engine power rating, and displacement of the engine per cylinder.

MSCE proposed a fire pump (FWP-1) engine with a maximum power rating of 240 hp and an emergency engine with a rating of up to 3,353 hp. The proposed emergency engine will have a displacement of 4.9 liters per cylinder. Using these specific engine parameters, the following table was developed of the applicable emission standards from the regulation for each of the proposed engines.

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[20] 40 CFR §§60.40Da(a)(1) and (a)(2).
[21] 40 CFR 60.40Da(e)(1).
[22] 40 CFR §§60.4200(a)(2), (a)(2)(i), and (a)(2)(ii).
[23] 40 CFR §§60.4211(f), (f)(1) through (f)(3) excluding (f)(2)(ii)-(iii).
[24] Peter Tsirigotis, Director of Polices and Programs Division, Guidance on Vacatur of RICE NESHAP and NSPS Provisions for Emergency Engines, U.S. EPA, April 15, 2016.

Table 14 Subpart IIII Emission Standards for the Proposed Engines (EG-01 & FWP-1)

Model Year	Maximum Engine Power Rating	Type Engine	NMHC + NO_X (g/hp-hr)	CO (g/hp-hr)	PM (g/hp-hr)
2009 and later	130≤KW<225 (175≤HP<300)	Fire Pump	3.0[a]	2.6[a]	0.15[a]
2006 and later	kW>600 (hp>800)	Emergency	4.8[b]	2.6[b]	0.15[b]

a – 40 CFR 60.4205(c) & Table 4 to Subpart IIII of Part 60—Emission Standards for Stationary Fire Pump Engines

b – 40 CFR 60.4205(b) refers to 60.4202(b)(2), which refers to Table 1 in 40 CFR 89.112.

Besides these emission standards, the regulation establishes specifications for the diesel fuel used in both engines, which sets a maximum sulfur content in at 15 ppm.[25]

This regulation requires manufacturers to certify their engines under EPA's Nonroad Emission Regulations before the model year engine is entered into commerce. The regulation requires the operator purchase a certified engine and operate/maintain such engine in accordance with the manufacturer's written instructions. To show compliance with these emission standards, MSCE intends to purchase certified engines to meet the applicable emission standards.

Subpart KKKK - Standards of Performance for Stationary Combustion Turbines

U.S. EPA has promulgated an NSPS for stationary combustion turbines constructed, modified, or reconstructed after February 18, 2005. Subpart KKKK applies to combustion turbines with a peak heat input of 10 MMBtu/hr and greater. Both proposed model combustion turbines have a heat input rating near 3,990 MMBtu/hr. Therefore, the turbines are affected sources under this subpart.

Sources subject to Subpart KKKK are exempt from the requirements of Subpart GG (NSPS for combustion turbines constructed/modified/reconstructed after October 3, 1977).[26] Emissions from any associated HRSG and duct burners are regulated under this subpart.[27]

This subpart establishes emissions standards for NO_x and SO_2. These turbines would be limited to 0.060 lb of SO_2 per MMBtu/hr of heat input. MSCE proposed to consume natural gas with a maximum sulfur content of 0.4 grains per 100 standard cubic feet of gas in the CTs and duct burners. Under 40 CFR §60.4365, a source is exempt from monitoring fuel sulfur content if the source burns natural gas that is covered by a transportation agreement (Federal Energy Regulatory Commission tariff limit) with a maximum of 20 grains of sulfur per 100 standard cubic feet of gas (40 CFR §60.4365(a)).

40 CFR §60.4325 establishes NO_x standards for affected units as specified in Table 1 of Subpart KKKK. Both proposed model (GE 7HA.003 and MHPS M501JAC) turbines are new turbines firing natural gas with a heat input of greater than 850 MMBtu/hr. In this subcategory

[25] 40 CFR §60.4207(b) which refers to 40 CFR §1090.305.

[26] 40 CFR 60.4305(b)

[27] 40 CFR §60.4305(a)

of Table 1 of Subpart KKKK, these turbines are subject to a NO_x standard of 15 ppm at 15 percent oxygen (O_2) content or 0.43 pounds of NO_x per megawatt-hour of useful output.

For both models of CTs, MSCE proposed rates of NO_x at 2 ppm at 15 percent oxygen, which equates to 0.063 lb/MW (gross output basis) for the MHPS M501JAC and 0.059 lb/MW (gross output basis) for the GE 7HA.03. These proposed rates do not reflect startup and shutdown events. Neither of the proposed model CTs can use steam or water injection to control the formation of NO_x emissions. Therefore, the monitoring requirements for CTs using water or steam injection would not be applicable for the proposed models.[28]

The regulation establishes this 0.43 lb NOx per MWh on a 30-day rolling average basis. The source determines the NO_x emissions for the CT for each operating day and determines the average of that day with previous 29 consecutive operation days. Then, the source determines if excess NOx emissions had occurred (the portions of the 30-day average above 0.43 lb/MW), This cycle repeat again and again with day 31 being dropped before calculating the next 30-day rolling average.[29] These proposed CTs would meet the applicability criteria under the Acid Rain Program, which requires MSCE to monitor SO_2 and NO_x emissions from the CTs using methods and procedures outlined in Part 75.[30] Part 75 prefers units to use CEMs (Continuous Emission Monitor) to determine NO_x and SO_2 emissions from EGUs. There are alternative methods in Part 75 if a source meets the criteria (e.g., low mass emission unit). Subpart KKKK adopts these methods and/or procedures with a few exceptions, which are that units are not allowed to use emission data with data developed using Part 75 missing data procedures.[31]

MSCE has proposed to monitor the SO_2 emissions in accordance with the protocol for gas-fired units under Part 75 and NOx emissions using a CEMs in accordance with Part 75 monitoring requirements. Subpart KKKK allows these methods to be used to demonstrate compliance and determine excess emissions for the SO_2 and NO_x standards. Both proposed models of CTs can meet these standards.

Subpart OOOOa - Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015

The reciprocating natural gas compressors at the facility would only be receiving natural gas that is downstream of point of custody transfer or downstream of a natural gas processing plant. Therefore, these reciprocating compressors do not meet the definition of "crude oil and natural gas production source category" and are not affected source(s) under Subpart OOOOa of Part 60.[32]

Subpart TTTT - Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units

This regulation established emission standards to control greenhouse gas (GHG) emissions from new EGUs construction after January 8, 2014. Under this regulation, each of the CTs meets the criteria of an EGU and is subject to the emission standards under this

[28] 40 CFR §60.4335
[29] 40 CFR §60.4350(h)
[30] 40 CFR §72.6(a)(3)(i) and 40 CFR 75 Subpart
[31] 40 CFR §60.4350(d)
[32] 40 CFR §60.5430a and §60.5365a.

regulation.[33] The proposed CTs are subject to two standards: 1) 1,000 lb of CO_2 per MWh on gross basis during baseload operations, 2) 120 lb of CO_2 per MMBtu of heat input during non-baseload operations. NSPS Subpart TTTT requires EGUs subject to the gross energy output standard to measure (Appendix D, Part 75) or calculate (Appendix G, Part 75) CO_2 mass emissions and record the hourly gross electrical output from the EGU using watt meters. MSCE has requested to calculate the CO_2 emissions as allowed by the regulation to demonstrate compliance with the emission standard. The CO_2 standard in this regulation requires emissions of CO_2 from the affected source to be always counted towards the standard and the averaging period is a 12-month rolling average.

Regulations under Part 63

The site of the proposed project is adjacent to the Longview Power Site. The Longview Power Site has the potential to emit of 15.87 tpy of total HAPs.[34] Longview Power LLC and Mountain State Energy Clean Energy LLC are subsidiaries of Mountain State Energy Holding LLC.[35] Thus, these two adjacent sites are under common control. HAP emissions from both sites will be aggregated together to determine if the whole site is a major source of HAP emissions.[36] With this project as proposed, the site has the potential to emit of 39.19 tpy of total HAPs. Therefore, the site will become a major source of HAPs with the operation of the emission source within this application.

The following is a list of the applicable rules the proposed emission units are subject to under 40 CFR Part 63.

Subpart YYYY – CTs

Subpart ZZZZ – Engines for the Firewater Pump and Emergency Generator

Subpart DDDDD – Fuel Gas Heaters

Subpart YYYY - National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines

MSCE's CTs are classified as new stationary combustion turbines.[37] The model of the CTs that MSCE had proposed are a lean premix gas-fired stationary combustion turbine. The regulation has stayed the emission standard for new or reconstructed combustion turbines that are lean premix gas fired CTs.[38] EPA has proposed to lift the stay but has not taken final action on the proposal.[39]

Should EPA lift the stay on emission standards for new and reconstructed CTs, the formaldehyde standard for the proposed turbines would be 91 parts per billion volumes dry

[33] 40 CFR §§60.5509(a), (a)(1), and (a)(2).
[34] Fact Sheet for Permit Number R30-06100134-2018, page 2.
[35] West Virginia Secretary of State, WV SOS - Business and Licensing - Corporations - Online Data Services
[36] 40 CFR §63.2, "Major Source"
[37] 40 CSR §63.6090(a)(2)
[38] 40 CFR §63.6095(d)
[39] National Emission Standards for Hazardous Air Pollutants: Stationary Combustion Turbines Residual Risk and Technology Review; Proposed Rule; 84 FR 15046; April 12, 2019.

(ppbvd) corrected to 15% oxygen.[40] Based on projected stack characteristics and a formaldehyde emission rate of 2.13E-4 lb/MMBtu, the formaldehyde concentration for both model CTs across all the proposed load scenarios is 85 ppbvd corrected to 15% oxygen. Thus, both proposed model CTs will be capable of meeting this standard should EPA lift the stay.

This regulation excludes duct burners and associated HRSG.[41] The regulation understands that the difficulties in separating the emissions from the CT and duct burner by allowing the sources to comply with the formaldehyde standard with the duct burners in operation.

Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

The proposed emergency generator and firewater pump engines are stationary reciprocating internal combustion engines that are manufactured after the applicability date in the regulation.[42] Therefore, both engines are classified as a new stationary engine located at a major source of HAPs. Since the engine for the firewater pump has a power output rating of less than 500 bhp and is subject to NSPS Subpart IIII, no further requirements of Subpart ZZZZ apply to the engine for the firewater pump.[43]

The engine for the proposed emergency generator has a rating of greater than 500 bhp. MSCE will not operate the emergency generator for peak shaving or for emergency demand response.[44] Thus, MSCE only needs to meet the initial notification requirements of Subpart ZZZZ for the emergency generator. [45] No other requirements of Subpart ZZZZ are applicable for the emergency generator.

Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters

This regulation establishes emission standards and work practice standards for boilers and process heaters located at a major source of HAPs. The two fuel gas heaters (FGH-1 & FGH-2) are process heaters with a maximum design heat input of 7 MMBtu/hr and will be constructed after April 1, 2013. Thus, these fuel gas heaters are classified as new process heaters at a major source of HAPs. The proposed heaters are designed to burn natural gas, which meet the criteria of Gas 1 fuel in the regulation. These heaters meet the criteria of Gas 1 fuel subcategory with a design heat input of less than 10 MMBtu/hr. Therefore, the proposed fuel gas heaters are only subject to the tune-up requirement of every two (2) years.[46]

The proposed duct burners with associated HRSG under this regulation are considered as EGU firing with 100% natural gas, and therefore, are not affected units under this regulation.[47]

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[40] 40 CFR §63.6100, and Item 1 of Table 1 to Subpart YYYY of Part 63 – Emission Limitations
[41] 40 CFR §63.6092
[42] 40 CFR §§63.6590(2)(i) and (2)(ii)
[43] 40 CFR §63.6590(c)(6)
[44] 40 CFR §63.6590(b) & (b)(i).
[45] 40 CFR §63.6590(b) & (b)(i).
[46] 40 CFR §63.7500(e)
[47] 40 CFR §63.7491(a)

There are no other subparts under Part 63 that are potentially applicable to the proposed emission units. Under 45 CSR 30, the Maidsville Facility will be classified as a major source of HAPs under the Title V Operating Permit Program. As a result of this action, the existing Longview facility will be required to update the facility's Title V Permit within 12 months after initial start-up of the proposed units.

Mandatory Greenhouse Gas Reporting Regulations (40 CFR Part 98)

The proposed facility is subject to the requirements specified in 40 CFR Part 98, as per 40 CFR Section 98.2 because this facility will emit greater than 25,000 metric tons of carbon dioxide equivalent (CO2e) in any 12 consecutive month period.

This change in HAP classification for the whole facility will require Longview Power LLC to modify their current Title V Permit to address the new applicable requirements for the existing sources (e.g., existing emergency generator, auxiliary boiler).

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

Most non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows, or suspects may cause cancer or other serious human health effects. The following HAPs are routinely emitted from combustion units: Acetaldehyde, Benzene, Ethylbenzene, Formaldehyde, Hexane, Toluene, and Xylene. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System [IRIS]):

Table 15 Toxicity Classification of the Emitted HAPs

HAP	Type	Known/Suspected Carcinogen	Classification
Acetaldehyde	VOC	Yes	Category B2 (Probable human carcinogen)
Formaldehyde	VOC	Yes	Category B1 - Probable Human Carcinogen
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Ethylene benzene	VOC	No	Inadequate Data
Hexane	VOC	No	Inadequate Data
Toluene	VOC	No	Inadequate Data
Xylenes	VOC	No	Inadequate Data

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health effects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. *There are no federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound refer to the IRIS database located at www.epa.gov/iris.

PSD REVIEW REQUIRMENTS

45 CSR 14 (PSD) requires applicants to determine the Best Available Control Technology (BACT) for each process and pollutant for which the project is major. These applicants must demonstrate that the increase in emissions of the pollutant will not cause or contribute to an exceedance of the National Ambient Air Quality Standard (NAAQS) and will not exceed the increment threshold of the pollutant for which the project is major. In addition to these requirements, the applicant must prepare an additional impacts analysis which must include a visibility impact analysis. These requirements ensure that the project in question is implementing the BACT level of control technology for each pollutant for which the project is major and that projected impacts associated with such increases would have minimal effects on the environment.

Best Available Control Technology (BACT) Evaluation

MSCE has classified their emission sources with this project as a major source and determined that the project will be significant for NOx, CO, PM, PM_{10}, $PM_{2.5}$, H_2SO_4, VOCs and GHGs. As such, an analysis to ensure implementation of the Best Available Control Technology (BACT) is required for each pollutant with a significant net emissions increase. MSCE conducted a technical review to investigate BACT decisions for PM, PM_{10}, $PM_{2.5}$, NOx, CO, VOCs, and GHGs pollutants that have recently been made by permitting authorities across the U.S. to satisfy BACT requirements.

METHODOLOGY

In the 1977 Amendments to the federal Clean Air Act (CAA), Congress enacted a program for the PSD regulations defining the requirements that a state must meet if that state chooses to adopt and obtain U.S. EPA approval of a PSD program.[48] Among the PSD requirements imposed, the state must require any proposed major emitting facility subject to the PSD program to apply BACT for each pollutant subject to regulation under the CAA that the source emits in a significant amount.[49] Under the CAA, BACT limits are to be determined on a case-by-case basis after taking into account energy, environmental, and economic impacts.[50] West Virginia has an approved PSD program.[51]

45 CSR 14 requires that BACT be applied to major modifications for each pollutant with a significant net emissions increase. The definition of "significant" is pollutant specific and is found in West Virginia regulations under §45-14-2.74.a. The net emissions increase for PM, PM_{10}, $PM_{2.5}$ and GHG exceeds the SERs as noted in previous sections, thereby triggering the requirement for BACT review.

In a memorandum dated December 1, 1987, U.S. EPA stated its preference for a "top-down" analysis for BACT review. The first step in this approach is to determine, for the emission unit in question, the most stringent control available for a similar or identical source or source category. If it can be shown that this level of control is technically, environmentally, or economically infeasible for the unit in question, then the next most stringent level of control is

[48] 42 U.S.C. §§7410(a)(2)(D) and 7471.
[49] 42 U.S.C. §§7475(a)(4)
[50] 42 U.S.C. §§7479(3)
[51] Approval and Promulgation of Air Quality Implementation Plans; West Virginia; Permits for Construction and Major Modification of Major Stationary Sources for the Prevention of Significant Deterioration of Air Quality, 83 FR 48716, September 27, 2018.

determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections. Presented below are the five basic steps of a top down BACT review as identified by the U.S. EPA.

- **Step 1 – Identify All Control Technologies**

  Available control technologies with the practical potential for application to the emission unit and regulated air pollutant in question are identified. Available control options include the application of alternate production processes and control methods, systems, and techniques including fuel cleaning and innovative fuel combustion, when applicable. The application of demonstrated control technologies in other similar source categories to the emission unit in question can also be considered. Technologies may be eliminated in subsequent steps in the analysis based on technical and economic infeasibility or environmental and energy impacts, control technologies with potential application to the emission unit under review are identified.

  Step 2 – Eliminate Technically Infeasible Options

  The next step in the top-down analysis is an evaluation of the technical feasibility of each of the identified control options. Each of the potential control technologies considered is described below along with a discussion of the technical feasibility with respect to the Project.

  Step 3 – Rank Remaining Control Technologies by Economics and Other Environmental Factors Control Effectiveness

  Step 4 – Evaluate Most Effective Controls and Document Results.

  Step 5 – Identify BACT

MSCE BACT Summary

MSCE's BACT has been summarized in the following tables by emission unit.

Table 16 BACT Summary for the Combustion Turbines w & w/o Duct Burners

Pollutant	Available Control Technology	Technologic Feasible Options	Economically, Environmentally, Energetically Feasible	Identify BACT	MSCE Proposed BACT
NOx	Selective Catalytic Reduction (SCR)	✓	✓	✓	Combustion Controls (DLN for CTs) with NO_x rate of 2 ppm @ 15% O_2
	SCONOx™	×	×	×	
	XONON ™	×	×	×	
	Selective Non-Catalytic Reduction	×	×	×	
	Combustion Controls (DLN & Low NOx Burners)	✓	✓	✓	
	Wet Injection	×	×	×	
CO	Good Combustion Practices	✓	✓	✓	Oxidation Catalysts & GCP with CO limit of 2.0 ppm @ 15% O_2
	Oxidation Catalyst	✓	✓	✓	
VOC	Good Combustion Practices	✓	✓	✓	Oxidation Catalysts & GCP with VOC limit of 1.0 ppm & 2.0 ppm w/o duct firing & w/duct firing @ 15% O_2
	Oxidation Catalyst	✓	✓	✓	
$PM/PM_{10}/PM_{2.5}$	Add on Control Devices	×	×	×	Clean Fuels & GCP with $PM_{10}/PM_{2.5}$ limit of 0.0091 lb/MMBtu
	Clean Fuels	✓	✓	✓	
	Good Combustion Practices	✓	✓	✓	
H_2SO_4	Scrubber	×	×	×	Low Sulfur Fuel with H_2SO_4 limit of 0.001 lb/MMBtu
	Low sulfur Fuel	✓	✓	✓	
GHG	Carbon Capture Sequestration	×	×	×	Thermal Efficiency/Cooling Air Cooling & Lower Carbon Fuels with an Annual Plant CO2 Cap of 5.1 MM tons.
	Lower Emitting Alternative Technology (Lower Carbon Fuels)	✓	✓	✓	
	Thermal Efficiency/Combustion Air Cooling	✓	✓	✓	

Table 17 BACT Summary for the Fuel Gas Heaters

Pollutant	**Available Control Technology**	**Technologic Feasible Options**	**Economically, Environmentally, Energetically Feasible**	**Identified BACT**	**MSCE Proposed BACT**
NOx	Selective Catalytic Reduction (SCR)	✗	✗	✗	Combustion Controls (Low NOx Burners) with NO_x rate of 0.036 lb/MMBtu
	SCONOx™	✗	✗	✗	
	XONON ™	✗	✗	✗	
	Selective Non-Catalytic Reduction	✗	✗	✗	
	Combustion Controls (Low NOx Burners)	✓	✓	✓	
CO	Good Combustion Practices	✓	✓	✓	Good Combustion Practices with CO limit
	Oxidation Catalyst	✗	✗	✗	
VOC	Good Combustion Practices	✓	✓	✓	Good Combustion Practices with VOC limit of 0.007 lb/MMBtu
	Oxidation Catalyst		✗	✗	
$PM/PM_{10}/PM_{2.5}$	Add on Control Devices	✗	✗	✗	Clean Fuels & Good Combustion Practices with $PM_{10}/PM_{2.5}$ limit of 0.008 lb/MMBtu
	Clean Fuels (low sulfur & Low ash)	✓	✓	✓	
	Good Combustion Practices	✓	✓	✓	
H_2SO_4	Scrubber	✗	✗	✗	Low Sulfur Fuel with H_2SO_4 limit of 0.001 lb/MMBtu
	Low sulfur Fuel	✓	✓	✓	
GHG	Carbon Capture Sequestration	✗	✗	✗	Thermal Efficiency/Cooling Air Cooling & Lower Carbon Fuels with an Annual Plant CO2 Cap of 5.1 MM tons.
	Lower Emitting Alternative Technology (Lower Carbon Fuels)	✓	✓	✓	

Table 18 BACT Summary for the Engines of the Emergency Generator & Fire Water Pump

Pollutant(s)	Available Control Technology	Technologic Feasible Options	Economically, Environmentally, Energetically Feasible	Identify BACT	MSCE Proposed BACT
NOx & VOC	Combustion Controls & Good Combustion Practices	✓	✓	✓	Combustion Controls (Engine Design) & Good Combustion Practices
CO	Good Combustion Practices	✓	✓	✓	Oxidation Catalyst & Combustion Practices
	Oxidation Catalyst	✓	✓	✓	
$PM/PM_{10}/PM_{2.5}$	Add on Control Devices	×	×	×	Clean Fuels & Good Combustion Practices
	Clean Fuels (low sulfur & Low ash)	✓	✓	✓	
	Good Combustion Practices	✓	✓	✓	
H_2SO_4	Low sulfur Fuel	✓	✓	✓	Using ULSD
GHG	Carbon Capture Sequestration	×	×	×	Lower Carbon Fuels
	Lower Emitting Alternative Technology (Lower Carbon Fuels)	✓	✓	✓	

DAQ's BACT Determination for the CTs with and without duct burner (DB) firing:

A review of EPA RBLC database of determinations was conducted for this project by the writer.[52] The review focused on determinations from January 1, 2011, through September 22, 2021, and Process Type 15.210 (Large Combustion Turbines > 25MW; Combined Cycle & Cogeneration; Natural Gas). This search of the RBLC identified 147 facilities and 231 processes. The writer included all these facilities and processes and generated a report in a comma separated values (csv) file format. A copy of the DAQ's query is included in the file.[53]

The writer ran a query of the RBLC database for CTs combusting natural gas with a rating greater than 25 MW, that went through BACT review. No determinations were found for NOx BACT, in terms of ppm or ppm at 15% oxygen, less than 2 ppm. There were 13 determinations made with a NO_x BACT at 2 ppm or 2 ppm at 15% O_2 using either low-NOx burners or DLN with SCRs.

[52] https://www.epa.gov/catc/ractbactlaer-clearinghouse-rblc-basic-information
[53] IPR File for R14-0038, Other Documents, WVDEP_DAQ_RBLC_PermitSearchResults.csv

The difference in the actual NOx BACT limits pertains to the averaging period and SUSD events. The averaging period varied from 30-day rolling average to 1-hour basis.[54] SUSD events in more recent permits set lb/specific SUSD event limits or established time frames for SUSDs and both.

This writer recommends the NO_x limit of 2.0 ppmvd at 15% O2 on 3-hour rolling average for all periods excluding SUSD, which was proposed by the applicant. Subpart KKKK established a 0.43 lb/MW (gross generation basis) on a 30-day rolling average basis. This standard includes all periods of operation including SUSD events. The 0.43 lb/MW standard will be incorporated as a backstop. Correcting the NO_x rates for the proposed CTs to energy output rates, the NSPS limit would not appear to be constraining with the average rate over the operating modes for the 7HA.03 at 0.052 lb/MW and the M501JAC at 0.051 lb/MW. These rates for CTs did not account for NO_x emissions during SUSD events. NO_x SUSD emission accounts for over 20% of the CTs annual NOx emissions, over 2% of the possible operating schedule. NOx limits during SUSD will be discussed later in this section.

MSCEs proposal for CO BACT as an oxidation catalyst with good combustion practices is consistent with other recent determinations in the RBLC database. The writer found several determinations with a CO BACT limit less than 2.0 ppmdv corrected to 15% O_2. These determinations ranged from 0.9 to 1.8 ppm with averaging periods from 1 hour to 3-hour averages. The writer recommends CO BACT at 2.0 ppmdv at 15% on a 3-hour rolling average using CO CEMs with additional requirements for continuous monitoring of the manufacturers' combustion system and two seasonal tunings of the CTs. Seasonal tuning of the CT will be focused to optimize (reduce) NOx emissions while minimizing the formation of CO.

MSCEs conclusion for VOC BACT, using an oxidation catalyst with good combustion practices, is consistent with the recent determinations posted in the RBLC. There are a few determinations that include clean fuels as VOC BACT. There were three determinations with a numerical limit less than 1.0 ppmdv on a three-hour average. Two of these determinations specifically noted that the BACT Limit applied without duct burner firing.[55] From the RBLC, the VOC BACT Limits ranged from 5 ppm to 0.7 ppm with an average of 2.2 ppm.

The DAQ determined that MSCE's BACT for VOCs is appropriate using oxidation catalyst and good combustion practice with a limit of 1.0 ppmvd at 15% O_2 w/o duct firing and 2.0 ppmvd w/duct firing. Compliance with these limits is on a 3-hour average basis.

The writer's review of PM/PM10/PM2.5 BACT in the RBLC noted 103 determinations less than MSCEs proposed PM BACT limit of 0.0091 lb/MMBtu. Most of these determinations noted the control method was good combustion practices and burning clean fuel. However, only 34 of these determinations required testing using Methods 201/201A (for filterable PM) with 202 (for condensable PM), which is needed to measure the filterable and condensable portion of the PM. US EPA reference methods for measuring PM10 and PM2.5 emissions from stationary sources are Methods 201/201A with 202.

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[54] Louisiana DEQ, Permit No. 0560-00987, May 31, 2020. page 452.
Commonwealth of Pennsylvania, DEP, Plan Approval 18-00033B, page 22.

[55] RBCLID VA-0321, VA-0328.

Of these determinations with lower limits than proposed, the permits that required testing using Methods 201/201A with 202, PM BACT limits ranged from 0.0085 to 0.0036 lb/MMBtu with an average of 0.0058 lb/MMBtu. Included in the application, MSCE did a query of the RBLC and noted Jackson Energy Center having a PM BACT Limit of 0.0026 lb/MMBtu.[56] The writer specifically looked up this RBLC ID for this facility and discovered that there are two PM BACT limits for the CTs at the Jackson Energy Center, which are Limit 1 of 0.0026 lb/MMBtu for PM and Limit 2 of .0042 lb/MMBtu of $PM_{10}/PM_{2.5}$.

The writer determined that there was only one determination associated with the PM BACT limit of 0.0036 lb/MMBtu, which was Long Ridge Energy Generation. In this determination, Ohio EPA set three different PM BACT limits for three different model CTs with this 0.0036 limit for a GE 7HA.02.[57]

Another review of the RBLC of PM BACT in terms of limits based on lb/hr was conducted. This review must be subdivided into the three groups based on unit capacity in terms of energy output, heat input and fuel rate. There are only five PM Mass Rate determinations that define the unit throughput in terms of MW (energy output), which ranged from 285 to 172 MW.[58] MSCEs proposed CT will be rated nearly 430 MW for the CT with additional 400 MW from the steam turbine or 200 MW from each of HRSG. The PM mass rates for these determinations were converted into lb/MW for comparison purposes, which ranged from 0.116 lb/MW to 0.047 lb MW. MSCEs proposed model CTs highest PM rate in terms of energy output were 0.069 lb/MW for the GE 7HA.03 during Case No. 34 and 0.046 lb/MW for the MHPS M501JAC during Case No. 31.

The review of the RBLC for determinations of PM_{10} & $PM_{2.5}$ Mass Limits with unit capacity in terms of heat input (MMBtu/hr) yield thirteen determinations.[59] The converted PM rate for these determinations in terms of lb/MMBtu ranged from 0.0036 to 0.0097 lb/MMBtu with an average of 0.0061 lb/MMBtu. The median of these converted PM rates is 0.0054 lb/MMBtu. MSCEs highest PM rate by proposed model CT in terms of energy output is 0.091 lb/MW for the GE 7HA.03 during Case Nos. 10, 27, and 34; and 0.006 lb/MMBtu for the MHPS M501JAC during Case Nos. 7, 12, 14, 29, and 31.

A review of the RBLC of mass-based PM limits with unit capacity (throughput in terms of annual gas usage) identified 15 determinations.[60] Five of these determinations didn't contain enough data to convert the mass rate PM limit into lb/MMBtu. The rest of these determinations (10) contain enough data to formulate the PM limit into terms of heat input, which yields a range between 0.0071 lb/MMBtu to 0.0031 lb/MMBtu, with an average of 0.0051 lb/MMBtu.

The DAQ has made recent PM BACT decisions of similar configurations, which established the BACT limit at 22.6 pounds per hour, per CT.[61] Based on the permitted heat input of the CT and DB for the Moundsville Facility, the PM BACT limit equates to 0.005

[56] Permit Application R14-0038, Appendix D, Table D-1, September 21, 2021
[57] RBLC ID OH-375.
[58] RBLC No. MD-0042, MD-0045, MD-0046, OH-0356 w/o duct firing, OH-0356 w/duct firing.
[59] RBLC No. LA-0254, LA-0364, OH-0360, OH-0366, OH-367, OH-0370, OH-372, OR-0050 (MHPS M501-GAC), OR-0050 (GE LMS-100).
[60] RBLC Nos. NJ-0079, NJ-0080 (four entries), NJ-0081 (two entries), NJ-0082, NJ-0088, OH-0352 (4 entries – w/ & w/o DB for Siemens & Mitsubishi CTs).
[61] Permit R14-0036A, Condition 4.1.5., May 22, 2019.

lb/MMBtu. The proposed control technology that MSCE determined to be BACT for the proposed CTs is acceptable and consistent with other similar PM BACT Determinations. However, the DAQ does not concur with the proposed BACT limit of 0.0091 lb/MMBtu.

MSCE did agree to a PM BACT limit of 0.0058 lb/MMBtu for both model CTs (GE 7HA.03 and MHPS M501JAC. This value is in line with average of the PM BACT determinations over the past 10 years for natural gas fired CT with an output rating greater than 25 MW. Allegheny County Health Department (ACHD) had issued a preliminary determination for a single GE 7HA.02 which includes a duct burner with a $PM_{10}/PM_{2.5}$ BACT as 0.0084 lb/MMBtu w/o duct firing and 0.0058 lb/MMBtu with duct firing.[62] The writer believes that these PM rates with respect to duct burner mode are reversed. It is expected that duct firing increases emissions because there is limited available oxygen from the turbine. It should be noted that ACHD has not made a final determination with regards to the Allegheny Energy Center's application for the construction of this GE 7HA.02.

The writer is aware of issues with PM testing in general from combustion turbines. Solar, a stationary combustion turbine manufacturer, recommends to their customers to use EPA Method 201/201A and 202 with test runs being extended to 4 hours for determining particulate matter emissions from their CTs.[63] The writer believes that the filterable portion of the total is significantly less than half, based on published data.[64] Doubling the run time, the extended testing time should ensure that the adequate amount of filterable PM is collected above the detection level of the testing method.

The DAQ has determined that the PM/PM10/PM2.5 BACT Limit for the proposed CTs be established at 0.0058 lb/MMBtu on a 12-hour average (3 runs of 4 hours for each run) basis using EPA Methods 201/201A and 202.

Regarding H_2SO_4 BACT, the review of the RBLC revealed that most determinations set low sulfur fuels and good combustion practices as BACT for H_2SO_4. In terms of lb/MMBtu, the BACT for H_2SO_4 ranged from 0.0022 to 0.0005. Other determinations set the BACT limit in terms of grains per 100 cubic feet of gas, which ranged from 0.5 to 5 grains per 100 cubic feet. These determinations with the BACT limits in terms of sulfur loading did not specify the method for determining compliance.

These sources would all be subject to the Acid Rain Program and required to account for the SO_2 emissions from these units. The Acid Rain Program allows EGUs burning low sulfur fuels (e.g., natural gas) to determine the unit's sulfur dioxide emissions based on sulfur content or contact/tariff agreement.

The applicant based the H_2SO_4 emissions on a total sulfur loading of 0.4 grains per 100 cubic feet of gas. MSCE determined that BACT technology was combusting low sulfur fuel. The writer agrees with the proposed technology and believes that H_2SO_4 should be established

[62] Allegheny County Health Department, Installation Permit Review Memo for IP-0959-I001, Appendix A, March 29, 2021, page 22.
[63] Solar Turbines Incorporated, Product Information Letter 171, PIL 171 Revision 4, February 110, 2014.
[64] Roy Huntley, US EPA, Complied PM Data from Gas Combustion Sources, natgas_procgas_lpg_pm_efs_not_ap42_032012_revisions.xls (live.com)

in term of the sulfur loading of the fuel. The DAQ determined H_2SO_4 BACT limit at 0.4 grains per 100 scf of gas compliance using procedures under the Acid Rain Program.

MSCE proposed the technology for GHG BACT for the facility being thermal efficiency technologies and low carbon fuel. From the RBLC, most of the determinations listed that the control technology for GHGs from CTs as low carbon/clean fuels and/or efficient process/turbines. The writer agrees with MSCE's technology selection that GHG BACT is low carbon fuel and high plant net efficiency.

Both manufacturers claim that their model CTs, in combined cycle mode, will have a net plant efficiency of over 64%.[65] For reducing GHG (mainly carbon dioxide emissions) from fossil fuel fired EGUs, high net plant efficiency is the key. The best indicator of plant efficiency is the unit's heat rate (Btu/kWh), or heat energy inputted per kilowatt hour generated. The heat rate, on lower heat value basis, was calculated for each of the proposed operating modes by proposed model CT. A summary of these heat rates is presented in the following table.

Table 19 Summary of the Heat Rate by CT

Manufacturer	Model	Units	Max HR	Avg HR	Min HR	SD	95th Percentile
GE	7HA.03	Btu/kWh	7,705	6,300	5,769	513	7,236
MHPS	M501JAC	Btu/kWh	7,597	6,423	5,823	539	7,502

HR – Heat Rate
SD – Standard Deviation
95th Percentile – using the average of the population plus 2 times the standard deviation of the population.

For combined cycle units greater than 25 MW, a heat rate of 5,500 Btu/kWh was listed as the lowest heat rate.[66] Looking at units closer to the proposed size (units greater than 300 MW), the lowest listed heat rate is 7,050 Btu/kWh. The writer is not exactly sure what basis is the heat rate in the NEEDS is based on (gross or net generation; higher heating value or lower heating value). The min values in the above table occurring when either model unit is at full load with both CTs online without duct firing. These minimum heat rates are competitive with the smaller combined cycle units listed in the NEEDS database. Based on the average heat rate across all the normal operating modes, the 7HA.03 has an average heat rate of 6,685 Btu/kWh (HHV – Gross) and the M501JAC average heat rate is 6,949 Btu/kWh (HHV – Gross). These model CTs are highly efficient for their size.

There are seven determinations in the RBLC that have listed the unit's heat rate as the BACT limit for CO_2 or CO_2e. These limits range from 7,720 to 7,109 Btu/kWh on a higher value and gross generation basis. Based on the average heat rate across all the operating modes, the 7HA.03 has an average heat rate of 6,685 Btu/kWh (HHV – Gross) and the M501JAC average heat rate is 6,949 Btu/kWh (HHV – Gross).

MSCE proposed a cap of 5,109,617 tons of CO_2 per year as the GHG BACT Limit which would cover all sources of CO_2 within this project. A cap as proposed is not reflective of

[65] https://www.ge.com/content/dam/gepower/global/en_US/documents/gas/gas-turbines/heavy-duty-products-specs/7ha.03-power-plants-fact-sheet.pdf ; https://power.mhi.com/products/gasturbines/lineup/m501j
[66] EPA NEEDs Data Base, National Electric Energy Data System (NEEDS) v6 | US EPA

the technology of the selective GHG BACT, and therefore, not acceptable as a limit for GHG. MSCE noted that a heat rate limit for the CTs may not be appropriate or defendable as a BACT Limit.

The heat rates in Table 19 show that there is a difference in performance between the two models of CTs. Thus, individual CO_2 limits for each of the model CTs will need to be developed.

Table 20 Summary of the CO2 Rate by Model CT

Manufacturer	Model	Units	Max CO_2 Rate	Avg CO_2 Rate	Min CO_2 Rate	SD	95th Percentile
GE	7HA.03	lb/MWh (gross)	877	757	706	48	852
MHPS	M501JAC	lb/MWh (gross)	846	709	641	62	832

MSCE believes that the 95th percentile would be appropriate limits on a 12-month rolling average basis. Comparing these 95th percentile values with recent GHG BACT determinations, the RBLC contains 17 determinations where the GHG BACT Limit was made in terms of lb/MWh. Some of the determinations specifically noted that the limit was on a gross generation basis. There was one determination that established a CO2 limit at 883 lb/MW on a net basis. Subpart TTTT establishes a CO2 standard of 1,000 lb/MW (gross basis) for natural gas fired units. Thus, BACT limits above 1,000 lb/MW were excluded. This left 12 determinations in the RBLC with CO_2 limits that ranged from 1,000 lb/MWh to 812 lb/MWh (gross basis) with an average of 917 lb/MWh.

Unit degradation is a huge concern for unit operators. Virginia DEQ has established unit degradation schedules in their permits.[67] The degradation rate used in these permits is based on an annual degradation rate of 0.325% based on an 11.7% degradation rate over 36 years. Using this degradation rate the following degradation schedule based on the CO_2 rate at the 95th percentile for each of the model CTs.

Table 21 CO_2 Degradation Schedule

Year	GE 7HA.03	MHPS M501JAC
	CO_2 lb/MWh (gross)	CO_2 lb/MWh (gross)
1-6	852	824
7-12	869	840
13-18	886	857
19-24	903	874
25-30	921	891
31 and later	939	908

[67] Virginia Department of Environmental Quality, Registration Number 52619, Condition 35, June 24, 2019. VA DEQ, Registration Number 52525

At year 31 and later, the CO_2 rate is still less than the 1,000 lb/MWh standard in Subpart TTTT. PA DEP has recently established a CO_2 limit for 894 lb/MWh for 2 GE 7HA.02 with HRSG and duct burner rated at 1,005 MMBtu/hr.[68]

The DAQ has determined the GHG BACT limit be based on the above schedule for the respective model CT on a 12-month rolling average basis. There will be a point that technology improvements in the electrical power generation sector and market conditions will not allow this facility to operate these CTs in base load configuration. The writer recommends the GHG BACT Limit be defaulted to the Subpart TTTT Standard for non-base load units of 120 lb/MMBtu.

The best approach in limiting or minimizing excessive emissions during SUSD is minimizing the duration of the event without causing equipment failure or excessive wear on the equipment. The operators for MSCE should be focused on starting up the units in a timely and safe fashion to minimize the operating time while waiting to be dispatched by the grid operator.

To determine annual emissions, MSCE proposed 197 hours per year for SUSD events. Instead of establishing emissions per event or duration limits per type of SUSD, MSCE proposed 30 operating day rolling total limits for NO_x and CO emissions emitted during SUSD. The annual SUSD emissions were divided by 12.17 (365 days in year/30 day) and multiplied by 1.5 to account for operational expected criteria; reliability/operational issues; and economic needs dictating more SUSD operations.

Table 22 SUSD 30 Day Rolling Limits

	Per CT		**30 Day Total (tons/30 days)**		**30 Days of Cold Starts & Shutdowns**	
	MHSP	**GE**	**MHSP**	**GE**	**MHSP**	**GE**
NO_x (tons)	21.74	21.11	2.68	2.79	1.99	3.63
CO (tons)	49.08	92.18	6.05	11.36	7.50	19.09
VOC (tons)	34.22	31.39	4.22	3.87	3.26	6.71
PM (tons)	0.39	2.24	0.05	0.28	0.04	0.33

Cold start with shutdown were added to the above table to prove that these 30-day rolling total limits would be constraining. The emissions from 30 days of cold starts are based on the annual number of starts (234 starts) divided by 12.17 and rounded up to the nearest whole number, which equated to 20 cold starts in 30 days. CO is the only constraining pollutant for the MHPS M501JAC. The 30-day rolling total limits is constraining for the GE 7HA.03 for all NSR pollutants.

[68] PA DEP, Plan Approval No. 18-00033B, April 29, 2021.

The permit will define when start-up begins and ends. Compliance with the CO and NOx limits will be determined using continuous emission monitoring systems (CEMS). Also, the permit will prohibit concurrent startup and shutdowns of both CTs.

DAQ BACT for the EMERGENCY GENERATOR and FIREWATER PUMP

For the emergency generator, the applicant proposed to limit the fuel to ULSD and hours of operations to 100 hours per year. The proposed engines are ultra-low sulfur diesel (ULSD) fired and the manufacturer's emission data indicate it will comply with the applicable emission standards of NSPS Subpart IIII. The NSPS is the minimum for establishing BACT Limits.

The writer conducted a review of the RBLC for control technologies that has been determined to be BACT for internal combustion engines consuming diesel greater than 500 hp for the emergency generator and engine less than 500 hp for the fire water pump.[69] This review of technologies was focused on the determination of whether add-on controls were determined to be BACT. There are two determinations for five processes (emission units), which were three emergency engines and two fire water pumps, which set oxidation catalyst and diesel particulate filter as BACT.[70]

MSCE determined that for CO oxidation catalyst was determined to be BACT at a CO rate of 0.3 g/hp-hr and 0.44 g/hp-hr for the emergency generator and fire water pump respectively. For the other pollutants except CO_2, MSCE determined that BACT was combustion control & good combustion and low sulfur fuel (ULSD). The BACT limits for NOx determined by MSCE to be 4.8 g/hp-hr and 3.0 g/hp-hr for the emergency generator and fire water pump respectively. For VOCs, MSCE determined BACT at 1.2 lb/hr and 1.0 lb/hr for the emergency generator and fire water pump respectively.

MSCE did not determine a specific numerical BACT limit for PM and H_2SO_4; and determined that the controls were clean fuels and good combustion and combustion of low sulfur fuel. The DAQ agrees with the applicant's determination of the control measures to meet BACT for these engines for PM and H_2SO_4. NSPS Subpart IIII establishes a PM standard for emergency and fire water pump engines at 0.15 grams per hp hour.

Most of the fuel sulfur is converted into SO_2. These engines will not be equipped with SCRs and therefore the formation of SO_3 will depend solely on combustion. The BACT Limit for H2SO4 is determined to be a sulfur maximum concentration of 15 ppm in the diesel (ULSD).

The DAQ has determined that the BACT for these manufacturer certified engines is meeting the emission standards of NSPS Subpart IIII for emergency and fire water pump engines of an engine model year 2021 or later except for CO. The BACT CO limit for these engines shall be 0.3 gm/hp-hr for the emergency generator and 0.44 gm/hp-hr for the fire water pump engines.

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[69] EPA, RBLC User Manual, Appendix C Process Type Code List, Pages C-4 though C-5.
[70] RBLC ID No. AK-0085 and MI-0433.

Besides operating and maintaining in accordance with the manufacturer's written instructions, the DAQ believes that engine tune-up on a frequency of once every-five years would be a reasonable work practice and can be recordable.

DAQ BACT for the FUEL GAS HEATERs

Pipeline quality natural gas will exclusively fuel the fuel gas heaters. The fuel gas heaters emissions assume the unit will operate for 8,760 hours per year, but the fuel gas heaters will only operate during startup operations and, when necessary, to ensure the temperature of the incoming natural gas is above the actual dew point temperature of the natural gas. The combustor for both model CTs is air cooled as part of the CTs NOx control. A portion of the heat rejected from the combustors is used to preheat the fuel for the CTs instead of using these fuel gas heaters during normal operations.

A review of the RBLC shows that add-on controls have not been employed for other similarly sized fuel gas heaters or dew point heaters which exclusively fire pipeline quality natural gas. Most BACT determinations in the RBLC for heaters with a design heat input of 10 MMBtu/hr determined that good combustion practices, and low-NOx burners was BACT. The combustion of natural gas, with a lower ash and sulfur content than other commonly used fuels (i.e., fuel oil, and coal), generates lower levels of particulate matter emissions compared to other fuels. Through this review MSCE determined that add-on controls are not considered commercially demonstrated for fuel gas heaters of a similar size firing natural gas only. MSCE proposed the use of pipeline quality natural gas and good combustion practices as BACT for PM, PM_{10}, and $PM_{2.5}$.

Table 23 Comparison of the Proposed Limits for the FGH vs RBLC

Pollutant	**RBLC ID of the Lowest BACT Limit**	**Lowest BACT Limit (lb/MMBtu)**	**MSCE Proposed Rate (lb/MMBtu)**
CO	LA-0364, MI-0442, & TX-0915	0.037	0.039
NO_x	MI-0442	0.036	0.036
VOC	TX-0915	0.0054	0.007
$PM_{10}/PM_{2.5}$	MI-0412 & MI-0442	0.0075	0.008
H_2SO_4	MA-0039[1]	0.0009	0.0001
GHG – CO_2e	VA-0321[2]	117	131.4

1 – H_2SO_4 BACT Limit for 80 MMBtu/hr Boiler.

2 - GHG BACT Limit for a 67 MMBtu/hr Boiler.

Other than GHGs, MSCE's proposed limits are consistent with the lowest rates listed in the RBLC. The DAQ has determined BACT for the FGHs is good combustion practices with low NOx burners combusting natural gas with a total sulfur content of no greater than 0.4 grains/100 cubic feet.

$PM/PM_{10}/PM_{2.5}$ BACT for Cooling Tower

MSCE determined that PM BACT for the cooling towers with drift eliminators to minimize the drift by 0.0005%. The RBLC supports this conclusion with 10 determinations that set mist eliminators as BACT.

GHG BACT for Fugitive Components

Some fugitive components such as flanges, valves, and open-ended lines (OELs) within the facility boundary would be associated with the proposed combustion turbines and fuel gas heaters. Natural gas released from fugitive components represents a potential source of GHG emissions from the facility in the form of methane contained in the natural gas.

The writer recommends that the permit include the leak detection and repair program from NSPS Subpart OOOOa with surveys being conducted annually and at least 30 days before any major planned outage.

As promulgated in Part 60, Subpart OOOOa leak detection and repair programs will minimize fugitive sources of VOCs and GHGs from natural gas facilities. Based on the definition of BACT under 45 CSR 14, the implementation of the LDAR program from Subpart OOOOa would be the minimum acceptable level for GHG BACT of fugitive sources. There are other promulgated LDAR programs available but no other specifically notes that the program is focused on GHGs. The DAQ has determined GHG BACT for fugitive sources of methane by adopting the requirements of 40 CFR 60.5397a.

There are questions concerning whether the circuit breakers for the facility will be located near the units or at the switch yard. These circuit breakers are filled with sulfur hexafluoride (SF_6), which is a GHG.[71] Several recent determinations required such circuit breakers be equipped with a low-pressure alarm system to be triggered if the leakage rate is at 10% by weight.[72] SF6 BACT has been determined to be maintaining sealed enclosed-pressure circuit breakers equipped with a low-pressure alarm and a low-pressure lockout where the alarms are triggered when 10% of the SF_6, by weight, has escaped.

AIR QUALITY IMPACT ANALYSIS

The applicant provided a Class II Air Quality Modeling report to demonstrate this proposed project will not exceed the Class II Area increment thresholds as listed in 45 CSR §14-4.1. and the National Ambient Air Quality Standards (NAAQS). In addition to this report,

[71] 45 CSR §14-2.80.a
[72] PA DEP, Plan Approval 18-00033B, Section C., No. 009, page 13. & EPA Region 9, PSD PERMIT SE 17-01, Condition 26, April 25, 2018, page 8 of 18.

MSCE conducted a Class I Significant Impact Analysis to satisfy the requirements of the rule and ensure that the emissions from the project would not cause any adverse impacts in any of the near-by Class I areas, which include: Dolly Sods, James River Face, Otter Creek Wilderness Area, and the Shenandoah National Park. A memo of the agency's review of the applicant's analysis can be found in Appendix B of this preliminary determination.

The Maidsville Facility is in Monongalia County, which is designated by U.S. EPA as "unclassifiable" and/or "attainment" for the NAAQS for NOx, CO, ozone, PM_{10}, and $PM_{2.5}$. To demonstrate compliance with the NAAQS, MSCE conducted an air quality analysis for these pollutants. Note that since there is no NAAQS standard for PM, modeling of this pollutant was not required to be performed.

Class I Area SIL Analysis

To ensure that the emissions from the project will not contribute to exceedances of the Class I Increment standards at any of the Class I areas located within 200 km of the facility, MSCE performed a screening analysis for Class I Increments. MSCE initially built an arc of receptors located approximately 50 km from the Project location (i.e., 50 km is the maximum recommended range for use of AERMOD). As the distance of 50 km is closer to the project location than all Class I areas, the model output concentrations should over-predicted compared to those expected at the actual distances.

The following table is a summary of the results of this screening analysis for the wilderness and national parks areas.

Table 24 Class I Area Screening Analysis

Pollutant	Averaging Period	Max Concentration (μg/m^3)	Significant Impact Level (μg/m^3)
NOx	1-hr	2.84	
	Annual	0.01	0.1
CO	1-hr	0.78	
	8-hr	0.30	
$PM_{2.5}$	24-Hour	0.096	0.27
	Annual	0.013	0.05
PM_{10}	24-Hour	0.12	0.3
	Annual	0.015	0.2

This analysis indicates that NO_x, $PM_{2.5}$, and PM_{10} emissions from the project have predicted concentrations far below the corresponding Class I Area SILs at the nearest Class I Area. Moreover, even at 50 km from the project the results are below the Class I Area SIL. Hence, the concentrations would be expected to be even lower than those shown in the above table. As such, the project should not cause or contribute to an exceedance of the PSD Class I Increment levels for NO_x, $PM_{2.5}$, and PM_{10}. Therefore, the requirements of 45 CSR 14-9. are satisfied with respect to the four Class I areas.

Class II Area SIL Analysis

The applicant conducted a Significant Impact Level (SIL) Analysis for Class II Area Increment and NAAQS. This type of analysis is used as a screening tool to eliminate the need to perform additional in-depth analysis that would require the modeling to include emissions from background and increment consuming sources in the local area to satisfy the requirements of 45 CSR 14. The results of this screening analysis indicated that emissions from MSCE's project are above the significant level for NO_x, $PM_{2.5}$ and PM_{10} for the respective short-term standards and annual averaging periods. Therefore, MSCE conducted further analysis which included emissions from the existing sources near the project to demonstrate that the emissions associated with the project would not cause or contribute to an exceedance of the increment threshold under 45 CSR 14, nor cause or contribute to a violation of the NAAQS for NO_x, PM_{10}, or $PM_{2.5}$. A summary of these results is presented in the following table.

Table 25 Summary of the Class II Screening Analysis

Average Period	NOx	PM10	PM2.5	CO
Normal Operations				
1-hr	**130.6**			66.4
8-hr				17.7
24-hr		**11.51**	5.74	
Secondary Formation			0.0258	
Total			**5.77**	
Annual	**1.24**	**2.15**	1.21	
Secondary Formation			0.000741	
Total			**1.21**	
Startup Shutdown Operations				
1-hr	**130.6**			864.1
24-hr		**11.52**	**5.76**	
Significant Impact Levels (SILs)				
Short-term (1- or 24-hr)	7.5	5	1.2	2000
Long-term (8-hr or Annual)	1	1	0.2	500

MSCE conducted a NAAQS analysis and Increment Analysis to satisfy the requirements of 45 CSR §14-9.1. and 45 CSR §14-4.1. The following table is summary of the maximum amount of increment that will be consumed by the project.

NAAQS Analysis

MSCE conducted a NAAQS analysis which included emissions from the Longview Power and Fort Martin Power Station and from seven other nearby facilities with the furthest facility being the Grantown Power Plant which is 17.5 km away from the project. MSCE initially identified APV Renaissance Partners to be included in the off-site inventory. During the DAQ review of this inventory, PA DEP informed the DAQ that APV Renaissance Partners had deactivated their plan approval for the facility, and therefore it was omitted from the inventory.[73]

The results of the NAAQS analysis predicts that there are exceedances of the NAAQS for these pollutants. MSCE demonstrated that their project contributions at all exceedances were less than the significant impact level and therefore is not causing or contributing to these exceedances.

[73] Email from Edward Orris, P.E., New Source Review Section Chief, PA DEP, Southwest Regional Office, Air Quality Program, January 5, 2021.

Table 26 NAAQS Analysis Results – Maximum Total Concentrations

NAAQS	NOx		PM2.5		PM10
	1-hr avg H8H 5-yr avg	**Annual Avg**	**24-hr avg H8H 5-yr avg**	**Annual Avg**	**24-hr avg H6H 5-yr avg**
All Sources (µg/m^3)	163.5	8.70	145.8	42.8	183.0
Secondary Formation(µg/m^3)	NA	NA	0.0258	0.000741	NA
Background (µg/m^3)	62.7	9.4	18	7.60	37
Total (µg/m^3)	**226.7**	18.1	**163.8**	**50.4**	**220.0**
NAAQS (µg/m^3)	188	100	35	12	150
Max MSCE Project Contribution to any exceedance (µg/m^3)	1.92	NA	0.248	0.038	0.486
SIL (µg/m^3)	7.5	1	1.2	0.2	5

H8H – High 8th High (form of the standard for the pollutant)
H6H - High 6th High (form of the standard for the pollutant)

45 CSR §14-9.1.b. requires MSCE to demonstrate that the project does not represent an impact above the applicable increment threshold established in 45 CSR §14-4.1. over Baseline concentrations.

"Baseline Concentration" is defined as the ambient concentration level which exists in the baseline area at the time of the applicable minor source baseline date. A baseline concentration is determined for each pollutant for which a minor source baseline date is established and includes:

> *The allowable emissions of major stationary sources which commenced construction before the major source baseline date but were not in operation by the applicable minor source baseline date.*

Basically, the sources that began emitting or made changes that affect the emissions after the Baseline date of the applicable pollutant are increment consuming sources and must be accounted for in the Increment Analysis. Like the NAAQS Analysis, MSCE's Increment Analysis did not identify any exceedances of applicable Increment Levels. The following table provides the maximum concentration of increment consumed and MSCE's corresponding portion.

Table 27 Summary of the PSD Increment Analysis

PSD Increment	NOx	PM2.5		PM10	
	Annual Avg	**24-hr avg H2H 5-yr avg**	**Annual Avg**	**24-hr avg H2H 5-yr avg**	**Annual Avg**
All Increment Consuming Sources ($\mu g/m^3$)	4.93	6.29	1.32	180.2	43.8
Secondary Formation($\mu g/m^3$)	NA	0.0258	0.000741	NA	NA
Total ($\mu g/m^3$)	4.93	6.32	1.32	**180.2**	**43.8**
Increment ($\mu g/m^3$)	25	9	4	30	17
MSCE Max Increment Consumed ($\mu g/m^3$)	0.0037	6.32	1.28	0.54	0.05
Max MSCE Project Contribution to any exceedance ($\mu g/m^3$)	NA	NA	NA	0.47	0.05
SIL ($\mu g/m^3$)	7.5	1	1.2	0.2	5

MSCE's NAAQS and Increment Analysis demonstrated that the project should not cause or contribute to an exceedance of any NAAQS or allowable Increment level.

Class I Area Air Quality Related Values Analysis

45 CSR 14-13.6 allows applicants to make a demonstration to the Federal Land Manager(s) (FLMs) of potentially affected Class I Areas that the emissions from the project would have no adverse impact on the air quality related values (AQRVs) in the Class I Area.

The Clean Air Act states that the FLMs are responsible for determining if an AQRV analysis for a Class I Area is necessary for a permit application that is subject to PSD (45 CSR14). To make such a determination, a "Q/d" analysis is typically used and accepted where "Q" is the emissions from the projected net increase from the project of NO_x, PM_{10}, SO_2, and sulfuric acid mist (H_2SO_4) in terms of tons per year. "Q" must be calculated using the maximum emission rate possible in any 24-hour operating period. "d" is the distance to the nearest Class I Area in terms of kilometers.

The maximum emission rates on a 24-hour basis, annualized from the project are:

- NO_x – 412.82 tpy
- PM_{10} (which includes condensable PM) – 232.70 tpy
- SO_2 – 52.79 tpy
- H2SO4 – 37.45 tpy
- Total "Q" – 735.72 tpy

Otter Creek Wilderness Area, which is the closest Class I Area to the project site, is at 78 km from the Maidsville site. Thus, the "Q/d" for this project is 8.1.

The corresponding FLMs of the four potentially affected Class I Areas were notified of pertinent details of this project on March 12, 2021. The DAQ was subsequently notified that no further analysis of AQRV for this project is necessary on March 14, 2021, from the National Park Service and April 14, 2021, from the U.S. Forest Service.

ADDITIONAL IMPACTS ANALYSIS

First, an assessment will be made regarding the amount of residential growth the proposed project will bring to the area. The amount of residential growth will depend on the size of the available work force, the number of new employees, and the availability of housing in the area. Associated commercial and industrial growth consists of new sources providing goods and services to the new employees and to the modified source itself.

The generators in this project will share the existing switch yard and interconnect to the transmission lines to the electrical grid with Longview Power's existing unit. The existing natural gas supply is not sufficient to supply the proposed CTs. A new pipeline segment will have to be constructed to connect the facility with TC Energy's transmission pipeline to the facility.

MSCE notes that the results of the SILs and NAAQS analysis presented in the application demonstrates that the project will not have a significant impact on air quality in the region. Also, MSCE anticipated no effects on growth due to the project.

Visibility Impairment Analysis

MSCE has conducted a screening modeling analysis to estimate worst case visibility impacts vista 10 km away from the Maidsville site which is Mylan Park. The intent of this analysis is to demonstrate worst case screening impacts in the vicinity of the project to satisfy the requirement of evaluating additional impacts to visibility under the PSD regulations.

A stack plume visibility screening analysis was performed based upon the procedures described in USEPA's Workbook for Plume Visual Impact Screening and Analysis. The screening procedure involves calculation of plume perceptibility (ΔE) and contrast (C) with the USEPA VISCREEN (Version 13190) model, emissions of NO_x and primary particulate matter (PM_{10}), worst-case meteorological dispersion conditions, and other default parameters as inputs. The screening procedure determines the light scattering impacts of particulates, including sulfates and nitrates, with a mean diameter of two micrometers (µm) and a standard deviation of two (2) µm. The VISCREEN model evaluates both plume perceptibility and contrast against two backgrounds, sky, and terrain.

The VISCREEN model provides two (2) levels of analysis, both are screening approaches. The Level-1 VISCREEN assessment uses a series of default criteria values to assess the visible impacts. If the source passes the criteria defined for a Level-1 VISCREEN assessment ($\Delta E<2.0$ and $Cp<0.05$), potential for visibility impairment is not expected to be significant and no further analysis is necessary. If a source fails the Level-1 criteria, more refined assumptions would be necessary. The analysis was performed assuming that all emitted particulate from the stacks would be PM_{10}. The emissions of primary NO_2, soot (elemental carbon), and SO_4 (primary sulfates) were set equal to the Level-1 VISCREEN default of zero for contrast.

The VISCREEN Level-1 model results are summarized in the table below. The calculated plume perceptibility and contrast parameters were determined to be below the VISCREEN default criteria for a visibility screening analysis for all screening criteria.

Table 28 Summary of the results of the Level 1 VISCREEN Analysis

Background	**Theta[a] (degrees)**	**Azimuth[b] (degrees)**	**Distance (km)**	**Alpha[c] (degrees)**	**Perceptibility (ΔE)[d]**		**Contrast (C)[e]**	
					Criteria	**Plume**	**Criteria**	**Plume**
Visual Impact: Mylan Park								
Sky	10	84	10	84	2.30	2.755	0.05	0.0023
Sky	140	84	10	84	2.00	0.889	0.05	-0.0180
Terrain	10	84	10	84	2.00	3.732	0.05	0.0390
Terrain	140	84	10	84	2.00	0.598	0.05	0.0220
Visual Impact: Morgantown Airport								
Sky	10	84	9	84	2.43	2.986	0.05	0.0025
Sky	140	84	9	84	2.00	0.980	0.05	-0.0190
Terrain	10	84	9	84	2.00	4.413	0.05	0.0440
Terrain	140	84	9	84	2.00	0.696	0.05	0.0240

a Theta is the vertical angle subtended by the plume
b Azimuth is the angle between the line connecting the source, observer, and the line of sight
c Alpha is the angle between the line of sight and the plume centerline
d Plume perceptibility parameter (dimensionless)
e Visual contract against background parameter (dimensionless)

The plume contrast depends on whether the product of the phase function and the albedo for the plume is larger or smaller than that for the background, the plume will be brighter ($C > 0$) or darker ($C < 0$) than the background horizon sky. Also note that the contrast is dependent on the plume optical thickness; as the plume optical thickness approaches zero, C approaches zero. Plume contrast also diminishes as the plume-observer distance increases.

For this demonstration, the model predicted a negative plume contrast with the sky with the Theta at 140^0, which means that the plume contrast is darker than the sky.

The criteria used to judge the results of this visibility impacts are the criteria for Class I Areas. There are no criteria for Class II Areas, and it is assumed that Class I Area criteria is acceptable for Class II Areas.

The Level-1 analysis indicates possible impacts at low angle observations from the project. MSCE performed a Level-2 analysis and refined the default weather conditions in VISCREEN to representative conditions based on data from the weather station at the Morgantown Airport.

Table 29 Summary of the Results of Level 2 Visual Impact Analysis

Background	Theta[a] (degrees)	Azimuth[b] (degrees)	Distance (km)	Alpha[c] (degrees)	Perceptibility (ΔE)[d]		Contrast (C)[e]	
					Criteria	Plume	Criteria	Plume
Visual Impact: Mylan Park								
Sky	10	144	10	84	3.72	0.477	0.06	0.0004
Sky	140	144	10	84	2.00	0.346	0.06	-0.003
Terrain	10	84	10	84	3.05	0.635	0.06	0.006
Terrain	140	84	10	84	2.00	0.098	0.06	0.003
Visual Impact: Morgantown Airport								
Sky	10	144	9	84	3.92	1.042	0.06	0.0008
Sky	140	144	9	84	2.00	0.346	0.06	-0.006
Terrain	10	84	9	84	3.14	1.508	0.06	0.015
Terrain	140	84	9	84	2.00	0.230	0.06	0.008

a Theta is the vertical angle subtended by the plume
b Azimuth is the angle between the line connecting the source, observer, and the line of sight
c Alpha is the angle between the line of sight and the plume centerline
d Plume perceptibility parameter (dimensionless)
e Visual contract against background parameter (dimensionless)

The results of the Level-2 analysis indicates that the project should not impact the visibility of the local vistas.

MSCE did preform a Level-1 Visibility of the nearest Class I Area, which is the Otter Creek Wilderness Area, using VISCREEN (Version: 13190) between the plume and the viewing area. If the hourly estimates of ΔE is less than 2.0 or the absolute value of the contrast values (|C|) is less than 0.05, then no further visibility analysis is required. MSCE results indicated that the potential emissions of NO_x and PM_{10} would produce a change in color difference of 0.062 and a contrast of 0.001 in the Otter Creek Wilderness Area.

MONITORING OF OPERATIONS

Monitoring of the proposed combustion turbines (CT-01 & CT-02) should be focused on monitoring NOx and CO emissions continuously using certified CEMs, power output and fuel consumed per month. The writer recommends monitoring the oxidation catalyst/SCR for each turbine to ensure that the exhaust is at conditions (temperature) that promote the oxidation reaction to occur and to detect build-up on the catalyst. The inlet temperature of the catalyst needs to be between 450- and 900-degrees Fahrenheit for the desired reactions to occur. It is recommended to monitor the inlet temperature on a continuous basis and record each instance the temperature is outside of this range and the mode the turbine was operating at during the occurrence. In addition, the pressure drop across the oxidation catalyst is required to be monitored monthly.

Ammonia slip needs to be monitored continuously. Excessive ammonia would be an indicator that the SCR is experiencing issues. Unreacted ammonia can increase the formation of condensable PM. MSCE has expressed concerns with current technologies in direct monitoring of ammonia on a real-time or continuous basis in the form of CEMs. As an alternative to a direct measurement system of ammonia, Texas allows EGUs to determine ammonia emissions via calculation of the difference between the input ammonia, measured by the ammonia injection rate, and the ammonia reacted, measured by the differential NO_X upstream and downstream of the control device that injects urea or ammonia into the exhaust stream (mass balance approach).[74] The writer recommends the direct measuring instrument and Texas indirect mass balance method for measuring ammonia slip from the SCRs of both CTs.

The application proposes a combustion turbine configuration of two CTs with HRSGs. The steam generated by these two HRSGs are routed to a single steam turbine with generator. To determine the total amount of electricity generator by each CT, the applicant will be required to continuously measure the steam flow from each HRSG of the respective CT. This measured steam flow (energy output) will be used to prorate the amount of electricity generator from the steam turbine back to the respective CT. The prorate amount of electricity will be add to the amount of electricity generated directly from the CT.

What constitutes good combustion practices for the CTs is not specifically stated in the application. MSCE will monitor key parameters or indicators that the CT manufacturers' proprietary combustion system is operating properly.

The utilization of the duct burners is expected to be very limited initially. MSCE expects duct burner firing to increase over the life of the unit. Requiring periodic visible emission observations is not reasonable. The writer recommends visible emission checks be conducted when the utilization of the duct burner is greater than 50% on a calendar year basis. Thus, MSCE will have to monitor and record the utilization of the duct burners.

The emergency generator is a limited use emission unit under this permit, operating as an emergency stationary engine as defined under Subpart IIII of Part 60. The hours the engine is operated shall be tracked through a non-resettable hour meter and the permittee shall record the purpose for the operation and track actual operation of the engines for non-emergency purposes. MSCE will be required to record the type of diesel delivered to the engines and whether it meets the definition of ultra-low sulfur diesel.

The purpose of the fuel gas heaters is to ensure that the incoming natural gas is heated to the required temperature on an as needed basis during the heating season. The writer believes tracking hours of operation or fuel usage monthly should be adequate in determining compliance with the established emission limits.

For demonstrating good combustion practices as BACT for the engines for the emergency generator and fire water pump; and the fuel gas heaters, the permit requires a tune-up once every five years and records maintained of such tune ups. These sources are limited use emission units and requiring tune-ups any more frequently would not provide any additional benefit to the environment.

[74] Texas Commission on Environmental Quality, Chapter 117 – Control of Air Pollution from Nitrogen Compounds, Subchapter G: General Monitoring and Testing Requirements, Division 2 Emission Monitoring, §117.8130(1) Ammonia Monitoring

PERFORMANCE TESTING

Emission testing on the proposed units will be limited to the combustion turbines. The turbines are subject to the NO_x and SO_2 emission standard of NSPS Subpart KKKK. The regulation requires testing for NO_x and SO_2 within 180 days after startup and subsequently annually thereafter. The Subpart KKKK allows the operators of CTs that have NOx continuous emission monitors (CEMs) to use the CEMs data as the NO_x demonstration. There are several different options for SO_2 compliance demonstration which depends upon which SO_2 standard the source has elected to comply with (SO_2 standard or the fuel sulfur content).

MSCE has proposed using the fuel sulfur content standard which allows the use of a valid tariff sheet having a sulfur content limit less than the standard or fuel sampling. MSCE has indicated that the natural gas that will be supplied to the facility will be transported on one of Columbia Gas's pipeline segments that is just north of the facility. According to Columbia's Tariff sheet, natural gas is required to have a total sulfur content no greater than 2 grains per 100 cubic feet.[75] This tariff sheet could be used by MSCE to satisfy the Subpart KKKK SO_2 standard for the CTs. MSCE is not required to conduct SO_2 testing that would involve measuring actual SO_2 emissions from the CTs under Subpart KKKK.

The writer has included initial compliance demonstrations of both CTs for $PM/PM_{10}/PM_{2.5}$, VOC, formaldehyde, and H_2SO_4 limits in the permit. $PM/PM_{10}/PM_{2.5}$ and H_2SO_4 emissions are not controlled by any addon control device. Subsequent testing should be based on other indicators instead of specific frequency. Most PM emissions for natural gas combustion is in the form of condensable PM. Subsequent testing should not be based on visible emission observations or ash content of the fuel. Condensable emissions can be in the form of sulfates. Both manufacturers-based PM emissions on the sulfur content in the fuel. One of the manufacturers-based PM emissions on 100% of the sulfur content being converted into ammonium sulfate. The writer recommends establishing subsequent PM testing based on monitored annual levels of sulfur in the fuel consumed and ammonia slip.

Sulfuric acid emissions are dependent on the sulfur content in the fuel and temperature of the exhaust entering the SCR. The permit is focusing on monitoring the sulfur content through fuel sampling for determining compliance with SO_2 emissions limits. During combustion of the fuel in the CT or duct burner, the fuel sulfur is nearly completely converted into sulfur dioxide. SCRs can convert or oxidize a portion of this sulfur dioxide (SO_2) into sulfur trioxide (SO_3). There is enough water (moisture) to react with the sulfur trioxide to be converted into sulfuric acid. The key in the conversion of the SO_2 to SO_3 is whether the exhaust temperature entering the SCR is above or below the sulfuric acid dewpoint temperature of the fuel. The sulfuric acid dewpoint of the gas analysis used by both CT manufacturers was determined to be 561^0F.[76] The writer has established subsequent PM testing based on monitored annual levels of sulfur in the fuel consumed and whether the annual average temperature of the exhaust is below 600^0F.

VOC emissions from the CTs will be controlled by the oxidation catalyst. Testing of VOCs should be based on an average CO concentration greater than the BACT limit of 2.0 ppm corrected to 15% O_2 or after replacement of the oxidation catalyst. Testing based on these

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[75] TC Energy - Columbia Gas, FERC Gas Tariff, Fourth Revised Volume NO. 1, Part VII – General Terms & Conditions, Section 25.5.c. https://ebb.tceconnects.com/infopost/

[76] Gas Processors Suppliers Association (GSPH), Engineering Data Book, 13th Edition, page 8-17.

indicators would either confirm an exceedance of the BACT Limit or verify compliance after a replacement.

The engines for the emergency generator and fire water pump are subject to Subpart IIII of Part 60. MSCE intends to purchase units with engines that have been certified as compliant in accordance with the applicable standard. Therefore, the regulation does not require a compliance demonstration to be conducted.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that MSCE's proposed electrical generating facility should meet all applicable requirements of state rules and federal regulations. It is recommended that Mountain State Clean Energy, LLC be granted a permit for the construction of a Major Source in accordance with 45 CSR 14 & 45CSR 13 for the proposed construction of the Maidsville Facility.

Edward S Andrews

Digitally signed by: Edward S Andrews
DN: CN = Edward S Andrews email = edward.s.andrews@wv.gov C = US O = WVDEP/Division of Air Quality OU = Permitting/New Source Review Workgroup
Date: 2021.09.29 13:44:09 -04'00'

Edward S. Andrews, P.E.
Engineer

Attachment A FLMs AQRV Determinations

Andrews, Edward S <edward.s.andrews@wv.gov>

RE: [External] RE: [EXTERNAL] WV PSD Application Second Notification (R14-0038 - Longview Power II, LLC)

Kessler, Joseph R <Joseph.R.Kessler@wv.gov> Thu, Apr 29, 2021 at 2:00 PM
To: "Stacy, Andrea" <Andrea_Stacy@nps.gov>, "Perron, Ralph -FS" <ralph.perron@usda.gov>, "mpitrolo@usda.gov" <mpitrolo@usda.gov>, "Salazer, Holly" <Holly_Salazer@nps.gov>, "King, Kirsten L" <kirsten_king@nps.gov>, "Shepherd, Don" <Don_Shepherd@nps.gov>, "Jackson, Bill -FS" <bjackson02@fs.fed.us>
Cc: "Andrews, Edward S" <Edward.S.Andrews@wv.gov>, "McKeone, Beverly D" <Beverly.D.Mckeone@wv.gov>

Will do. Thanks for the timely response.

Joe Kessler

From: Stacy, Andrea <Andrea_Stacy@nps.gov>
Sent: Thursday, April 29, 2021 1:48 PM
To: Kessler, Joseph R <Joseph.R.Kessler@wv.gov>; Perron, Ralph -FS <ralph.perron@usda.gov>; mpitrolo@usda.gov; Salazer, Holly <Holly_Salazer@nps.gov>; King, Kirsten L <kirsten_king@nps.gov>; Shepherd, Don <Don_Shepherd@nps.gov>; Jackson, Bill -FS <bjackson02@fs.fed.us>
Cc: Andrews, Edward S <Edward.S.Andrews@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>
Subject: [External] RE: [EXTERNAL] WV PSD Application Second Notification (R14-0038 - Longview Power II, LLC)

CAUTION: External email. Do not click links or open attachments unless you verify sender.

Hi Joe,

I appreciate the update regarding the application changes. I want to confirm that our determination remains the same, a Class I AQRV analysis will not be necessary for Shenandoah NP. Please provide us with the BACT determination when that is complete, as well as a copy of the draft and final permits once those items are available. Thanks for keeping us in the loop!

-Andrea

From: Kessler, Joseph R <Joseph.R.Kessler@wv.gov>
Sent: Tuesday, April 6, 2021 12:15 PM
To: Perron, Ralph -FS <ralph.perron@usda.gov>; Stacy, Andrea <Andrea_Stacy@nps.gov>; mpitrolo@usda.gov; Salazer, Holly <Holly_Salazer@nps.gov>; King, Kirsten L <kirsten_king@nps.gov>; Shepherd, Don <Don_Shepherd@nps.gov>; Jackson, Bill -FS <bjackson02@fs.fed.us>
Cc: Andrews, Edward S <Edward.S.Andrews@wv.gov>; Kessler, Joseph R <Joseph.R.Kessler@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>
Subject: [EXTERNAL] WV PSD Application Second Notification (R14-0038 - Longview Power II, LLC)

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

In January of last year, the WVDAQ sent a notification e-mail to the appropriate FLMs concerning a proposed 1,200 mW natural gas-fired combined cycle (NGCC) power plant located adjacent to the existing Longview coal-fired electric generating station (see the attached PDF). Based on the information given, the FS (2/14/20) and the NPS (2/15/20) concluded that a Class I AQRV analysis would not be necessary. Mountain State Clean Energy (aka Longview Power II, LLC) has now resubmitted the permit application with revised emergency generator and firewater pump emission rates. Therefore, we are resending the notification and updating the FLM notification form (see attached). Also attached is a PDF made from an excel file detailing the Q/D calculations for this project.

Attached is the **FLM Notification Form** for the following PSD Permit Application originally submitted on December 10, 2019 and resubmitted in March 2021:

Permit Number:	**R14-0038**
Applicant:	**Mountain State Clean Energy (aka Longview Power II, LLC)**
Facility:	**Longview Power II**
Location:	**Maidsville , Monongalia County, WV**
Facility ID Number:	**061-00134**

The revised permit application is available online at: https://dep.wv.gov/daq/permitting/Documents/Longview%20PSD/061-00134_APPL_R14-0038%20Final.pdf

The application has not yet been deemed complete. The proposed facility is considered as one source with the adjacent coal-fired facility. The applicant has stated the highest Q/D (based on Otter Creek NWA), based on the proposed emissions of the NGCC, has been calculated to be 8.99.

Please contact the engineer assigned to review the permit application (see FLM Notification Form for his contact info) if you have any questions.

Thank You,

Joe Kessler, PE

Engineer

West Virginia Division of Air Quality

601-57th St., SE

Charleston, WV 25304

Phone: (304) 926-0499 x1219

Fax: (304) 926-0478

Joseph.r.kessler@wv.gov

Andrews, Edward S <edward.s.andrews@wv.gov>

[External] RE: [External Email]WV PSD Application Second Notification (R14-0038 - Longview Power II, LLC)

Perron, Ralph -FS <ralph.perron@usda.gov> Mon, Apr 19, 2021 at 10:10 AM
To: "Kessler, Joseph R" <Joseph.R.Kessler@wv.gov>, "Andrea Stacy (andrea_stacy@nps.gov)" <andrea_stacy@nps.gov>, Holly Salazer <holly_salazer@nps.gov>, Kirsten King <kirsten_king@nps.gov>, "Don Shepherd (don_shepherd@nps.gov)" <don_shepherd@nps.gov>, Tim Allen <tim_allen@fws.gov>, "Collins, Catherine" <Catherine_Collins@fws.gov>
Cc: "Andrews, Edward S" <Edward.S.Andrews@wv.gov>, "McKeone, Beverly D" <Beverly.D.Mckeone@wv.gov>

CAUTION: External email. Do not click links or open attachments unless you verify sender.

Hi Joe,

Thank you for sharing this information with us for the proposed NGCC power plant adjacent to the existing Longview coal-fired power plant. Based on the emissions data you have shared, and after reviewing the revised permit application, the US Forest Service will not be requesting AQRV analyses for this project.

Please keep us informed of any significant changes to this project, as well as any other proposals which may have an effect on the Otter Creek and/or Dolly Sods Class I areas.

Thanks

Ralph Perron
Air Quality Specialist

Forest Service

Eastern Region

p: 603-536-6228
c: 802-222-1444
ralph.perron@usda.gov

71 White Mountain Drive
Campton, NH 03223
www.fs.fed.us

Caring for the land and serving people

From: Kessler, Joseph R <Joseph.R.Kessler@wv.gov>
Sent: Tuesday, April 6, 2021 2:15 PM
To: Perron, Ralph -FS <ralph.perron@usda.gov>; Andrea Stacy (andrea_stacy@nps.gov) <andrea_stacy@nps.gov>; mpitrolo@usda.gov; Holly Salazer <holly_salazer@nps.gov>; Kirsten King <kirsten_king@nps.gov>; Don Shepherd

(don_shepherd@nps.gov) <don_shepherd@nps.gov>; Jackson, Bill -FS <bjackson02@fs.fed.us>
Cc: Andrews, Edward S <Edward.S.Andrews@wv.gov>; Kessler, Joseph R <Joseph.R.Kessler@wv.gov>; McKeone, Beverly D <Beverly.D.Mckeone@wv.gov>
Subject: [External Email]WV PSD Application Second Notification (R14-0038 - Longview Power II, LLC)

In January of last year, the WVDAQ sent a notification e-mail to the appropriate FLMs concerning a proposed 1,200 mW natural gas-fired combined cycle (NGCC) power plant located adjacent to the existing Longview coal-fired electric generating station (see the attached PDF). Based on the information given, the FS (2/14/20) and the NPS (2/15/20) concluded that a Class I AQRV analysis would not be necessary. Mountain State Clean Energy (aka Longview Power II, LLC) has now resubmitted the permit application with revised emergency generator and firewater pump emission rates. Therefore, we are resending the notification and updating the FLM notification form (see attached). Also attached is a PDF made from an excel file detailing the Q/D calculations for this project.

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Applicant:	**Mountain State Clean Energy (aka Longview Power II, LLC)**
Facility:	**Longview Power II**
Location:	**Maidsville , Monongalia County, WV**
Facility ID Number:	**061-00134**

The revised permit application is available online at: https://dep.wv.gov/daq/permitting/Documents/Longview%20PSD/061-00134_APPL_R14-0038%20Final.pdf

The application has not yet been deemed complete. The proposed facility is considered as one source with the adjacent coal-fired facility. The applicant has stated the highest Q/D (based on Otter Creek NWA), based on the proposed emissions of the NGCC, has been calculated to be 8.99.

Please contact the engineer assigned to review the permit application (see FLM Notification Form for his contact info) if you have any questions.

Thank You,

Joe Kessler, PE

Engineer

West Virginia Division of Air Quality

601-57th St., SE

Charleston, WV 25304

Phone: (304) 926-0499 x1219

Fax: (304) 926-0478

Joseph.r.kessler@wv.gov

Attachment B Emission Rates & Stack Parameters By CT

Hourly Emission Rates and Stack Characteristics
For Each Proposed Operating Mode by CT

Table B- 1 MHPS M501 JAC 2X1 Configurate Emissions Rates

Case No.	Season	CT Load	Ambient Dry Bulb Temp, Relative Humidity	Evaporative Coolers	Duct Burners	NOx (lb/hr)	CO (lb/hr)	VOC (lb/hr)	PM (lb/hr)	SO_2 (lb/hr)	H_2SO_4 (lb/hr)	CO_2 (lb/hr)
2x1 Configuration												
1	Winter	100%	12.9 / 71.8	Off	Off	29.6	18.0	5.16	16.81	4.63	1.98	480,836
2	Winter	100%	12.9 / 71.8	Off	On	31.6	19.2	11.01	21.15	4.93	2.87	512,285
3	Winter	75%	12.9 / 71.8	Off	Off	24.5	14.9	4.27	14.17	3.83	1.64	397,088
4	Winter	50%	12.9 / 71.8	Off	Off	18.7	11.4	3.25	10.77	2.90	1.24	301,365
5	Winter	MECL	12.9 / 71.8	Off	Off	16.3	9.9	2.84	9.87	2.52	1.08	264,756
6	Spring/Fall	100%	53.7 / 69.6	Off	Off	28.6	17.4	4.99	16.34	4.47	1.92	464,032
7	Spring/Fall	100%	53.7 / 69.6	Off	On	31.7	19.3	11.05	23.13	4.94	2.88	513,397
8	Spring/Fall	75%	53.7 / 69.6	Off	Off	22.7	13.8	3.96	13.12	3.55	1.52	368,324
9	Spring/Fall	50%	53.7 / 69.6	Off	Off	17.4	10.6	3.03	10.18	2.71	1.16	281,609
10	Spring/Fall	MECL	53.7 / 69.6	Off	Off	15.6	9.5	2.72	9.55	2.39	1.03	251,475
11	Summer	100%	87.0 / 46.4	On	Off	28.0	17.0	4.88	15.92	4.37	1.87	453,801
12	Summer	100%	87.0 / 46.4	On	On	**32.1**	**19.5**	**11.19**	24.99	**5.00**	**3.33**	**519,619**
13	Summer	100%	87.0 / 46.4	Off	Off	26.9	16.4	4.69	15.39	4.20	1.80	435,884
14	Summer	100%	87.0 / 46.4	Off	On	31.4	19.1	10.94	**25.32**	4.89	2.10	507,990
15	Summer	75%	87.0 / 46.4	Off	Off	21.3	13.0	3.72	12.40	3.33	1.43	345,952
16	Summer	50%	87.0 / 46.4	Off	Off	16.4	10.0	2.86	9.74	2.57	1.10	266,784
17	Summer	MECL	87.0 / 46.4	Off	Off	15.7	9.6	2.75	9.65	2.46	1.05	255,820

Table B- 2 MHPS M501 JAC 1X1 Configurate Emissions Rates

Case No.	Season	CT Load	Ambient Dry Bulb Temp, Relative Humidity	Evaporative Coolers	Duct Burners	NOx (lb/hr)	CO (lb/hr)	VOC (lb/hr)	PM (lb/hr)	SO_2 (lb/hr)	H_2SO_4 (lb/hr)	CO_2 (lb/hr)
1 X 1 Configuration												
18	Winter	100%	12.9 / 71.8	Off	Off	29.6	18.0	5.16	16.81	4.63	1.98	480,839
19	Winter	100%	12.9 / 71.8	Off	On	31.6	19.2	11.02	21.12	4.93	2.87	512,288
20	Winter	75%	12.9 / 71.8	Off	Off	24.5	14.9	4.27	14.15	3.83	1.64	397,088
21	Winter	50%	12.9 / 71.8	Off	Off	18.6	11.4	3.25	10.77	2.90	1.24	301,365
22	Winter	MECL	12.9 / 71.8	Off	Off	16.3	9.9	2.84	9.88	2.52	1.08	264,756
23	Average	100%	53.7 / 69.6	Off	Off	28.6	17.4	4.99	16.33	4.47	1.92	464,034
24	Average	100%	53.7 / 69.6	Off	On	31.7	19.3	11.05	23.13	4.94	2.88	513,399
25	Average	75%	53.7 / 69.6	Off	Off	22.7	13.8	3.96	13.11	3.55	1.52	368,324
26	Average	50%	53.7 / 69.6	Off	Off	17.3	10.6	3.02	10.17	2.71	1.16	281,609
27	Average	MECL	53.7 / 69.6	Off	Off	15.5	9.4	2.70	9.49	2.39	1.03	251,475
28	Summer	100%	87.0 / 46.4	On	Off	28.0	17.0	4.88	15.92	4.37	1.87	453,803
29	Summer	100%	87.0 / 46.4	On	On	**32.1**	**19.5**	**11.19**	24.99	**5.00**	**3.33**	**519,621**
30	Summer	100%	87.0 / 46.4	Off	Off	26.9	16.4	4.69	15.39	4.20	1.80	435,885
31	Summer	100%	87.0 / 46.4	Off	On	31.4	19.1	10.94	**25.32**	4.89	2.10	507,991
32	Summer	75%	87.0 / 46.4	Off	Off	21.3	13.0	3.72	12.33	3.33	1.43	345,952
33	Summer	50%	87.0 / 46.4	Off	Off	16.4	10.0	2.86	9.74	2.57	1.10	266,784
34	Summer	MECL	87.0 / 46.4	Off	Off	15.7	9.6	2.75	9.70	2.46	1.05	255,820

Table B- 3 GE 7HA.03 2x1 Configuration Emissions Rates

Case No.	Season	CT Load	Ambient Dry Bulb Temp, Relative Humidity	Evaporative Coolers	Duct Burners	NOx	CO	VOC	PM	SO_2	H_2SO_4	CO_2
2x1 Configuration												
1	Winter	100%	12.9/75	Off	Off	30.3	18.5	5.29	17.85	5.36	3.60	540,719
2	Winter	100%	12.9/75	Off	On	31.4	19.1	10.96	22.00	5.56	4.01	560,374
3	Winter	75%	12.9/75	Off	Off	24.3	14.8	4.23	17.02	4.29	2.90	432,749
4	Winter	50%	12.9/75	Off	Off	18.7	11.4	3.26	16.20	3.31	2.20	333,816
5	Winter	MECL	12.9/75	Off	Off	15.5	9.5	2.71	15.85	2.75	1.90	277,497
6	Spring/Fall	100%	53.7 / 69	Off	Off	29.5	17.9	5.14	17.73	5.21	3.50	525,577
7	Spring/Fall	100%	53.7 / 69	Off	On	31.5	19.2	10.98	21.27	5.57	4.01	561,079
8	Spring/Fall	75%	53.7 / 69	Off	Off	23.3	14.2	4.07	16.91	4.13	2.80	416,187
9	Spring/Fall	50%	53.7 / 69	Off	Off	17.8	10.8	3.10	16.08	3.15	2.10	317,345
10	Spring/Fall	MECL	53.7 / 69	Off	Off	13.5	8.2	2.36	15.50	2.40	1.60	242,016
11	Summer	100%	87.0 / 46.5	On	Off	28.5	17.4	4.98	17.63	5.05	3.41	509,199
12	Summer	100%	87.0 / 46.5	On	On	**32.1**	**19.5**	**11.18**	22.84	**5.67**	**4.11**	**571,154**
13	Summer	100%	87.0 / 46.5	Off	Off	27.0	16.5	4.71	17.39	4.78	3.21	481,600
14	Summer	100%	87.0 / 46.5	Off	On	30.7	18.7	10.72	**22.94**	5.43	3.90	547,109
15	Summer	75%	87.0 / 46.5	Off	Off	21.5	13.1	3.75	16.69	3.81	2.61	383,836
16	Summer	50%	87.0 / 46.5	Off	Off	16.5	10.0	2.87	16.02	2.92	2.05	294,376
17	Summer	MECL	87.0 / 46.5	Off	Off	13.0	7.9	2.28	15.56	2.31	1.66	233,164

Table B- 4 GE 7HA.03 1x1 Configuration Emissions Rates

Case No.	Season	CT Load	Ambient Dry Bulb Temp, Relative Humidity	Evaporative Coolers	Duct Burners	NOx (lb/hr)	CO (lb/hr)	VOC (lb/hr)	PM (lb/hr)	SO_2 (lb/hr)	H_2SO_4 (lb/hr)	CO_2
1x1 Configuration												
18	Winter	100%	12.9/75	Off	Off	30.4	18.5	5.30	17.85	5.37	3.60	541,450
19	Winter	100%	12.9/75	Off	On	34.1	20.8	11.89	23.36	6.02	4.28	607,982
20	Winter	75%	12.9/75	Off	Off	24.3	14.8	4.24	17.00	4.30	2.88	433,337
21	Winter	50%	12.9/75	Off	Off	18.7	11.4	3.27	16.22	3.31	2.22	334,118
22	Winter	MECL	12.9/75	Off	Off	15.5	9.5	2.71	15.85	2.75	1.90	277,756
23	Spring/Fall	100%	53.7 / 69	Off	Off	29.5	18.0	5.15	17.73	5.22	3.50	526,447
24	Spring/Fall	100%	53.7 / 69	Off	On	33.2	20.2	11.59	22.97	5.88	4.17	591,949
25	Spring/Fall	75%	53.7 / 69	Off	Off	23.4	14.2	4.07	16.87	4.13	2.77	416,768
26	Spring/Fall	50%	53.7 / 69	Off	Off	17.8	10.8	3.10	16.10	3.15	2.11	317,757
27	Spring/Fall	MECL	53.7 / 69	Off	Off	13.5	8.2	2.36	15.50	2.40	1.61	242,183
28	Summer	100%	87.0 / 46.5	On	Off	28.6	17.4	4.99	17.61	5.06	3.40	510,001
29	Summer	100%	87.0 / 46.5	On	On	32.3	19.7	11.27	23.16	5.71	4.10	575,505
30	Summer	100%	87.0 / 46.5	Off	Off	27.1	16.5	4.72	17.40	4.78	3.22	482,309
31	Summer	100%	87.0 / 46.5	Off	On	30.8	18.7	10.73	22.94	5.44	3.90	547,818
32	Summer	75%	87.0 / 46.5	Off	Off	21.5	13.1	3.76	16.63	3.81	2.56	384,313
33	Summer	50%	87.0 / 46.5	Off	Off	16.5	10.0	2.88	15.92	2.92	1.96	294,677
34	Summer	MECL	87.0 / 46.5	Off	Off	13.0	7.9	2.28	15.44	2.31	1.55	233,352

Table B- 5 MHPS M501JAC Stack Conditions

STACK CONDITIONS (per CT/HRSG)						
Case No.	**Stack Height**	**Internal Diameter**	**Exhaust Flow Rate**	**Exhaust Flow Rate**	**Exhaust Temperature**	**Exit Velocity**
	ft	**ft**	**lb/hr**	**acfm**	**^{o}F**	**ft/s**
1	180	23.0	5,865,514	1,663,794	174.2	66.7
2	180	23.0	5,876,214	1,645,279	165.2	66.0
3	180	23.0	5,089,847	1,434,817	170.9	57.6
4	180	23.0	3,890,310	1,160,392	207.6	46.5
5	180	23.0	3,843,564	1,148,128	210.0	46.1
6	180	23.0	5,792,704	1,650,527	175.4	66.2
7	180	23.0	5,809,486	1,628,608	163.9	65.3
8	180	23.0	4,727,816	1,327,669	166.6	53.3
9	180	23.0	3,747,049	1,120,889	208.0	45.0
10	180	23.0	3,758,837	1,124,899	209.6	45.1
11	180	23.0	5,680,590	1,639,668	180.0	65.8
12	180	23.0	5,702,957	1,611,061	164.7	64.6
13	180	23.0	5,524,789	1,587,437	178.5	63.7
14	180	23.0	5,549,290	1,560,601	163.0	62.6
15	180	23.0	4,484,997	1,268,192	168.6	50.9
16	180	23.0	3,656,866	1,109,402	215.1	44.5
17	180	23.0	3,842,742	1,168,002	217.4	46.9
18	180	23.0	5,865,548	1,649,733	168.8	66.2
19	180	23.0	5,876,248	1,631,621	160.0	65.5
20	180	23.0	5,089,849	1,426,284	167.1	57.2
21	180	23.0	3,890,311	1,155,099	204.6	46.3
22	180	23.0	3,843,565	1,143,144	207.1	45.9
23	180	23.0	5,792,730	1,633,805	169.0	65.5
24	180	23.0	5,809,512	1,618,379	160.0	64.9
25	180	23.0	4,727,817	1,321,068	163.5	53.0
26	180	23.0	3,747,050	1,115,914	205.0	44.8
27	180	23.0	3,758,838	1,120,000	206.7	44.9
28	180	23.0	5,680,613	1,613,871	169.9	64.7
29	180	23.0	5,702,980	1,598,952	160.0	64.1
30	180	23.0	5,524,810	1,563,528	168.8	62.7
31	180	23.0	5,549,311	1,553,092	160.0	62.3
32	180	23.0	4,484,995	1,255,471	162.3	50.4
33	180	23.0	3,656,868	1,094,577	206.1	43.9
34	180	23.0	3,842,744	1,151,900	208.1	46.2

Table B- 6 GE 7HA.03 Stack Conditions

STACK CONDITIONS (per CT/HRSG)						
Case No.	**Stack Height**	**Internal Diameter**	**Exhaust Flow Rate**	**Exhaust Flow Rate**	**Exhaust Temperature**	**Exit Velocity**
	ft	**ft**	**lb/hr**	**acfm**	**°F**	**ft/s**
1	180	23.0	6,160,868	1,703,906	159.3	68.4
2	180	23.0	6,166,972	1,687,489	152.3	67.7
3	180	23.0	4,958,447	1,347,749	148.7	54.1
4	180	23.0	4,184,124	1,126,787	144.1	45.2
5	180	23.0	3,610,008	962,541	138.5	38.6
6	180	23.0	6,095,244	1,690,401	159.4	67.8
7	180	23.0	6,106,247	1,675,054	151.9	67.2
8	180	23.0	4,893,869	1,334,741	149.3	53.5
9	180	23.0	4,055,166	1,095,438	144.4	43.9
10	180	23.0	3,344,852	893,109	138.2	35.8
11	180	23.0	5,912,380	1,665,965	165.7	66.8
12	180	23.0	5,931,564	1,648,323	155.7	66.1
13	180	23.0	5,647,132	1,578,894	162.1	63.3
14	180	23.0	5,667,413	1,557,339	149.9	62.5
15	180	23.0	4,685,761	1,294,382	155.1	51.9
16	180	23.0	3,903,345	1,065,855	148.9	42.8
17	180	23.0	3,274,179	883,548	142.3	35.4
18	180	23.0	6,160,385	1,680,453	150.8	67.4
19	180	23.0	6,180,663	1,679,914	147.2	67.4
20	180	23.0	4,958,533	1,335,398	143.1	53.6
21	180	23.0	4,184,021	1,120,635	140.8	45.0
22	180	23.0	3,609,905	960,429	137.2	38.5
23	180	23.0	6,095,132	1,663,123	149.4	66.7
24	180	23.0	6,115,410	1,669,503	148.3	67.0
25	180	23.0	4,893,949	1,322,957	143.9	53.1
26	180	23.0	4,055,248	1,090,222	141.5	43.7
27	180	23.0	3,344,842	891,916	137.4	35.8
28	180	23.0	5,912,261	1,628,162	151.5	65.3
29	180	23.0	5,932,540	1,635,184	150.6	65.6
30	180	23.0	5,647,012	1,545,375	148.9	62.0
31	180	23.0	5,667,290	1,546,340	145.6	62.0
32	180	23.0	4,685,837	1,274,227	145.5	51.1
33	180	23.0	3,903,426	1,054,869	142.6	42.3
34	180	23.0	3,274,168	878,413	138.8	35.2

Appendix A Air Quality Modeling Memo

MEMO

To: Ed Andrews
From: Jon McClung
CC: David Fewell, Bev McKeone, Joe Kessler, Steve Pursley, Rex Compston
Date: September 23, 2021
Re: Air Quality Impact Analysis Review - Mountain State Clean Energy, LLC
PSD Permit Application No. R14-0038 - Plant ID No. 061-00134

I have completed my review and replication of the air quality impact analysis submitted by Mountain State Clean Energy, LLC (MSCE) in support of the PSD permit application (R14-0038) for the proposed construction of a gas-fired combined-cycle power plant to be located adjacent to the existing Longview Power site near Maidsville, West Virginia, within Monongalia County. Review and replication of various components of the modeling analysis were performed by Ed Andrews, Joe Kessler, Steve Pursley, and Rex Compston. The communication history summary relating to modeling information is included in Attachment A. The initial protocol for the modeling analysis was submitted by MSCE on February 16, 2019, with numerous revisions summarized in Attachment A, and conditionally approved by West Virginia Division of Air Quality (DAQ) on March 26, 2020. The initial PSD permit application was received on December 10, 2019. The permit application contains the modeling analysis report and numerous revisions to this application and report are summarized in Attachment A. The final version of the permit application, including the modeling analysis report, was submitted on September 20, 2021 (dated September 21, 2021). This dispersion modeling analysis is required pursuant to §45-14-9 (Requirements Relating to the Source's Impact on Air Quality).

As part of the review process, an applicant for a PSD permit performs the air quality impact analysis and submits a report and the results to the DAQ. The DAQ then reviews and replicates the modeling analysis to confirm the modeling inputs, procedures, and results. This memo contains a synopsis of the modeling analysis. For a complete technical description of the modeling analysis, please consult the complete administrative record that contains communications with the applicant, the protocol, modeling analysis reports, and electronic modeling files submitted by the applicant.

This review is for the Class II area surrounding the proposed project site. Class I areas within 300 km of the project site are: Dolly Sods Wilderness (WV), Otter Creek Wilderness (WV), James River Face Wilderness (Virginia), and Shenandoah National Park (Virginia). The Federal Land Managers (FLMs) responsible for evaluating potential affects on Air Quality Related Values (AQRVs) for federally protected Class I areas were consulted. Based on the emissions from the proposed project and the distances to the Class I areas the National Park Service and U.S. Forest Service have stated a Class I analysis for this project is not required.

MSCE proposes to construct a new nominal 1200 megawatt (MW) gas-fired combined-cycle power plant (Project) to produce electricity that will be supplied to the PJM power grid and connect to the grid via the existing interconnection used by the Longview Power Plant. The components associated with the Project are:

- One combined-cycle power train consisting of two natural gas-fueled combustion turbines (CTs), two heat recovery steam generators with duct burners (HRSGs);
- One diesel fuel-fired firewater pump;
- One diesel fuel-fired emergency generator;
- Wet mechanical draft cooling tower;
- Two fuel gas preheaters.

Monongalia County, WV is in attainment or unclassifiable/attainment status for all criteria pollutants. Pollutants emitted in excess of the significant emission rate are subject to PSD review in unclassifiable/attainment areas. The facility wide maximum Project emissions and the PSD significant emission rates in Table 1 (from Page 1-5 of the revised permit application, 9/21/2021). The annual emissions for the entire facility include 234 start-ups (187 hot startups, 36 warm startups, and 11 cold startups) and 234 shut-down (Page 2-11 of revised permit application, 9/21/2021).

Table 1. Project Emission Rates

Summary of Facility Wide Maximum Emissions for the Mt. State Clean Energy Project

Pollutant	Annual Emissions (tons/year)	PSD Significance Level (tons/year)	PSD Pollutant
NO_x	321	40	Yes
CO	276	100	Yes
VOCs	141	40	Yes
$PM/PM_{10}/PM_{2.5}$	210	25/15/10	Yes
SO_2	39.9	40	No
H_2SO_4	35.8	7	Yes
Ozone Precursor (NO_x)	321	40	Yes
Ozone Precursor (VOC)	141	40	Yes
$PM_{2.5}$ Precursor Pollutant (NO_x)	321	40	Yes
$PM_{2.5}$ Precursor Pollutant (SO_2)	39.9	40	No
Lead	0.0011	0.6	No
Fluorides	0	1	No
Vinyl Chloride	0	1	No
Total Reduced Sulfur	0	10	No
Sulfur Compounds	0	10	No
GHG (CO_2e)	5,135,347	100,000	Yes
Hazardous Air Pollutants (HAPS)	8.19 23.3	10 single 25 multiple	No No

Dispersion modeling was conducted by MSCE for NO_x, CO, PM_{10}, and $PM_{2.5}$. Secondary formation of $PM_{2.5}$ as a result of NO_x and SO_2 emissions was addressed by MSCE and is discussed below. Also, formation of ozone from NO_x and VOC emissions was addressed by the applicant and is discussed below.

Table 2 presents a summary of the air quality standards that were addressed for CO, NO_2, PM_{10}, and $PM_{2.5}$. The pollutants, averaging times, increments, significant impact levels (SILs) and National Ambient Air Quality Standards (NAAQS) are listed. The NAAQS are incorporated by reference in WV Legislative Rule 45CSR8 and the PSD increments are found in 45CSR14. The SIL for 1-hour NO_2 represents the value the Division of Air Quality has implemented as described in the memorandum included in Attachment B.

Table 2. Ambient Air Quality Standards, SILs, and PSD Increments (All conc. in µg/m3)

Pollutant	Averaging Period	SIL	PSD Increments	NAAQS
CO	1-hour	2000	-	40,000
	8-hour	500	-	10,000
NO_2	1-Hour	7.5	-	188
	Annual	1	25	100
PM_{10}	24-Hour	5	30	150
	Annual	1	17	-
$PM_{2.5}$	24-Hour	1.2	9	35
	Annual	0.2	4	12

An air quality impact analysis, as a part of the PSD review process, is a two tiered process. First, a proposed facility is modeled by itself, on a pollutant-by-pollutant and averaging-time basis, to determine if ambient air concentrations predicted by the model exceed the significant impact level (SIL). If ambient impacts are below the SIL then the proposed source is deemed to not have a significant impact and no further modeling is needed. If ambient impacts exceed the SIL then the modeling analysis proceeds to the second tier of cumulative modeling. The cumulative modeling analysis consists of modeling the proposed facility with existing off-site sources and adding representative background concentrations and comparing the results to PSD increments (increment consuming and expanding sources only, no background concentration) and NAAQS. In order to receive a PSD permit, the proposed source must not cause or contribute to an exceedance of the NAAQS or PSD increments. In cases where the PSD increments or NAAQS are predicted to be exceeded in the cumulative analysis, the proposed source would not be considered to cause or contribute to the exceedance if the project-only impacts are less than the SIL, and the applicant may still receive a permit if all other requirements are met.

On January 22, 2013, the U.S. Court of Appeals for the District of Columbia Circuit vacated two provisions in EPA's PSD regulations containing SILs for $PM_{2.5}$. The court granted the EPA's request to remand and vacate the SIL provisions in Sections 51.166(k)(2) and 52.21(k)(2) of the regulations so that EPA could address corrections. EPA's position remains that the court decision does not preclude the use of SILs for $PM_{2.5}$ but special care should be taken in applying the SILs for $PM_{2.5}$. This special care involves ensuring that the difference between the NAAQS and the representative measured background concentration is greater than the SIL. If this difference is greater than the SIL, then it is appropriate to use the SIL as a screening tool to inform the decision as to whether to require a cumulative air quality impact analysis. As shown in Table 3 (from Page 7-3 of the revised permit application, 9/21/2021), for both the 24-hr and annual averaging time for $PM_{2.5}$, this difference is greater than the SIL and it is appropriate to use the SIL as a screening tool. Also shown in Table 3 is the same information for other pollutants and averaging times.

Table 3. NAAQS, Monitor Design Values, and Significant Impact Levels

Comparison of NAAQS, Representative Background Concentrations, and SILs

Pollutant and Averaging Period	Background	Background	NAAQS	NAAQS	SIL	NAAQS-Background Difference	Greater than SIL?
SO_2	(ppb)	(μg/m^3)	(ppb)	(μg/m^3)	(μg/m^3)	(μg/m^3)	
3-hour	20.6	53.6	500	1,300	25	1,246	YES
1-hour	16.0	41.6	75	196	7.8[14]	153	YES
NO_2							
Annual	5.00	9.4	53	100	1	90.6	YES
1-hour	34.8	62.7	100	188	7.5	125	YES
$PM_{2.5}$							
Annual		7.6		12	0.2	4.4	YES
24-hour		18		35	1.2	17	YES
PM_{10}							
24-hour		37		150	5	113	YES
CO							
8-hour	0.9	1,028	9,000	10,000	500	8,972	YES
1-hour	1.9	2,169	35,000	40,000	2,000	37,830	YES

Modeling Basis

The modeling system used conforms to 40 CFR 51 Appendix W, applicable guidance, and the protocol and is summarized below:

- MSCE used the regulatory dispersion model and supporting programs: AERMOD (version 19191), AERMET (version 19191), AERMINUTE (version 15272), AERMAP (version 18081), AERSURFACE (version 19039_DRFT), and BPIPPRM (version 04274). The AERMOD modeling system (AERMOD, AERMET, AERMAP) is the regulatory default modeling system for near-field (<50km) regulatory dispersion modeling.
- AERMET was used to process five years of surface meteorological data from the Morgantown, WV airport (ICAO code: KMGW; WBAN Station ID 13736). Upper air data from Pittsburgh, PA airport (WBAN Station ID 94823) were used.
- AERSURFACE was used to develop appropriate surface characteristic (albedo, Bowen ratio, surface roughness) inputs to AERMET.
- A nested receptor grid was developed and AERMAP was used to determine terrain heights and hill height scales for use by AERMOD to determine maximum modeled concentrations.
- The background monitoring data used in the cumulative modeling analysis is in Table 4 (from Page 7-24 of the revised permit application, 9/21/2021)

Table 4. Background Monitor Design Values

Ambient Air Data for NAAQS Analysis

Pollutant and Averaging Period	Design Values			Site Location
	2017	2018	2019	
SO_2 (ppb)				
3-hour	10.6	6	20.6	Morgantown Airport US 119 & Airport Blvd. (AQS Site ID 54-061-0003)
1-hour	11.0	14.0	16.0	
NO_2 (ppb)				
Annual	5.00	5.00	5.00	220 Meddings Road Charleroi, PA (AQS Site ID 42-125-0005)
1-hour	35	34	33	
$PM_{2.5}$ ($\mu g/m^3$)				
Annual	7.60	7.20	7.10	Morgantown Airport US 119 & Airport Blvd. (AQS Site ID 54-061-0003)
24-hour	18	17	17	
PM_{10} ($\mu g/m^3$)				
24-hour	37	35	34	Weirton - Summit Circle (AQS Site ID 54-29-0009)
CO (ppm)				
8-hour	0.60	0.60	0.90	2 Ball Park Rd Shadyside, OH (AQS Site ID 39-013-0006)
1-hour	0.80	0.80	1.90	
O3 (ppm)				
8-hr	0.06	0.06	0.06	Morgantown Airport US 119 & Airport Blvd. (AQS Site ID 54-061-0003)

<u>Ozone Analysis and Secondary Formation of $PM_{2.5}$</u>

In April 2019, EPA released a guidance memorandum[1] (MERP Memorandum) that describes how modeled emission rates of precursors (MERPs) could be calculated as part of a Tier 1 ozone and secondary $PM_{2.5}$ formation analysis to assess a project's emissions of precursor pollutants. The MERPs may be used to describe an emission rate of a precursor that is expected to result in ambient ozone (O_3) or fine particulate matter ($PM_{2.5}$) impact that would be less than a specific air quality concentration threshold for O_3 or $PM_{2.5}$ that a permitting authority chooses to use to determine whether an impact is significant. Additionally, the methods in this guidance can be used to quantify an estimate of impact to perform a cumulative impact analysis. Based on this guidance, MSCE has quantified the potential secondary formation of $PM_{2.5}$ from NO_x and SO_2 and the quantified the impact of the Project's NO_x and VOC emissions on ozone.

The MERP Memorandum defines a MERP as:

MERP = Critical Air Quality Threshold * (Modeled emission rate from hypothetical source/ Modeled air quality impact from hypothetical source)

For ozone, EPA has proposed a Significant Impact Level (SIL) of 1 ppb and this value can be used to represent the critical air quality threshold. Table 5 shows the ozone analysis for the Project (from Page 7-20 of the permit application, revised 9/21/2021).

Table 5. Ozone Analysis for the MSCE Project

MERP Analysis for O_3 for SIL and NAAQS

Ozone MERP - SIL Results									
MSCE NO_X	MERP NO_X	MSCE VOC	MERP VOC						
Tons/year	Tons/year	Tons/year	Tons/year	Cumulative MERP O_3					
321	262	141	5,170	1.25					
Ozone - NAAQS MERP Results									
Background O3	MSCE NO_X	MERP NO_X	MSCE VOC	MERP VOC	SIL O_3		Cumulative Ozone	NAAQS	Below
ppb	Tons/year	Tons/year	Tons/year	Tons/year	$\mu g/m^3$		ppb	ppb	
60	321	262	141	5,170	1		61.2	70	Yes

The cumulative analysis for ozone is: total ozone = ozone from NO_x + ozone from VOC + background ozone = MSCE NO_x/MERP NO_x + MSCE VOC/MERP VOC + 60 ppb.

[1]Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.s under the PSD Permitting Program (4/30/19)

Total ozone = 321/262 + 141/5170 + 60 ppb = 1.225 + 0.027 + 60 = 61.2 ppb, which is less than the 8-hr ozone NAAQS of 70 ppb.

MSCE utilized EPA's website at https://www.epa.gov/scram/merps-view-qlik to obtain information necessary to assess the Project's formation of secondary $PM_{2.5}$ from NO_x and SO_2. The USEPA model results for the hypothetical source No. 7 in West Virginia (Doddridge) were used to develop linear equations for the predicted $PM_{2.5}$ concentrations from direct emissions of NO_x and SO_2 for a 90ft stack ht. The linear equations are shown in Figure 1 (from Pages 7-21 and 7-22 of the permit application, revised 9/21/21).

Figure 1. Linear Equations and Assessment of Secondary Formation of $PM_{2.5}$

Annual Secondary $PM_{2.5}$ due to NOx = 1.30E-06*(321 tpy) +2.54E-05 = 0.000443 µg/m^3
Annual Secondary $PM_{2.5}$ due to SO_2 = 4.14E-06*(39.9 tpy) +1.33E-04 = 0.000298 µg/m^3
Total Secondary $PM_{2.5}$ (Annual) = 0.000741 µg/m^3

24-hr Secondary $PM_{2.5}$ due to NOx = 3.67E-05*(321 tpy) +5.36E-04 = 1.23E-02 µg/m^3
24-hr Secondary $PM_{2.5}$ due to SO_2 = 9.13E-05*(39.9 tpy) +9.88E-03 = 1.35E-02 µg/m^3
Total Secondary $PM_{2.5}$ (24-hr) = 0.0258 µg/m^3

The results shown in Figure 1 are included by MSCE in the SIL and cumulative analyses conducted for $PM_{2.5}$.

Modeling Operating Scenarios

MSCE performed a load and normal operating condition analysis by modeling normal operating conditions (34 operating scenarios: three load conditions (50%, 75%, and 100%) for winter, summer, average conditions, with and without duct burners). Each of the operating scenarios has unique exhaust gas conditions and pollutant emission rates. For each pollutant and averaging time, MSCE identified the operating scenario that produced the highest modeled concentration and used that scenario for all further pollutant and time period specific refined modeling including short-term and long-term averaging periods including SIL and cumulative multi-source modeling. Normal operation modeling scenarios were modeled for each hour of the entire meteorological record.

MSCE also modeled startup (cold, warm, hot) and shutdown (SUSD) scenarios for short-term (1-hr and 24-hr) standards. Each of the SUSD operating scenarios has unique exhaust gas conditions and pollutant emission rates. For all SUSD scenarios, MSCE modeled one CT utilizing the SUSD mode and one CT in normal operation. SUSD modeling scenarios were modeled for each hour of the entire meteorological record. For annual standards, the annualized emission rates include the SUSD emissions.

SIL Analysis Results (Tier I)

The results of the Significant Impact Analysis for the MSCE Project sources are included in Table 6 (from Page 7-7 of the revised permit application, 9/21/2021). Any pollutant/averaging time result exceeding the Significant Impact Level (SIL) must be addressed in a cumulative analysis. A pollutant/averaging time with a result below the SIL is considered insignificant and no further modeling analysis is required. A cumulative modeling analysis is required for the following pollutant(s)/averaging time(s): 1-hr and Annual NO_x, 24-hr and annual PM_{10}, 24-hr and Annual $PM_{2.5}$. No further modeling is required for 1-hr and 8-hr CO.

Table 6. SIL Analysis Results

Comparison of Maximum Predicted Concentrations ($\mu g/m^3$) from the MSCE Project Emissions to SILs

Averaging Period	NO_x	PM_{10}	$PM_{2.5}$	CO
Normal Operation				
1-hr	130.6			66.4
8-hr				17.7
24-hr		11.51	5.74	
Secondary Formation			0.0258	
Total			5.77	
Annual	1.24	2.15	1.21	
Secondary Formation			0.000741	
Total			1.21	
Startup/Shutdown				
1-hr	130.6			864.1
24-hr		11.52	5.76	
Significant Impact Levels (SILs)				
Short-term (1-, or 24-hr)	7.5	5	1.2	2,000
Long-term (8-hr or Annual)	1	1	0.2	500

Cumulative Analysis Results (Tier II)

The cumulative analysis includes the modeled impacts from the MSCE Project sources, off-site existing sources, and representative monitored background concentrations. For off-site existing sources, the impacts represent maximum hourly or annualized hourly potential emissions, as determined from applicable permits. The background concentration data is summarized above with detailed information in the applicant's modeling report. The cumulative analysis addresses both worst-case normal operation and startup/shutdown scenarios of the MSCE project.

The SIL analysis is based on the highest-first-high modeled concentration. The cumulative analysis is based on the modeled concentration in the form of the standard for each pollutant and averaging time and varies for NAAQS and PSD increments. Table 7 shows the maximum total concentrations for worst-case normal operations for all the receptors modeled in the cumulative analysis (from Page 7-12 of the revised permit application, 9/21/2021). No modeled exceedances exist for the annual NO_X NAAQS and for the following PSD increment standards: annual NO_X, 24-hr $PM_{2.5}$, annual $PM_{2.5}$. Modeled exceedances exist for the following: NAAQS - 1-hr NO_X, 24-hr $PM_{2.5}$, annual $PM_{2.5}$, 24-hr PM_{10}; PSD increments - 24-hr PM_{10}, annual PM_{10}. However, for all modeled exceedances of the NAAQS or PSD increments, the MSCE Project is below the SIL and does not cause or contribute to the modeled exceedances.

Table 7. Cumulative Analysis Results - Worst-Case Normal Operations

Comparison of Predicted Multi-Source Concentration (µg/m^3) to SIL, NAAQS and PSD Increment

NAAQS	NO_x 1-hr average H8H 5-yr Average	NO_x Annual Average Max	$PM_{2.5}$ 24-hr average H8H 5-yr Average	$PM_{2.5}$ Annual Average Max	PM_{10} 24-hr average H6H	
All sources	163.5	8.70	145.8	42.8	183.0	
Secondary Formation	NA	NA	0.0258	0.000741	NA	
Background	62.7	9.4	18	7.60	37	
Total	**226.2**	18.1	**163.8**	**50.4**	**220.0**	
NAAQS	188	100	35	12	150	
Maximum MSCE Project contribution to any predicted NAAQS exceedance	1.92	NA	0.248	0.038	0.486	
SIL	7.5	1	1.2	0.2	5	
PSD Increment		NO_x Annual Average Max	$PM_{2.5}$ 24-hr average H2H	$PM_{2.5}$ Annual Average Max	PM_{10} 24-hr average H2H	PM_{10} Annual Average Max
All sources		4.93	6.29	1.32	180.2	43.8
Secondary Formation		NA	0.0258	0.000741	NA	NA
Total		4.93	6.32	1.32	180.2	43.8
Increment		25	9	4	30	17
Maximum MSCE Project contribution to any predicted PSD Increment exceedance		NA	NA	NA	0.47	0.05
SIL		1	1.2	0.2	5	1

MSCE modeled startup (cold, warm, hot) and shutdown (SUSD) scenarios for short-term (1-hr and 24-hr) standards. For annual standards, the annualized emission rates include the SUSD emissions. Table 8 shows the maximum total concentrations for the worst-case SUSD scenario for all the receptors modeled in the cumulative analysis (from Page 7-13 of the revised permit application, 9/21/2021). No modeled exceedances exist for the 1-hr CO NAAQS and for the 24-hr $PM_{2.5}$ PSD increment standard. Modeled exceedances exist for the following: NAAQS - 1-hr NO_X, 24-hr $PM_{2.5}$, 24-hr PM_{10}; PSD increments - 24-hr PM_{10}. However, for all modeled exceedances of the NAAQS or PSD increments, the MSCE Project is below the SIL and does not cause or contribute to the modeled exceedances.

Table 8. Cumulative Analysis Results - Startup/Shutdown (SUSD) Modeling Scenarios

Comparison of Predicted Maximum MSCE Concentrations to the NAAQS and PSD Increment for Startup/Shutdown Conditions

Pollutant/Ave Period NAAQS	Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Exceeds NAAQS?	Max MSCE Project Contribution ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Maximum Impact Case
NO_x/1-hr H8H/5-yr Average (2014-2018)	163.5	62.7	226.2	188	YES	7.48	7.5	Shutdown
CO/1-hr Maximum CT B (2017)	864.1	914.3	1,778.4	40,000	NO			Cold Start
$PM_{2.5}$/24-hr H8H/5-yr Average (2014-2018) CT B	145.8	18	163.8	35	YES	0.249	1.2	Cold Start
PM_{10}/24-hr H6H/5-yr Average (2014-2018) CT B	183.0	37	220.0	150	YES	0.488	5	Cold Start
Pollutant/Ave Period PSD Increment			**Total Impact**	**PSD Increment**	**Exceeds PSD Increment?**	**Max MSCE Project Contribution**	**SIL**	**Maximum Impact Case**
$PM_{2.5}$/24-hr H2H (2015) CT B			6.30	9	NO		1.2	Cold Start
PM_{10}/24-hr H2H (2016) CT A			180.17	30	YES	0.472	5	Cold Start

Summary

The air quality impact analysis prepared and submitted by MSCE to the DAQ has been reviewed and replicated and conforms to 40 CFR 51 Appendix W, applicable guidance, and the modeling protocol. For various NAAQS and PSD increment standards, modeled exceedances exist for both worst-case normal operations and startup/shutdown scenarios. However, since MSCE Project-only impacts are below the SIL for all modeled exceedances, MSCE does not cause or contribute to the modeled exceedances of the NAAQS or PSD increments. No further modeling is necessary by MSCE.

ATTACHMENT A

MSCE Modeling Communication History

1. MSCE LVU2 Protocol submitted February 16, 2019.
2. DAQ responded with comments March 12, 2019.
3. MSCE provided response to comments 8 13 2019.
4. MSCE provided revised protocol 9 23 2019.
5. DAQ provided comments on revised protocol 11 20 2019.
6. MSCE LVU2 submitted revised protocol 12 4 2019.
7. DAQ provided comments 1 9 2020.

7A. MSCE LVU2 submitted application (12 10 2019) and modeling analysis results report in January 2020.

8. MSCE LVU2 responded 3 23 2020.
9. MSCE LVU2 revised protocol 3 25 2020.
10. DAQ conditionally approved on 3 26 2020 MSCE LVU2 protocol (conditioned on consultation approval by EPA R3 regarding the use of draft AERSURFACE)
11. EPA R3 on 3 30 2020 provides full consultation approval for the use of the Draft Version of AERSURFACE.
12. Modeling files submitted 4 17 2020.
13. DAQ issues 5 4 2020 Administrative incompleteness letter with modeling issues.
14. MSCE LVU2 5 14 2020 additional modeling files submitted.
15. DAQ issues Administrative Complete Letter June 1 2020.
16. DAQ issues technical deficiencies to MSCE 8 11 2020.
17. MSCE submits revised modeling files 10 5 2020 and related modeling report revisions.
18. MSCE submits revised modeling files 10 28 2020.
19. DAQ issues Technical Deficiencies 12 14 2020.
20. MSCE submits 3 15 2021 full revised permit application with revised modeling files and modeling analysis report.
21. MSCE submits 6 3 2021 revised modeling report information.
22. DAQ sends incomplete application letter 6 8 2021 identifying modeling issues.
23. MSCE submits response to 6 8 2021 issues on 6 17 2021.
24. DAQ provides comments to MSCE on 6 17 2021.
25. MSCE submits 7 9 2021 revised modeling files and updated modeling analysis report information.
26. MSCE submits revised modeling analysis report information on 7 21 2021.

27 MSCE submits revised modeling analysis information on 7 22 2021.

28. DAQ provides comments to MSCE on 8 3 2021.
29. MSCE submitted revised modeling files and associated information on 8 10 2021.
30. In-person meeting with MSCE on 8 17 2021.
31. MSCE submitted revised modeling information on 8 18 2021.
32. MSCE submitted revised modeling information on 8 19 2021.
33. MSCE submitted revised modeling files and related information on 8 24 2021.

34. MSCE submitted revised modeling files and related information on 8 30 2021.
35. DAQ provides comments to MSCE on 9 8 2021.
36. MSCE submits modeling files 9 13 2021.
37. DAQ provides comments on 9 20 2021 on modeling files submitted by MSCE on 9 13 2021.
38. MSCE submits revised modeling files 9 20 2021.
39. MSCE submits revised permit application with modeling analysis report on 9 20 2021 (dated 9 21 2021).

ATTACHMENT B

Division of Air Quality Memorandum regarding Interim 1-Hour Significant Impact Levels for Nitrogen Dioxide and Sulfur Dioxide west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
dep.wv.gov

MEMORANDUM

To: Jay Fedczak
Fred Durham

Cc: John Benedict
Bev McKeone
Joe Kessler
Steve Pursley

From: Jon McClung JDM

Date: January 28, 2014

Subject: Interim 1-Hour Significant Impact Levels for Nitrogen Dioxide and Sulfur Dioxide

Summary

As a follow-up to our discussions regarding the use of interim significant impact levels (SILs) for the 1-hour nitrogen dioxide (NO_2) and 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standards (NAAQS), I have conducted a detailed review of EPA's relevant guidance concerning their recommended SILs. EPA's guidance provides recommended SILs for 1-hr NO_2 and 1-hr SO_2 to serve as a useful screening tool for implementing the PSD requirements for an air quality analysis. EPA has provided recommended interim SILs since they have not yet codified final SILs through rulemaking. I have confirmed via discussions with the EPA Region 3 Modeler, Timothy A. Leon Guerrero, that the recommended SILs are consistent for use with EPA's PSD permitting program, as codified in 40 CFR 51. We have reviewed EPA's recommended interim SILs for 1-hr NO_2 and 1-hr SO_2 and concur with EPA's finding that an applicant for a PSD permit demonstrating an air quality impact at or below the SIL is *de minimis* in nature and would not cause a violation of the NAAQS. The interim SILs should be used in air quality impact assessments for PSD permit applications until EPA issues a final rule establishing SILs for 1-hr NO_2 and 1-hr SO_2.

Discussion

On February 9, 2010, EPA published a final rule, which became effective on April 12, 2010, establishing a new 1-hour NO_2 NAAQS at 100 ppb (188 $\mu g/m^3$ at 25 °C and 760 mm Hg), based on the 3-year average of the 98^{th}-percentile of the annual distribution of the daily maximum 1-hour concentrations.

On June 22, 2010, EPA published a final rule, which became effective on August 23, 2010, establishing a new 1-hour SO_2 NAAQS at 75 ppb (196 $\mu g/m^3$ at 25 °C and 760 mm Hg), based on the 3-year average of the 99^{th}-percentile of the annual distribution of the daily maximum 1-hour concentrations.

EPA guidance establishes that an air quality assessment for a PSD application begins with the applicant estimating the potential air quality impacts from the project source alone. If a source demonstrates an impact above a SIL then a cumulative impact analysis and PSD increment analysis is required. If modeled impacts do not exceed the SIL, the permitting authority may conclude that the project would not cause or contribute to a violation of the NAAQS and EPA would not consider it necessary to conduct a more comprehensive cumulative impact assessment. Establishing an appropriate SIL is an integral part of the PSD air quality analysis process since without it a permitting authority may not conclude that impacts below a SIL are *de minimis* and further analyses that may not be necessary to demonstrate compliance would automatically be required.

Interim 1-Hour NO_2 and 1-Hour SO_2 SILs

This memo documents the establishment, for the West Virginia PSD program, of an interim 1-hour NO_2 SIL of 4 ppb (7.5 $\mu g/m^3$), which is the same as that recommended by EPA in the June 29, 2010 memorandum from Stephen D. Page, *Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program.* This memorandum, which contains the technical analysis to determine the SIL, is appended as Attachment 1.

This memo also documents the establishment, for the West Virginia PSD program, an interim 1-hour SO_2 SIL of 3 ppb (7.8 $\mu g/m^3$), which is the same as that recommended by EPA in the August 23, 2010 memorandum from Stephen D. Page, *Guidance Concerning the Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program.* This memorandum, which contains the technical analysis to determine the SIL, is appended as Attachment 2.

DAQ Attachment 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JUN 29 2010

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program

FROM: Stephen D. Page, Director
Office of Air Quality Planning and Standards

TO: Regional Air Division Directors

On January 22, 2010, the Environmental Protection Agency (EPA) announced a new 1-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (hereinafter, either the 1-hour NO_2 NAAQS or 1-hour NO_2 standard) of 100 parts per billion (ppb), which is attained when the 3-year average of the 98th-percentile of the annual distribution of daily maximum 1-hour concentrations does not exceed 100 ppb at each monitor within an area. EPA revised the primary NO_2 NAAQS to provide the requisite protection of public health. The final rule for the new 1-hour NO_2 NAAQS was published in the Federal Register on February 9, 2010 (75 FR 6474), and the standard became effective on April 12, 2010. EPA policy provides that any federal Prevention of Significant Deterioration (PSD) permit issued under 40 CFR 52.21 on or after that effective date must contain a demonstration of source compliance with the new 1-hour NO_2 standard.

EPA is aware of reports from stakeholders indicating that some sources—both existing and proposed—are modeling potential violations of the 1-hour NO_2 standard. In many cases, the affected units are emergency electric generators and pump stations, where short stacks and limited property rights exist. However, larger sources, including coal-fired and natural gas-fired power plants, refineries, and paper mills, could also model potential violations of the new NO_2 NAAQS.

To respond to these reports and facilitate the PSD permitting of new and modified major stationary sources, we are issuing the attached guidance, in the form of two memoranda, for implementing the new 1-hour NO_2 NAAQS under the PSD permit program. The guidance contained in the attached memoranda addresses two areas. The first memorandum, titled, "General Guidance for Implementing the 1-hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour NO_2 Significant Impact Level," includes guidance for the preparation and review of PSD permits with respect to the new 1-hour NO_2 standard. This guidance memorandum sets forth a recommended interim 1-hour NO_2 significant impact level (SIL) that states may consider when carrying out the required

PSD air quality analysis for NO_2, until EPA promulgates a 1-hour NO_2 SIL via rulemaking. The second memorandum, titled "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard," includes specific modeling guidance for estimating ambient NO_2 concentrations and determining compliance with the new 1-hour NO_2 standard.

This guidance does not bind state and local governments and the public as a matter of law. Nevertheless, we believe that state and local air agencies and industry will find this guidance useful when carrying out the PSD permit process. We believe it will provide a consistent approach for estimating NO_2 air quality impacts from proposed construction or modification of NOx emissions sources. For the most part, the attached guidance reiterates existing policy and guidance, but focuses on how this information is relevant to implementation of the new 1-hour NO_2 NAAQS.

Please review the guidance included in the two attached memoranda. If you have questions regarding the general implementation guidance contained in the first memorandum, please contact Raj Rao (rao.raj@epa.gov). If you have questions regarding the modeling guidance in the second memorandum, please contact Tyler Fox (fox.tyler@epa.gov). We are continuing our efforts to address permitting issues related to NO_2 and other NAAQS including the recently-signed 1-hour sulfur dioxide NAAQS. We plan to issue additional guidance to address these new 1-hour standards in the near future.

Attachments:

1. Memorandum from Anna Marie Wood, Air Quality Policy Division, to EPA Regional Air Division Directors, "General Guidance for Implementing the 1-hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour NO_2 Significant Impact Level" (June 28, 2010).
2. Memorandum from Tyler Fox, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (June 28, 2010).

cc: Anna Marie Wood
Richard Wayland
Raj Rao
Tyler Fox
Dan deRoeck
Roger Brode
Rich Ossias
Elliott Zenick
Brian Doster

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

June 28, 2010

MEMORANDUM

SUBJECT: General Guidance for Implementing the 1-hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour NO_2 Significant Impact Level

FROM: Anna Marie Wood, Acting Director /s/
Air Quality Policy Division

TO: Regional Air Division Directors

INTRODUCTION

We are issuing the following guidance to explain and clarify the procedures that may be followed by applicants for Prevention of Significant Deterioration (PSD) permits and permitting authorities reviewing such applications to properly demonstrate that proposed construction will not cause or contribute to a violation of the new 1-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (hereinafter, either the 1-hour NO_2 NAAQS or 1-hour NO_2 standard) that became effective on April 12, 2010. EPA revised the primary NO_2 NAAQS by promulgating a 1-hour NO_2 NAAQS to provide the requisite protection of public health. Under section 165(a)(3) of the Clean Air Act (the Act) and sections 52.21(k) and 51.166(k) of EPA's PSD regulations, to obtain a permit, a source must demonstrate that its proposed emissions increase will not cause or contribute to a violation of any NAAQS.

This guidance is intended to: (1) explain the recommended procedures for stakeholders to follow to properly address concerns over high preliminary modeled estimates of ambient NO_2 concentrations that suggest potential violations of the new 1-hour NO_2 standard under some modeling and permitting scenarios; (2) help reduce the burden of modeling for the hourly NO_2 standard where it can be properly demonstrated that a source will not have a significant impact on ambient 1-hour NO_2 concentrations; and (3) identify approaches that allow sources and permitting authorities to mitigate, in a manner consistent with existing regulatory requirements, potential modeled violations of the 1-hour NO_2 NAAQS, where appropriate. Accordingly, the techniques described in this memorandum may be used by permit applicants and permitting authorities to configure projects and permit conditions in order to reasonably conclude that a proposed source's emissions do not cause or contribute to modeled 1-hour NO_2 NAAQS violations so that permits can be issued in accordance with the applicable PSD program requirements.

This guidance discusses existing provisions in EPA regulations and previous guidance for applying those provisions but focuses on the relevancy of this information for implementing the new NAAQS for NO_2. Importantly, however, this guidance also sets forth a recommended interim 1-hour NO_2 significant impact level (SIL) that EPA will use for implementing the federal PSD program, and that states may choose to rely upon to implement their PSD programs for NOx if they agree that these values represent *de minimis* impact levels and incorporate into each permit record a rationale supporting this conclusion. This interim SIL is a useful screening tool that can be used to determine whether or not the emissions from a proposed source will significantly impact hourly NO_2 concentrations, and, if significant impacts are predicted to occur, whether the source's emissions "cause or contribute to" any modeled violations of the new 1-hour NO_2 NAAQS.

BACKGROUND

On April 12, 2010, the new 1-hour NO_2 NAAQS became effective. EPA interprets its regulations at 40 CFR 52.21 (the federal PSD program) to require permit applicants to demonstrate compliance with "any" NAAQS that is in effect on the date a PSD permit is issued. (See, e.g., EPA memo dated April 1, 2010, titled "Applicability of the Federal Prevention of Significant Deterioration Permit Requirements to New and Revised National Ambient Air Quality Standards.") Due to the introduction of a short-term averaging period for the 1-hour NO_2 NAAQS, we anticipate that some stationary sources with relatively short stacks may experience increased difficulty demonstrating that emissions from new construction or modifications will not cause or contribute to a violation of the 1-hour NO_2 NAAQS.

We are responding to reports from stakeholders which indicate that some sources, existing and proposed, are modeling high hourly NO_2 concentrations showing violations of the 1-hour NO_2 NAAQS—based only on the source's projected emissions of NOx under some modeling and permitting scenarios. We find that, in many cases, the modeled violations are resulting from emissions at emergency electric generators and pump stations, where short stacks and limited property rights exist. In other cases, the problem may occur during periods of unit startup, particularly where controls may initially not be in operation. Finally, certain larger sources, including coal-fired and natural gas-fired power plants, refineries, and paper mills could also experience problems in meeting the new 1-hour NO_2 NAAQS using particular modeling assumptions and permit conditions.

We believe that, in some instances, the projected violations result from the use of maximum modeled concentrations that do not adequately take into account the form of the 1-hour standard, and are based on the conservative assumption of 100% NOx-to-NO_2 conversion in the ambient air. To the extent that this is the case, it may be possible to provide more accurate projections of ambient NO_2 concentrations by applying current procedures which account for the statistical form of the 1-hour NO_2 standard, as well as more realistic estimates of the rate of conversion of NOx emissions to ambient NO_2 concentrations. See EPA Memorandum from Tyler Fox, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (June 28, 2010) for specific modeling guidance for estimating ambient NO_2 concentrations consistent with the new 1-hour NO_2 NAAQS. In addition, where short stacks are currently being used, or are under design, it may be possible to lessen the source's air quality impacts without improper dispersion by implementing "good engineering practice" (GEP) stack heights to increase the height of existing or designed stacks to avoid excessive concentrations due to downwash, as described in the guidance below.

It is EPA's expectation that the guidance in this memorandum and available modeling guidance for NO_2 assist in resolving some of the issues arising from preliminary analyses that are reportedly showing potential exceedances of the new 1-hour NO_2 NAAQS that would not be present under more refined modeling applications. In addition, the techniques described in this memorandum may also help avoid violations of the standard through design of the proposed source or permit conditions, consistent with existing regulatory requirements, which enable the source to demonstrate that its proposed emissions increase will not cause or contribute to a modeled violation of the 1-hour NO_2 standard. Moreover, the interim 1-hour NO_2 SIL that is included in this guidance will provide a reasonable screening tool for efficiently implementing the PSD requirements for an air quality impact analysis.

The following discussion provides guidance concerning demonstrating compliance with the new NAAQS and mitigating modeled violations using air quality-based permit limits more stringent than what the Best Available Control Technology provisions may otherwise require, air quality offsets, the use of GEP stack heights, possible permit conditions for emergency generators, and an interim 1-hour NO_2 SIL.

AIR-QUALITY BASED EMISSIONS LIMITATIONS

Once a level of control required by the Best Available Control Technology provisions is proposed by the PSD applicant, the proposed source's emissions must be modeled at the BACT emissions rate(s) to demonstrate that those emissions will not cause or contribute to a violation of any NAAQS or PSD increment. EPA's 1990 Workshop Manual (page B.54) describes circumstances where a source's emissions based on levels proposed through the top-down process may not be sufficiently controlled to prevent modeled violations of an increment or NAAQS. In such cases, it may be appropriate for PSD applicants to propose a more stringent control option (that is, beyond the level identified via the top-down process) as a result of an adverse impact on the NAAQS or PSD increments.

DEMONSTRATING COMPLIANCE WITH THE NEW NAAQS & MITIGATING MODELED VIOLATIONS WITH AIR QUALITY OFFSETS

A 1988 EPA memorandum provides procedures to follow when a modeled violation is identified during the PSD permitting process. See Memorandum from Gerald A. Emison, EPA OAQPS, to Thomas J. Maslany, EPA Air Management Division, "Air Quality Analysis for Prevention of Significant Deterioration (PSD)." (July 5, 1988). In brief, a reviewing authority may issue a proposed new source or modification a PSD permit only if it can be shown that the proposed project's emissions will not "cause or contribute to" any modeled violations.

To clarify the above statement, in cases where modeled violations of the 1-hour NO_2 NAAQS are predicted, but the permit applicant can show that the NOx emissions increase from the proposed source will not have a significant impact *at the point and time of any modeled violation*, the permitting authority has discretion to conclude that the source's emissions will not contribute to the modeled violation. As provided in the July 5, 1988, guidance memo, in such instances, because of the proposed source's *de minimis* contribution to any modeled violation, the source's impact will not be considered to cause or contribute to such modeled violations, and the permit could be issued. This concept continues to apply, and the significant impact level (described further below) may be used as part of this analysis. A 2006 decision by the EPA Environmental Appeals Board (EAB) provides detailed reasoning that demonstrates the permissibility of finding that a PSD source would not be considered to cause or contribute to a modeled NAAQS violation because its estimated air quality impact was insignificant at the time and place of the modeled violations.[1] See In re *Prairie State Gen. Co.*, 13 E.A.D. ___, ___, PSD Appeal No. 05-05, Slip. Op. at 137-144 (EAB 2006)

However, where it is determined that a source's impact does cause or contribute to a modeled violation, a permit cannot be issued without some action taken to mitigate the source's impact. In accordance with 40 CFR 51.165(b)[2], a major stationary source or major modification (as defined at §51.165(a)(1)(iv) and (v)) that locates in an NO_2 attainment area, but would cause or contribute to a violation of the 1-hour NO_2 NAAQS anywhere may "reduce the impact of its emissions upon air quality by obtaining sufficient emission reductions to, at a minimum, compensate for its adverse ambient [NO_2] impact where the major source or major modification would otherwise cause or contribute to a violation ...." An applicant can meet this requirement for obtaining additional emissions reductions by either reducing its emissions at the source, e.g., promoting more efficient production methodologies and energy efficiency, or by obtaining air quality offsets (see below). See, e.g., In re *Interpower of New York, Inc.*, 5 E.A.D. 130, 141 (EAB 1994).[3] A State may also provide the necessary emissions reductions by imposing emissions limitations on other sources through an approved State Implementation Plan (SIP) revision. These approaches may also be combined as necessary to demonstrate that a source will not cause or contribute to a violation of the NAAQS.

Unlike emissions offset requirements in nonattainment areas, in addressing the air quality offset concept, it may not be necessary for a permit applicant to fully offset the proposed emissions increase if an emissions reduction of lesser quantity will mitigate the adverse air quality impact on a modeled violation. ("Although full emission offsets are not required, such a source must obtain emission offsets sufficient to compensate for its air quality impact where the violation occurs." 44 FR 3274, January 16, 1979, at 3278.) To clarify this, the 1988 guidance memo referred to above states that:

> offsets sufficient to compensate for the source's significant impact must be obtained pursuant to an approved State offset program consistent with State Implementation Plan (SIP) requirements under 40 CFR 51.165(b). Where the source is contributing to an

[1] While there is no 1-hour NO_2 significant impact level (SIL) currently defined in the PSD regulations, we believe that states may adopt interim values, with the appropriate justification for such values, to use for permitting purposes. In addition, we are recommending an interim SIL as part of this guidance for implementing the NO_2 requirements in the federal PSD program, and in state programs where states choose to use it.

[2] The same provision is contained in EPA's Interpretative Ruling at 40 CFR part 51 Appendix S, section III.

[3] In contrast to Nonattainment New Source Review permits, offsets are not mandatory requirements in PSD permits if it can otherwise be demonstrated that a source will not cause or contribute to a violation of the NAAQS. See, In re *Knauf Fiber Glass, GMBH*, 8 E.A.D. 121, 168 (EAB 1999).

existing violation, the required offset may not correct the violation. Such existing violations must be addressed [through the SIP].

In addition, in order to determine the appropriate emissions reductions, the applicant and permitting authority should take into account modeling procedures for the form of the 1-hour standard and for the appropriate NOx-NO_2 conversion rate that applies in the area of concern. As part of this process, existing ambient ozone concentrations and other meteorological conditions in the area of concern may need to be considered. Note that additional guidance for this and other aspects of the modeling analysis for the impacts of NOx emissions on ambient concentrations of NO_2 are addressed in EPA modeling guidance, including the June 28, 2010, Memorandum titled, "Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard."

"GOOD ENGINEERING PRACTICE" STACK HEIGHT & DISPERSION TECHNIQUES

If a permit applicant is unable to show that the source's proposed emissions increase will not cause or contribute to a modeled violation of the new 1-hour NO_2 NAAQS, the problem could be the result of plume downwash effects which may cause high ambient concentrations near the source. In such cases, a source may be able to raise the height of its existing stacks (or designed stacks if not yet constructed) to a GEP stack height of at least 65 meters, measured from the ground-level elevation at the base of the stack.

While not necessarily totally eliminating the effects of downwash in all cases, raising stacks to GEP height may provide substantial air quality benefits in a manner consistent with statutory provisions (section 123 of the Act) governing acceptable stack heights to minimize extensive concentrations due to atmospheric downwash, eddies or wakes. Permit applicants should also be aware of the regulatory restrictions on stack heights for the purpose of modeling for compliance with NAAQS and increments. Section 52.21(h) of the PSD regulations currently prohibits the use of dispersion techniques, such as stack heights above GEP, merged gas streams, or intermittent controls for setting NOx emissions limits or to meet the annual and 1-hour NAAQS and annual NO_2 increments. However, stack heights in existence before December 31, 1970, and dispersion techniques implemented before then, are not affected by these limitations. EPA's general stack height regulations are promulgated at 40 CFR 51.100(ff), (gg), (hh), (ii), (jj), (kk) and (nn), and 40 CFR 51.118.

a. *Stack heights*: A source cannot take credit for that portion of a stack height in excess of the GEP height when modeling to develop the NOx emissions limitations or to determine source compliance with the annual and 1-hour NO_2 NAAQS. It should be noted, however, that this limitation <u>does not limit</u> the actual height of any stack constructed by a new source or modification.

The following limitations apply in accordance with §52.21(h):

- For a stack height less than GEP, the actual stack height must be used in the source impact analysis for NOx emissions;

- For a stack height equal to or greater than 65 meters, the impact on NOx emission limits may be modeled using the greater of:
  - A *de minimis* stack height equal to 65 meters, as measured from the ground-level elevation at the base of the stack, without demonstration or calculation (40 CFR 51.100(ii)(1));
  - The refined formula height calculated using the dimensions of nearby structures in accordance with the following equation:

  GEP = H + 1.5L, where H is the height of the nearby structure and L is the lesser dimension of the height or projected width of the nearby structure (40 CFR 51.100(ii)(2)(ii)).[4]

- A GEP stack height exceeding the refined formula height may be approved when it can be demonstrated to be necessary to avoid "excessive concentrations" of NO_2 caused by atmospheric downwash, wakes, or eddy effects by the source, nearby structures, or nearby terrain features.
  (40 CFR 51.100(ii)(3), (jj), (kk));

- For purposes of PSD (and NOx/NO_2), "excessive concentrations" means a maximum ground-level concentration of NO_2 due to NOx emissions from a stack due in whole or in part to downwash, wakes, and eddy effects produced by nearby structures or nearby terrain features which individually is at least 40 percent in excess of the maximum NO_2 concentration experienced in the absence of such effects and (a) which contributes to a total NO_2 concentration due to emissions from all sources that is greater than the annual or 1-hour NO_2 NAAQS or (b) greater than the PSD (annual) increment for NO_2.
  (40 CFR 51.100(kk)(1)).

Reportedly, for economic and other reasons, many existing source stacks have been constructed at heights less than 65 meters, and source impact analyses may show that the source's emissions will cause or contribute to a modeled violation of the annual or 1-hour NO_2 NAAQS. Where this is the case, sources should be aware that they can increase their stack heights up to 65 meters without a GEP demonstration.

b. *Other dispersion techniques*: The term "dispersion technique" includes any practice carried out to increase final plume rise, subject to certain exceptions (40 CFR 51.100(hh)(1)(iii), (2)(i) – (v)). Beyond the noted exceptions, such techniques are not allowed for getting credit for modeling source compliance with the annual and 1-hour NO_2 NAAQS and annual NO_2 increment.

[4] For stacks in existence on January 12, 1979, the GEP equation is GEP = 2.5 H (provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation for NOx (40 CFR 51.100(ii)(2)(i)

OPERATION OF EMERGENCY EQUIPMENT & GENERAL STARTUP CONDITIONS

In determining an emergency generator's potential to emit, existing guidance (EPA memo titled "Calculating Potential to Emit (PTE) for Emergency Generators," September 6, 1995) allows a default value of 500 hours "for estimating the number of hours that an emergency generator could be expected to operate under worst-case conditions." The guidance also allows for alternative estimates to be made on a case-by-case basis for individual emergency generators. This time period must also consider operating time for both testing/maintenance as well as for emergency utilization. Likewise, existing EPA policy does not allow NOx emissions to be excluded from the source impact analysis (NAAQS and increments) when the emergency equipment is operating during an emergency. EPA provides no exemption from compliance with the NAAQS during periods of emergency operation. Thus, it is not sufficient to consider only emissions generated during periods of testing/maintenance in the source impact analysis.

If during an emergency, emergency equipment is never operated simultaneously with other emissions units at the source that the emergency equipment will back up, a worst-case hourly impact analysis may very well occur during periods of normal source operation when other emissions units at the facility are likely to be operating simultaneously with the scheduled testing of emergency equipment. To avoid such worst-case modeling situations, a permit applicant may commit to scheduling the testing of emergency equipment during times when the source is not otherwise operating, or during known off-peak operating periods. This could provide a basis to justify not modeling the 1-hour impacts of the emergency equipment under conditions that would include simultaneous operation with other onsite emissions units. Accordingly, permits for emergency equipment may include enforceable conditions that specifically limit the testing/maintenance of emergency equipment to certain periods of time (seasons, days of the week, hours of the day, etc.) as long as these limitations do not constitute dispersion techniques under 40 CFR 51.1(hh)(1)(ii).

We also note that similar problems associated with the modeling of high 1-hour NO_2 concentrations have been reported to occur during startup periods for certain kinds of emissions units—often because control equipment cannot function during all or a portion of the startup process. EPA currently has no provisions for exempting emissions occurring during equipment startups from the air quality analysis to demonstrate compliance with the NAAQS. Startup emissions may occur during only a relatively small portion of the unit's total annual operating schedule; however, they must be included in the required PSD air quality analysis for the NAAQS. Sources may be willing to accept enforceable permit conditions limiting equipment startups to certain hours of the day when impacts are expected to be lower than normal. Such permit limitations can be accounted for in the modeling of such emissions. Applicants should direct other questions arising concerning procedures for modeling startup emissions to the applicable permitting authority to determine the most current modeling guidance.

SCREENING VALUES

In the final rule establishing the hourly NO_2 standard, EPA discussed various implementation considerations for the PSD permitting program. 75 FR.6474, 6524 (Feb. 9, 2010). This discussion included the following statements regarding particular screening values that have historically been used on a widespread basis to facilitate implementation of the PSD permitting program:

> We also believe that there may be a need to revise the screening tools currently used under the NSR/PSD program for completing NO_2 analyses. These screening tools include the significant impact levels (SILs), as mentioned by one commenter, but also include the significant emissions rate for emissions of NOx and the significant monitoring concentration (SMC) for NO_2. EPA intends to evaluate the need for possible changes or additions to each of these important screening tools for NOx/NO_2 due to the addition of a 1-hour NO_2 NAAQS. If changes or additions are deemed necessary, EPA will propose any such changes for public notice and comment in a separate action. 75 FR 6525.

EPA intends to conduct an evaluation of these issues and submit our findings in the form of revised significance levels under notice and comment rulemaking if any revisions are deemed appropriate. In the interim, for the reasons provided below, we recommend the continued use of the existing significant emissions rates (SER) for NOx emissions as well as an interim 1-hour NO_2 SIL that we are setting forth today for conducting air quality impact analyses for the 1-hour NO_2 NAAQS. As described in the section titled Introduction, EPA intends to implement the interim 1-hour NO_2 SIL contained herein under the federal PSD program and offers states the opportunity to use it in their PSD programs if they choose to do so. EPA is not addressing the significant monitoring concentrations in this memorandum.

SIGNIFICANT EMISSIONS RATE

Under the terms of existing EPA regulations, the applicable significant emissions rate for nitrogen oxides is 40 tons per year. 40 CFR 52.21(b)(23); 40 CFR 51.166(b)(23). The significant emissions rates defined in those regulations are specific to individual pollutants but are not differentiated by the averaging times of the air quality standards applicable to some of the listed pollutants. Although EPA has not previously promulgated a NO_2 standard using an averaging time of less than one year, the NAAQS for SO_2 have included standards with 3-hour and 24-hour averaging times for many years. EPA has applied the 40 tons per year significant emissions rate for SO_2 across all of these averaging times. Until the evaluation described above and any associated rulemaking is completed, EPA does not believe it has cause to apply the NO_2 significant emissions rate any differently than EPA has historically applied the SO_2 significant emissions rate and others that apply to standards with averaging times less than 1 year.

Under existing regulations, an ambient air quality impact analysis is required for "each pollutant that [a source] would have the potential to emit in significant amounts." 40 CFR 52.21(m)(1)(i)(a); 40 CFR. 51.166(m)(1)(i)(a). For modifications, these regulations require this analysis for "each pollutant for which [the modification] would result in a significant net emissions increase." 40 CFR.52.21(m)(1)(i)(b); 40 CFR.51.166(m)(1)(i)(b). EPA construes this regulation to mean that an ambient impact analysis is not necessary for pollutants with emissions rates below the significant emissions rates in paragraph (b)(23) of the regulations. No additional action by EPA or permitting authorities is necessary at this time to apply the 40 tpy significant emissions rate in existing regulations to the hourly NO_2 standard.

INTERIM 1-HOUR NO_2 SIGNIFICANT IMPACT LEVEL

A significant impact level (SIL) serves as a useful screening tool for implementing the PSD requirements for an air quality analysis. The primary purpose of the SIL is to serve as a screening tool to identify a level of ambient impact that is sufficiently low relative to the NAAQS or PSD increments such that the impact can be considered trivial or *de minimis*. Hence, the EPA considers a source whose individual impact falls below a SIL to have a *de minimis* impact on air quality concentrations that already exist. Accordingly, a source that demonstrates that the projected ambient impact of its proposed emissions increase does not exceed the SIL for that pollutant at a location where a NAAQS or increment violation occurs is not considered to cause or contribute to that violation. In the same way, a source with a proposed emissions increase of a particular pollutant that will have a significant impact at some locations is not required to model at distances beyond the point where the impact of its proposed emissions is below the SILs for that pollutant. When a proposed source's impact by itself is not considered to be "significant," EPA has long maintained that any further effort on the part of the applicant to complete a cumulative source impact analysis involving other source impacts would only yield information of trivial or no value with respect to the required evaluation of the proposed source or modification. The concept of a SIL is grounded on the *de minimis* principles described by the court in *Alabama Power Co. v. Costle*, 636 F.2d 323, 360 (D.C. Cir. 1980); See also *Sur Contra La Contaminacion v. EPA*, 202 F.3d 443, 448-49 (1st Cir. 2000) (upholding EPA's use of SIL to allow permit applicant to avoid full impact analysis); *In re: Prairie State Gen. Co.*, PSD Appeal No. 05-05, Slip. Op. at 139 (EAB 2006)

EPA has codified several SILs into regulations at 40 CFR 51.165(b). EPA plans to undertake rulemaking to develop a 1-hour NO_2 SIL for the new NAAQS for NO_2. However, EPA has recognized that the absence of an EPA-promulgated SIL does not preclude permitting authorities from developing interim SILs for use in demonstrating that a cumulative air quality analysis would yield trivial gain. Response to Comments, Implementation of New Source Review (NSR) Program for Particulate Matter Less Than 2.5 Micrometers in Diameter ($PM_{2.5}$), pg. 82 (March 2008) [EPA-HQ-OAR-2003-0062-0278].

Until such time as a 1-hour NO_2 SIL is defined in the PSD regulations, we are herein providing a recommended interim SIL that we intend to use as a screening tool for completing the required air quality analyses for the new 1-hour NO_2 under the federal PSD program at 40 CFR 52.21. To support the application of this interim SIL in each instance, a permitting authority that utilizes this SIL as part of an ambient air quality analysis should include in the permit record the analysis reflected in this memorandum and the referenced documents to demonstrate that an air quality impact at or below the SIL is *de minimis* in nature and would not cause a violation of the NAAQS.

Using the interim 1-hour NO_2 SIL, the permit applicant and permitting authority can determine: (1) whether, based on the proposed increase in NOx emissions, a cumulative air quality analysis is required; (2) the area of impact within which a cumulative air quality analysis should focus; and (3) whether, as part of a cumulative air quality analysis, the proposed source's NOx emissions will cause or contribute to a modeled violation of the 1-hour NO_2 NAAQS.

In this guidance, EPA recommends an interim 1-hour NO_2 SIL value of 4 ppb. To determine initially whether a proposed project's emissions increase will have a significant impact (resulting in the need for a cumulative air quality analysis), this interim SIL should be compared to either of the following:

- The highest of the 5-year averages of the maximum modeled 1-hour NO_2 concentrations predicted each year at each receptor, based on 5 years of National Weather Service data; or
- The highest modeled 1-hour NO_2 concentration predicted across all receptors based on 1 year of site-specific meteorological data, or the highest of the multi-year averages of the maximum modeled 1-hour NO_2 concentrations predicted each year at each receptor, based on 2 or more, up to 5 complete years of available site-specific meteorological data.

Additional guidance will be forthcoming for the purpose of comparing a proposed source's modeled impacts to the interim 1-hour NO_2 SIL in order to make a determination about whether that source's contribution is significant when a cumulative air quality analysis identifies violations of the 1-hour NO_2 NAAQS (i.e., "causes or contributes to" a modeled violation).

We derived this interim 1-hour NO_2 SIL by using an impact equal to 4% of the 1-hour NO_2 NAAQS (which is 100 ppb). We have chosen this approach because we believe it is reasonable to base the interim 1-hour NO_2 SIL directly on consideration of impacts relative to the 1-hour NO_2 NAAQS. In 1980, we defined SER for each pollutant subject to PSD. 45 FR 52676, August 7, 1980 at 52705-52710. For PM and SO_2, we defined the SER as the emissions rate that resulted in an ambient impact equal to 4% of the applicable short-term NAAQS. The 1980 analysis focused on levels no higher than 5% of the primary standard because of concerns that higher levels were found to result in unreasonably large amounts of increment being consumed by a single source. Within the range of impacts analyzed, we considered two factors that had an important influence on the choice of *de minimis* emissions levels: (1) cumulative effect on increment consumption of multiple sources in an area, each making the maximum *de minimis* emissions increase; and (2) the projected consequence of a given *de minimis* level on administrative burden. As explained in the preamble to the 1980 rulemaking and the supporting documentation,[5] EPA decided to use 4% of the 24-hour primary NAAQS for PM and SO_2 to define the significant emissions rates (SERs) for those pollutants. It was noted that, at the time, only an annual NO_2 NAAQS existed. Thus, for reasons explained in the 1980 preamble, to define the SER for NOx emissions we used a design value of 2% of the annual NO_2 NAAQS. See 45 FR 52708. Looking now at a short-term NAAQS for NO_2, we believe that it is reasonable as an interim approach to use a SIL value that represents 4% of the 1-hour NO_2

[5] EPA evaluated de minimis levels for pollutants for which NAAQS had been established in a document titled "Impact of Proposed and Alternative De Minimis Levels for Criteria Pollutants"; EPA-450/2-80-072, June 1980.

NAAQS. EPA will consider other possible alternatives for developing a 1-hour NO_2 SIL in a future rulemaking that will provide an opportunity for public participation in the development of a SIL as part of the PSD regulations.

Several state programs have already adopted interim 1-hour NO_2 SILs that differ (both higher and lower) from the interim value being recommended herein. The EPA-recommended interim 1-hour NO_2 SIL is not intended to supersede any interim SIL that is now or may be relied upon to implement a state PSD program that is part of an approved SIP, or to impose the use of the SIL concept on any state that chooses to implement the PSD program—in particular the ambient air quality analysis—without using a SIL as a screening tool. Accordingly, states that implement the PSD program under an EPA-approved SIP may choose to use this interim SIL, another value that may be deemed more appropriate for PSD permitting purposes in the state of concern, or no SIL at all. The application of any SIL that is not reflected in a promulgated regulation should be supported by a record in each instance that shows the value represents a *de minimis* impact on the 1-hour NO_2 standard, as described above.

In the event of questions regarding the general implementation guidance contained in this memorandum, please contact Raj Rao (rao.raj@epa.gov).

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June 28, 2010

MEMORANDUM

SUBJECT: Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard

FROM: Tyler Fox, Leader
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TO: Regional Air Division Directors

INTRODUCTION

On January 22, 2010, EPA announced a new 1-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (1-hour NO_2 NAAQS or 1-hour NO_2 standard) which is attained when the 3-year average of the 98th-percentile of the annual distribution of daily maximum 1-hour concentrations does not exceed 100 ppb at each monitor within an area. The final rule for the new 1-hour NO_2 NAAQS was published in the Federal Register on February 9, 2010 (75 FR 6474-6537), and the standard became effective on April 12, 2010 (EPA, 2010a). This memorandum clarifies the applicability of current guidance in the *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W) for modeling NO_2 impacts in accordance with the Prevention of Significant Deterioration (PSD) permit requirements to demonstrate compliance with the new 1-hour NO_2 standard.

SUMMARY OF CURRENT GUIDANCE

While the new 1-hour NAAQS is defined relative to ambient concentrations of NO_2, the majority of nitrogen oxides (NOx) emissions for stationary and mobile sources are in the form of nitric oxide (NO) rather than NO_2. Appendix W notes that the impact of an individual source on ambient NO_2 depends, in part, "on the chemical environment into which the source's plume is to be emitted" (see Section 5.1.j). Given the role of NOx chemistry in determining ambient impact levels of NO_2 based on modeled NOx emissions, Section 5.2.4 of Appendix W recommends the following three-tiered screening approach for NO_2 modeling for annual averages:

- Tier 1 - assume full conversion of NO to NO_2 based on application of an appropriate refined modeling technique under Section 4.2.2 of Appendix W to estimate ambient NOx concentrations;
- Tier 2 - multiply Tier 1 result by empirically-derived NO_2/NOx ratio, with 0.75 as the annual national default ratio (Chu and Meyer, 1991); and

- Tier 3 - detailed screening methods may be considered on a case-by-case basis, with the Ozone Limiting Method (OLM) identified as a detailed screening technique for point sources (Cole and Summerhays, 1979).

Tier 2 is often referred to as the Ambient Ratio Method, or ARM. Site-specific ambient NO_2/NOx ratios derived from appropriate ambient monitoring data may also be considered as detailed screening methods on a case-by-case basis, with proper justification. Consistent with Section 4.2.2, AERMOD is the current preferred model for "a wide range of regulatory applications in all types of terrain" for purposes of estimating ambient concentrations of NO_2, based on NOx emissions, under Tiers 1 and 2 above. We discuss the role of AERMOD for Tier 3 applications in more detail below.

APPLICABILITY OF CURRENT GUIDANCE TO 1-HOUR NO_2 NAAQS

In general, the Appendix W recommendations regarding the annual NO_2 standard are also applicable to the new 1-hour NO_2 standard, but additional issues may need to be considered in the context of a 1-hour standard, depending on the characteristics of the emission sources, and depending on which tier is used, as summarized below:

- Tier 1 applies to the 1-hour NO_2 standard without any additional justification;
- Tier 2 may also apply to the 1-hour NO_2 standard in many cases, but some additional consideration will be needed in relation to an appropriate ambient ratio for peak hourly impacts since the current default ambient ratio is considered to be representative of "area wide quasi-equilibrium conditions"; and
- Tier 3 "detailed screening methods" will continue to be considered on a case-by-case basis for the 1-hour NO_2 standard. However, certain input data requirements and assumptions for Tier 3 applications may be of greater importance for the 1-hour standard than for the annual standard given the more localized nature of peak hourly vs. annual impacts. In addition, use of site-specific ambient NO_2/NOx ratios based on ambient monitoring data will generally be more difficult to justify for the 1-hour NO_2 standard than for the annual standard.

While Appendix W specifically mentions OLM as a detailed screening method under Tier 3, we also consider the Plume Volume Molar Ratio Method (PVMRM) (Hanrahan, 1999a) discussed under Section 5.1.j of Appendix W to be in this category at this time. Both of these options account for ambient conversion of NO to NO_2 in the presence of ozone, based on the following basic chemical mechanism, known as titration, although there are important differences between these methods:

$$NO + O_3 \rightarrow NO_2 + O_2 \qquad \text{(Eq. 1)}$$

As noted in Section 5.1.j, EPA is currently testing the PVMRM option to determine its suitability as a refined method. Limited evaluations of PVMRM have been completed, which show encouraging results, but the amount of data currently available is too limited to justify a designation of PVMRM as a refined method for NO_2 (Hanrahan, 1999b; MACTEC, 2005). EPA is currently updating and extending these evaluations to examine model performance for predicting hourly NO_2 concentrations, including both the OLM and PVMRM options, and results of these additional evaluations will be provided at a later date. A sensitivity analysis of the OLM and PVMRM options in AERMOD has been conducted that compares modeled concentrations based on OLM and PVMRM with Tiers 1 and 2 for a range of source characteristics (MACTEC, 2004). This analysis serves as a useful reference to understand how ambient NO_2 concentrations may be impacted by application of this three-tiered screening approach, and includes comparisons for both annual average and maximum 1-hour NO_2 concentrations.

Key model inputs for both the OLM and PVMRM options are the in-stack ratios of NO_2/NOx emissions and background ozone concentrations. While the representativeness of these key inputs is important in the context of the annual NO_2 standard, they will generally take on even greater importance for the new 1-hour NO_2 standard, as explained in more detail below. Recognizing the potential importance of the in-stack NO_2/NOx ratio for hourly NO_2 compliance demonstrations, we recommend that in-stack ratios used with either the OLM or PVMRM options be justified based on the specific application, i.e., there is no "default" in-stack NO_2/NOx ratio for either OLM or PVMRM.

The OLM and PVMRM methods are both available as non-regulatory-default options within the EPA-preferred AERMOD dispersion model (Cimorelli, *et al.*, 2004; EPA, 2004; EPA, 2009). As a result of their non-regulatory-default status, pursuant to Sections 3.1.2.c, 3.2.2.a, and A.1.a(2) of Appendix W, application of AERMOD with the OLM or PVMRM option is no longer considered a "preferred model" and, therefore, requires justification and approval by the Regional Office on a case-by-case basis. While EPA is continuing to evaluate the PVMRM and OLM options within AERMOD for use in compliance demonstrations for the 1-hour NO_2 standard, as long as they are considered to be non-regulatory-default options, their use as alternative modeling techniques under Appendix W should be justified in accordance with Section 3.2.2, paragraph (e), as follows:

> "e. Finally, for condition (3) in paragraph (b) of this subsection [preferred model is less appropriate for the specific application, or there is no preferred model], an alternative refined model may be used provided that:
>
> i. The model has received a scientific peer review;
> ii. The model can be demonstrated to be applicable to the problem on a theoretical basis;
> iii. The data bases which are necessary to perform the analysis are available and adequate;
> iv. Appropriate performance evaluations of the model have shown that the model is not biased toward underestimates; and
> v. A protocol on methods and procedures to be followed has been established."

Since AERMOD is the preferred model for dispersion for a wide range of application, the focus of the alternative model demonstration for use of the OLM and PVMRM options within AERMOD is on the treatment of NOx chemistry within the model, and does not need to address basic dispersion algorithms within AERMOD. Furthermore, items i and iv of the alternative model demonstration for these options can be fulfilled in part based on existing documentation (Cole and Summerhays, 1979; Hanrahan, 1999a; Hanrahan, 1999b; MACTEC, 2005), and the remaining items should be routinely addressed as part of the modeling protocol, irrespective of the regulatory status of these options. The issue of applicability to the problem on a theoretical basis (item ii) is a case-by-case determination based on an assessment of the adequacy of the ozone titration mechanism utilized by these options to account for NOx chemistry within the AERMOD model based on "the chemical environment into which the source's plume is to be emitted" (Appendix W, Section 5.1.j). The adequacy of available data bases needed for application of OLM and PVMRM (item iii), including in-stack NO_2/NOx ratios and background ozone concentrations, is a critical aspect of the demonstration which we discuss in more detail below. It should also be noted that application of the OLM or PVMRM methods with other Appendix W models or alternative models, whether as a separate post-processor or integrated within the model, would require additional documentation and demonstration that the methods have been implemented and applied appropriately within that context, including model-specific performance evaluations which satisfy item iv under Section 3.2.2.e.

Given the form of the new 1-hour NO_2 standard, some clarification is needed regarding the appropriate data periods for modeling demonstrations of compliance with the NAAQS vs. demonstrations of attainment of the NAAQS through ambient monitoring. While monitored design values for the 1-hour NO_2 standard are based on a 3-year average (in accordance with Section 1(c)(2) of Appendix S to 40 CFR Part 50), Section 8.3.1.2 of Appendix W addresses the length of the meteorological data record for dispersion modeling, stating that "[T]he use of 5 years of NWS [National Weather Service] meteorological data or at least 1 year of site specific data is required." Section 8.3.1.2.b further states that "one year or more (including partial years), up to five years, of site specific data . . . are preferred for use in air quality analyses." Although the monitored design value for the 1-hour NO_2 standard is defined in terms of the 3-year average, this definition does not preempt or alter the Appendix W requirement for use of 5 years of NWS meteorological data or at least 1 year of site specific data. The 5-year average based on use of NWS data, or an average across one or more years of available site specific data, serves as an unbiased estimate of the 3-year average for purposes of modeling demonstrations of compliance with the NAAQS. Modeling of "rolling 3-year averages," using years 1 through 3, years 2 through 4, and years 3 through 5, is not required. Furthermore, since modeled results for NO_2 are averaged across the number of years modeled for comparison to the new 1-hour NO_2 standard, the meteorological data period should include complete years of data to avoid introducing a seasonal bias to the averaged impacts. In order to comply with Appendix W recommendations in cases where partial years of site specific meteorological data are available, while avoiding any seasonal bias in the averaged impacts, an approach that utilizes the most conservative modeling result based on the first complete-year period of the available data record vs. results based on the last complete-year period of available data may be appropriate, subject to approval by the appropriate reviewing authority. Such an approach would ensure that all available site specific data are accounted for in the modeling analysis without imposing an undue burden on the applicant and avoiding arbitrary choices in the selection of a single complete-year data period.

The form of the new 1-hour NO_2 standard also has implications regarding appropriate methods for combining modeled ambient concentrations with monitored background concentrations for comparison to the NAAQS in a cumulative modeling analysis. As noted in the March 23, 2010 memorandum regarding "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS" (EPA, 2010b), combining the 98^{th} percentile monitored value with the 98^{th} percentile modeled concentrations for a cumulative impact assessment could result in a value that is below the 98^{th} percentile of the combined cumulative distribution and would, therefore, not be protective of the NAAQS. However, unlike the recommendations presented for $PM_{2.5}$, the modeled contribution to the cumulative ambient impact assessment for the 1-hour NO_2 standard should follow the form of the standard based on the 98^{th} percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled. A "first tier" assumption that may be applied without further justification is to add the overall highest hourly background NO_2 concentration from a representative monitor to the modeled design value, based on the form of the standard, for comparison to the NAAQS. Additional refinements to this "first tier" approach based on some level of temporal pairing of modeled and monitored values may be considered on a case-by-case basis, with adequate justification and documentation.

DISCUSSION OF TECHNICAL ISSUES

While many of the same technical issues related to application of Appendix W guidance for an annual NO_2 standard would also apply in the context of the new 1-hour NO_2 standard, there are some important differences that may also need to be considered depending on the specific application. This section discusses several aspects of these technical issues related to the new 1-hour NO_2 NAAQS, including a discussion of source emission inventories required for modeling demonstrations of compliance with the NAAQS and other issues specific to each of the three tiers identified in Section 5.2.4 of Appendix W for NO_2 modeling.

Emission Inventories

The source emissions data are a key input for all modeling analyses and one that may require additional considerations under the new 1-hour NO_2 standard is the source emissions data. Section 8.1 of Appendix W provides guidance regarding source emission input data for dispersion modeling and Table 8-2 summarizes the recommendations for emission input data that should be followed for NAAQS compliance demonstrations. Although existing NOx emission inventories used to support modeling for compliance with the annual NO_2 standard should serve as a useful starting point, such inventories may not always be adequate for use in assessing compliance with the new 1-hour NO_2 standard since some aspects of the guidance in Section 8.1 differs for long-term (annual and quarterly) standards vs. short-term ($\leq$ 24 hours) standards. In particular, since maximum ground-level concentrations may be more sensitive to operating levels and startup/shutdown conditions for an hourly standard than for an annual standard, emission rates and stack parameters associated with the maximum ground-level concentrations for the annual standard may underestimate maximum concentrations for the new 1-hour NO_2 standard. Due to the importance of in-stack NO_2/NOx ratios required for application of the OLM and PVMRM options within AERMOD discussed above, consideration should also be given to the potential variability of in-stack NO_2/NOx ratios under different operating conditions when those non-regulatory-default options are applied. We also note that source emission input data recommendations in Table 8-2 of Appendix W for "nearby sources" and "other sources" that may be needed to conduct a cumulative impact assessment include further differences between emission data for long-term vs. short-term standards which could also affect the adequacy of existing annual NOx emission inventories for the new 1-hour NO_2 standard. The terms "nearby sources" and "other sources" used in this context are defined in Section 8.2.3 of Appendix W. Attachment A provides a more detailed discussion on determining NOx emissions for permit modeling.

While Section 8.2.3 of Appendix W emphasizes the importance of professional judgment by the reviewing authority in the identification of nearby and other sources to be included in the modeled emission inventory, Appendix W establishes "a significant concentration gradient in the vicinity of the source" under consideration as the main criterion for this selection. Appendix W also indicates that "the number of such [nearby] sources is expected to be small except in unusual situations." See Section 8.2.3.b. Since concentration gradients will vary somewhat depending on the averaging period being modeled, especially for an annual vs. 1-hour standard, the criteria for selection of "nearby" and "other" sources for inclusion in the modeled inventory may need to be reassessed for the 1-hour NO_2 standard.

The representativeness of available ambient air quality data also plays an important role in determining which nearby sources should be included in the modeled emission inventory. Key issues to consider in this regard are the extent to which ambient air impacts of emissions from nearby sources are reflected in the available ambient measurements, and the degree to which emissions from those background sources during the monitoring period are representative of allowable emission levels under the existing permits. The professional judgments that are required in developing an appropriate inventory of background sources should strive toward the proper balance between adequately characterizing the potential for cumulative impacts of emission sources within the study area to cause or contribute to violations of the NAAQS, while minimizing the potential to overestimate impacts by double-counting of modeled source impacts that are also reflected in the ambient monitoring data. We would also caution against the literal and uncritical application of very prescriptive procedures for identifying which background sources should be included in the modeled emission inventory for NAAQS compliance demonstrations, such as those described in Chapter C, Section IV.C.1 of the draft *New Source Review Workshop Manual* (EPA, 1990), noting again that Appendix W emphasizes the importance of professional judgment in this process. While the draft workshop manual serves as a useful general reference regarding New Source Review (NSR) and PSD programs, and such procedures may play a useful role in defining the spatial extent of sources whose emissions may need to be considered, it should be recognized that "[i]t is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements." See, Preface.

Given the range of issues involved in the determination of an appropriate inventory of emissions to include in a cumulative impact assessment, the appropriate reviewing authority should be consulted early in the process regarding the selection and proper application of appropriate monitored background concentrations and the selection and appropriate characterization of modeled background source emission inventories for use in demonstrating compliance with the new 1-hour NO_2 standard.

<u>Tier-specific Technical Issues</u>

This section discusses technical issues related to application of each tier in the three-tiered screening approach for NO_2 modeling recommended in Section 5.2.4 Appendix W. A basic understanding of NOx chemistry and "of the chemical environment into which the source's plume is to be emitted" (Appendix W, Section 5.1.j) will be helpful for addressing these issues based on the specific application.

Tier 1:

Since the assumption of full conversion of NO to NO_2 will provide the most conservative treatment of NOx chemistry in assessing ambient impacts, there are no technical issues associated with treatment of NOx chemistry for this tier. However, the general issues related to emission inventories for the 1-hour NO_2 standard discussed above and in Attachment A apply to Tier 1.

Tier 2:

As noted above, the 0.75 national default ratio for ARM is considered to be representative of "area wide quasi-equilibrium conditions" and, therefore, may not be as appropriate for use with the 1-hour NO_2 standard. The appropriateness of this default ambient ratio will depend somewhat on the characteristics of the sources, and as such application of Tier 2 for 1-hour NO_2 compliance demonstrations may need to be considered on a source-by-source basis in some cases. The key technical issue to address in relation to this tier requires an understanding of the meteorological conditions that are likely to be associated with peak hourly impacts from the source(s) being modeled. In general, for low-level releases with limited plume rise, peak hourly NOx impacts are likely to be associated with nighttime stable/light wind conditions. Since ambient ozone concentrations are likely to be relatively low for these conditions, and since low wind speeds and stable atmospheric conditions will further limit the conversion of NO to NO_2 by limiting the rate of entrainment of ozone into the plume, the 0.75 national default ratio will likely be conservative for these cases. A similar rationale may apply for elevated sources where plume impaction on nearby complex terrain under stable atmospheric conditions is expected to determine the peak hourly NOx concentrations. By contrast, for elevated sources in relatively flat terrain, the peak hourly NOx concentrations are likely to occur during daytime convective conditions, when ambient ozone concentrations are likely to be relatively high and entrainment of ozone within the plume is more rapid due to the vigorous vertical mixing during such conditions. For these sources, the 0.75 default ratio may not be conservative, and some caution may be needed in applying Tier 2 for such sources. We also note that the default equilibrium ratio employed within the PVMRM algorithm as an upper bound on an hourly basis is 0.9.

Tier 3:

This tier represents a general category of "detailed screening methods" which may be considered on a case-by-case basis. Section 5.2.4(b) of Appendix W cites two specific examples of Tier 3 methods, namely OLM and the use of site-specific ambient NO_2/NOx ratios supported by ambient measurements. As noted above, we also believe it is appropriate to consider the

PVMRM option as a Tier 3 detailed screening method at this time. The discussion here focuses primarily on the OLM and PVMRM methods, but we also note that the use of site-specific ambient NO_2/NOx ratios will be subject to the same issues discussed above in relation to the Tier 2 default ARM, and as a result it will generally be much more difficult to determine an appropriate ambient NO_2/NOx ratio based on monitoring data for the new 1-hour NO_2 standard than for the annual standard.

While OLM and PVMRM are both based on the same simple chemical mechanism of titration to account for the conversion of NO emissions to NO_2 (see Eq. 1) and therefore entail similar technical issues and considerations, there are some important differences that also need to be considered when assessing the appropriateness of these methods for specific applications. While the titration mechanism may capture the most important aspects of NO-to-NO_2 conversion in many applications, both methods will suffer from the same limitations for applications in which other mechanisms, such as photosynthesis, contribute significantly to the overall process of chemical transformation.· Sources located in areas with high levels of VOC emissions may be subject to these limitations of OLM and PVMRM. Titration is generally a much faster mechanism for converting NO to NO_2 than photosynthesis, and as such is likely to be appropriate for characterizing peak 1-hour NO_2 impacts in many cases.

Both OLM and PVMRM rely on the same key inputs of in-stack NO_2/NOx ratios and hourly ambient ozone concentrations. Although both methods can be applied within the AERMOD model using a single "representative" background ozone concentration, it is likely that use of a single value would result in very conservative estimates of peak hourly ambient concentrations since its use for the 1-hour NO_2 standard would be contingent on a demonstration of conservatism for all hours modeled. Furthermore, hourly monitored ozone concentrations used with the OLM and PVMRM options must be concurrent with the meteorological data period used in the modeling analysis, and thus the temporal representativeness of the ozone data for estimating ambient NO_2 concentrations could be a factor in determining the appropriateness of the meteorological data period for a particular application. As noted above, the representativeness of these key inputs takes on somewhat greater importance in the context of a 1-hour NO_2 standard than for an annual standard, for obvious reasons. In the case of hourly background ozone concentrations, methods used to substitute for periods of missing data may play a more significant role in determining the 1-hour NO_2 modeled design value, and should therefore be given greater scrutiny, especially for data periods that are likely to be associated with peak hourly concentrations based on meteorological conditions and source characteristics. In other words, ozone data substitution methods that may have been deemed appropriate in prior applications for the annual standard may not be appropriate to use for the new 1-hour standard.

While these technical issues and considerations generally apply to both OLM and PVMRM, the importance of the in-stack NO_2/NOx ratios may be more important for PVMRM than for OLM in some cases, due to differences between the two methods. The key difference between the two methods is that the amount of ozone available for conversion of NO to NO_2 is based simply on the ambient ozone concentration and is independent of source characteristics for OLM, whereas the amount of ozone available for conversion in PVMRM is based on the amount of ozone within the volume of the plume for an individual source or group of sources. The plume volume used in PVMRM is calculated on an hourly basis for each source/receptor combination, taking into account the dispersive properties of the atmosphere for that hour. For a low-level release where peak hourly NOx impacts occur close to the source under stable/light wind conditions, the plume volume will be relatively small and the ambient NO_2 impact for such cases will be largely determined by the in-stack NO_2/NOx ratio, especially for sources with relatively close fenceline or ambient air boundaries. This example also highlights the fact that the relative importance of the in-stack NO_2/NOx ratios may be greater for some applications than others, depending on the source characteristics and other factors. Assumptions regarding in-stack NO_2/NOx ratios that may have been deemed appropriate in the context of the annual standard may not be appropriate to use for the new 1-hour standard. In particular, it is worth reiterating that the 0.1 in-stack ratio often cited as the "default" ratio for OLM should not be treated as a default value for hourly NO_2 compliance demonstrations.

Another difference between OLM and PVMRM that is worth noting here is the treatment of the titration mechanism for multiple sources of NOx. There are two possible modes that can be used for applying OLM to multiple source scenarios within AERMOD: (1) apply OLM to each source separately and assume that each source has all of the ambient ozone available for conversion of NO to NO_2; and (2) assume that sources whose plumes overlap compete for the available ozone and apply OLM on a combined plume basis. The latter option can be applied selectively to subsets of sources within the modeled inventory or to all modeled sources using the OLMGROUP keyword within AERMOD, and is likely to result in lower ambient NO_2 concentrations in most cases since the ambient NO_2 levels will be more ozone-limited. One of the potential refinements in application of the titration method incorporated in PVMRM is a technique for dynamically determining which sources should compete for the available ozone based on the relative locations of the plumes from individual sources, both laterally and vertically, on an hourly basis, taking into account wind direction and plume rise. While this approach addresses one of the implementation issues associated with OLM by making the decision of which sources should compete for ozone, there is only very limited field study data available to evaluate the methodology.

Given the importance of the issue of whether to combine plumes for the OLM option, EPA has addressed the issue in the past through the Model Clearinghouse process. The general guidance that has emerged in those cases is that the OLM option should be applied on a source-by-source basis in most cases and that combining plumes for application of OLM would require a clear demonstration that the plumes will overlap to such a degree that they can be considered as "merged" plumes. However, much of that guidance was provided in the context of applying the OLM method outside the dispersion model in a post-processing mode on an annual basis. The past guidance on this issue is still appropriate in that context since there is no realistic method to account for the degree of plume merging on an hourly basis throughout the modeling analysis when applied as a post-processor. However, the implementation of the OLM option within the AERMOD model applies the method on a source-by-source, receptor-by-receptor, and hour-by-hour basis. As a result, the application of the OLMGROUP option within AERMOD is such that the sources only compete for the available ozone to the extent that each source contributes to the cumulative NOx concentration at each receptor for that hour. Sources which contribute significantly to the ambient NOx concentration at the receptor will compete for available ozone in proportion to their contribution, while sources that do not contribute significantly to the ambient NOx concentration will not compete for the ozone. Thus, the OLMGROUP option implemented in AERMOD will tend to be "self-correcting" with respect to concerns that combining plumes for OLM will overestimate the degree of ozone limiting potential (and therefore underestimate ambient NO_2 concentrations). As a result of these considerations, we recommend that use of the "OLMGROUP ALL" option, which specifies that all sources will potentially compete for the available ozone, be routinely applied and accepted for all approved applications of the OLM option in AERMOD. This recommendation is supported by model-to-monitor comparisons of hourly NO_2 concentrations from the application of AERMOD for the Atlanta NO_2 risk and exposure assessment (EPA, 2008), and recent re-evaluations of hourly NO_2 impacts from the two field studies (New Mexico and Palaau) that were used in the evaluation of PVMRM (MACTEC, 2005). These model-to-monitor comparisons of hourly NO_2 concentrations show reasonably good performance using the "OLMGROUP ALL" option within AERMOD, with no indication of any bias to underestimate hourly NO_2 concentrations with OLMGROUP ALL. Furthermore, model-to-monitor comparisons based on OLM without the OLMGROUP option do exhibit a bias to overestimate hourly NO_2 concentrations. We will provide further details regarding these recent hourly NO_2 model-to-monitor comparisons at a later date.

SUMMARY

To summarize, we emphasize the following points:

1. The 3-tiered screening approach recommended in Section 5.2.4 of Appendix W for annual NO_2 assessments generally applies to the new 1-hour NO_2 standard.
2. While generally applicable, application of the 3-tiered screening approach for assessments of the new 1-hour NO_2 standard may entail additional considerations, such as the importance of key input data, including appropriate emission rates for the 1-hour standard vs. the annual standard for all tiers, and the representativeness of in-stack NO_2/NOx ratios and hourly background ozone concentrations for Tier 3 detailed screening methods.
3. Since the OLM and PVMRM methods in AERMOD are currently considered non-regulatory-default options, application of these options requires justification and approval by the Regional Office on a case-by-case basis as alternative modeling techniques, in accordance with Section 3.2.2, paragraph (e), of Appendix W.
4. Applications of the OLM option in AERMOD, subject to approval under Section 3.2.2.e of Appendix W, should routinely utilize the "OLMGROUP ALL" option for combining plumes.
5. While the 1-hour NAAQS for NO_2 is defined in terms of the 3-year average for monitored design values to determine attainment of the NAAQS, this definition does not preempt or alter the Appendix W requirement for use of 5 years of NWS meteorological data or at least 1 year of site specific data.

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ATTACHMENT A

Background on Hourly NOx Emissions for Permit Modeling for the 1-hour NO_2 NAAQS

Introduction

The purpose of this attachment is to address questions about availability of hourly NOx emissions for permit modeling under the new NO_2 NAAQS. It summarizes existing guidance regarding emission input data requirements for NAAQS compliance modeling, and provides background on the historical approach to development of inventories for NO_2 permit modeling and computation of hourly emissions appropriate for assessing the new 1-hour NO_2 standard. Although the NAAQS is defined in terms of ambient NO_2 concentrations, source emission estimates for modeling are based on NOx.

Under the PSD program, the owner or operator of the source is required to demonstrate that the source does not cause or contribute to a violation of a NAAQS (40 CFR 51.166 (k)(1) and 40 CFR 52.21 (k)(1)) and/or PSD increments (40 CFR 51.166 (k)(2) and 52.21 (k)(2)). However, estimation of the necessary emission input data for NAAQS compliance modeling entails consideration of numerous factors, and the appropriate reviewing authority should be consulted early in the process to determine the appropriate emissions data for use in specific modeling applications (see 40 CFR 51, Appendix W, 8.1.1.b and 8.2.3.b)

Summary of Current Guidance

Section 8.1 of the *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51, provides recommendations regarding source emission input data needed to support dispersion modeling for NAAQS compliance demonstrations. Table 8-2 of Appendix W provides detailed guidance regarding the specific components of the emission input data, including the appropriate emission limits (pounds/MMBtu), operating level (MMBtu/hr), and operating factor (e.g., hr/yr or hr/day), depending on the averaging time of the standard. Table 8-2 also distinguishes between the emission input data needed for the new or modified sources being assessed, and "nearby" and "other" background sources included in the modeled emission inventory.

Based on Table 8-2, emission input data for new or modified sources for annual and quarterly standards are essentially the same as for short-term standards ($\leq$ 24 hours), based on maximum allowable or federally enforceable emission limits, design capacity or federally enforceable permit conditions, and the assumption of continuous operation. However, there are a few additional considerations cited in Appendix W that could result in different emission input data for the 1-hour vs. annual NO_2 NAAQS. For example, while design capacity is listed as the recommended operating level for the emission calculation, peak hourly ground-level concentrations may be more sensitive than annual average concentrations to changes in stack parameters (effluent exit temperature and exit velocity) under different operating capacities. Table 8-2 specifically recommends modeling other operating levels, such as 50 percent or 75 percent of capacity, for short-term standards (see footnote 3). Another factor that may affect maximum ground-level concentrations differently between the 1-hour vs. annual standard is restrictions on operating factors based on federally enforceable permit conditions. While federally enforceable operating factors other than continuous operation may be accounted for in the emission input data (e.g., if operation is limited to 8 am to 4 pm each day), Appendix W also states that modeled emissions should not be averaged across non-operating time periods (see footnote 2 of Table 8-2).

While emission input data recommendations for "nearby" and "other" background sources included in the modeled emission inventory are similar to the new or modified source emission inputs in many respects, there is an important difference in the operating factor between annual and short-term standards. Emission input data for nearby and other sources may reflect actual operating factors (averaged over the most recent 2 years) for the annual standard, while continuous operation should be assumed for short-term standards. This could result in important differences in emission input data for modeled background sources for the 1-hour NO_2 NAAQS relative to emissions used for the annual standard.

Model Emission Inventory for NO_2 Modeling

For the existing annual NO_2 NAAQS, the permit modeling inventory has generally been compiled from the annual state emission inventory questionnaire (EIQ) or Title V permit applications on file with the relevant permitting authority (state or local air program). Since a state uses the annual EIQ for Title V fee assessment, the state EIQ typically requires reporting of unit capacity, total fuel combusted, and/or hours of operation to help verify annual emissions calculations for fee accuracy purposes. Likewise, Title V operating permit applications contain all of the same relevant information for calculating emissions. While these emission inventories are important resources for gathering emission input data on background sources for NAAQS compliance modeling, inventories which are based on actual operations may not be sufficient for short-term standards, such as the new 1-hour NO_2 NAAQS. However, appropriate estimates of emissions from background sources for the 1-hour NO_2 standard may be derived in many cases from information in these inventories regarding permitted emission limits and operating capacity.

Historically, it has not been a typical practice for an applicant to use the EPA's national emission inventory (NEI) as the primary source for compiling the permit modeling inventory. Since the emission data submitted to the NEI represents annual emission totals, it may not be suitable for use in NAAQS compliance modeling for short-term standards since modeling should be based on continuous operation, even for modeled background sources. Although the NEI may provide emission data for background sources that are more appropriate for the annual NO_2 standard, the utility of the NEI for purposes of NAAQS compliance modeling is further limited due to the fact that additional information regarding stack parameters and operating rates required for modeling may not be available from the NEI. While records exist in the NEI for reporting stack data necessary for point source modeling (i.e., stack coordinates, stack heights, exit temperatures, exit velocities), some states do not report such information to the NEI, or there are may be errors in the location data submitted to the NEI. Under such conditions, default stack information based upon SIC is substituted and use of such data could invalidate modeling results. Building locations and dimensions, which may be required to account for building downwash influences in the modeling analysis, may also be missing or incomplete in many cases.

A common and relatively straightforward approach for compiling the necessary information to develop an inventory of emissions from background sources for a permit modeling demonstration is as follows, patterned after the draft *New Source Review Workshop Manual* (EPA, 1990). The applicant completes initial modeling of allowable emission increases associated with the proposed project and determines the radii of impact (ROI) for each pollutant and averaging period, based on the maximum distance at which the modeled ambient concentration exceeds the Significant Impact Level (SIL) for each pollutant and averaging period. Typically, the largest ROI is selected and then a list of potential background sources within the ROI plus a screening distance beyond the ROI is compiled by the permitting authority and supplied to the applicant. The applicant typically requests permit applications or EIQ submittals from the records department of the permitting authority to gather stack data and source operating data necessary to compute emissions for the modeled inventory. Once the applicant has gathered the relevant data from the permitting authorities, model emission rates are calculated. While this approach is fairly common, it should be noted that the draft workshop manual "is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements" (see, Preface), and the appropriate reviewing authority should be consulted early in the process regarding the selection of appropriate background source emission inventories for the 1-hour NO_2 standard. We also note that Appendix W establishes "a significant concentration gradient in the vicinity of the source" under consideration as the main criterion for selection of nearby sources for inclusion in the modeled inventory, and further indicates that "the number of such [nearby] sources is expected to be small except in unusual situations." See Section 8.2.3.b.

As mentioned previously, modeled emission rates for short-term NAAQS are computed consistent with the recommendations of Section 8.1 of Appendix W, summarized in Table 8-2. The maximum allowable (SIP-approved process weight rate limits) or federally enforceable permit limit emission rates assuming design capacity or federally enforceable capacity limitation are used to compute hourly emissions for dispersion modeling against short-term NAAQS such as the new 1-hour NO_2 NAAQS. If a source assumes an enforceable limit on the hourly firing capacity of a boiler, this is reflected in the calculations. Otherwise, the design capacity of the source is used to compute the model emission rate. A load analysis is typically necessary to determine the load or operating condition that causes the maximum ground-level concentrations. In addition to 100 percent load, loads such as 50 percent and 75 percent are commonly assessed. As noted above, the load analysis is generally more important for short-term standards than for annual standards. For an hourly standard, other operating scenarios of relatively short duration such as "startup" and "shutdown" should be assessed since these conditions may result in maximum hourly ground-level concentrations, and the control efficiency of emission control devices during these operating conditions may also need to be considered in the emission estimation.

Emission Calculation Example

The hourly emissions are most commonly computed from AP-42 emission factors based on unit design capacity. For a combustion unit, the source typically reports both the unit capacity and the actual total amount of fuel combusted annually (gallons, millions of cubic feet of gas, etc.) to the permitting authority for the EIQ. Likewise, Title V operating permit applications will contain similar information that can be used to compute hourly emissions.

For example, assume you are modeling an uncontrolled natural gas package boiler with a design firing rate of 30 MMBtu/hr. The AP-42 emission factor for an uncontrolled natural gas external combustion source (AP-42, Section 1.4) for firing rates less than 100 MMBtu/hr is 100 lbs. NOx/10^6 SCF natural gas combusted. The hourly emission rate is derived by converting the emission factor expressed in terms of lbs. NOx/10^6 SCF to lbs. NOx/MMBtu. The conversion is done by dividing the 100 lbs. NOx/10^6 SCF by 1,020 to convert the AP-42 factor to lbs. NOx/MMBtu. The new emission factor is now 0.098 lbs. NOx/MMBtu.

For this example, the source has no limit on the hourly firing rate of the boiler; therefore, the maximum hourly emissions are computed by multiplying the design firing rate of the boiler by the new emission factor.

E_{hourly} = 0.098 lbs/MMBtu x 30MMBtu/hr = 2.94 lbs/hr

Thus 2.94 lbs/hr represents the emission rate that would be input into the dispersion model for modeling against the 1-hour NO_2 NAAQS to comport with emission rate recommendations of Section 8.1 of Appendix W.

It is important to note that data derived for the annual state emission inventory (EI) is based on actual levels of fuel combusted for the year, and is therefore different than how allowable emissions are computed for near-field dispersion modeling. For the annual EI report, a source computes their annual emissions based upon the AP-42 emission factor multiplied by the actual total annual throughput or total fuel combusted.

In the 30 MMBtu/hr boiler example, the annual NOx emissions reported to the NEI is computed by:

E_{annual} = (AP-42 emission factor) x (total annual fuel combusted)

E_{annual} = (100 lbs/10^6 SCF) x (100 10^6 SCF/yr) = 10,000 lbs. NOx/yr or 5 tons NOx/yr

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

AUG 23 2010

MEMORANDUM

SUBJECT: Guidance Concerning the Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program

FROM: Stephen D. Page, Director
Office of Air Quality Planning and Standards

TO: Regional Air Division Directors

On June 2, 2010, the U.S. Environmental Protection Agency (EPA) announced a new 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standard (hereinafter, either the 1-hour SO_2 NAAQS or 1-hour SO_2 standard) of 75 ppb, which is attained when the 3-year average of the annual 99th-percentile of 1-hour daily maximum concentrations does not exceed 75 ppb at each monitor within an area. EPA revised the primary SO_2 NAAQS to provide the requisite protection of public health. The final rule for the new 1-hour SO_2 NAAQS was published in the Federal Register on June 22, 2010 (75 FR 35520), and the standard becomes effective on August 23, 2010. In the same notice, we also announced that we are revoking both the existing 24-hour and annual primary SO_2 standards. However, as explained in this guidance, those SO_2 standards, as well as the 24-hour and annual increments for SO_2, remain in effect for a while further and must continue to be protected.

EPA interprets the Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act and EPA regulations to require that any federal permit issued under 40 CFR 52.21 on or after that effective date must contain a demonstration of source compliance with the new 1-hour SO_2 NAAQS. We anticipate that some new major stationary sources or major modifications, especially those involving relatively short stacks, may experience difficulty demonstrating that emissions from proposed projects will not cause or contribute to a modeled violation of the new 1-hour SO_2 NAAQS. We also anticipate problems that sources may have interpreting the modeled 1-hour SO_2 impacts if the form of the hourly standard is not properly addressed. To respond to these and other related issues, we are providing the attached guidance, in the form of two memoranda, for implementing the new 1-hour SO_2 NAAQS under the PSD permit program.

The first memorandum, titled "General Guidance for Implementing the 1-hour SO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour SO_2 Significant Impact Level," includes guidance for the preparation and review of PSD permits with respect to the new 1-hour SO_2 standard. That guidance memorandum sets forth a recommended interim 1-hour SO_2 significant impact level (SIL) that states may consider for carrying out the required PSD air quality analysis for SO_2, until EPA promulgates a 1-hour SO_2 SIL via rulemaking, and addresses the continued use of the existing SO_2 Significant Emissions Rate (SER) and Significant Monitoring Concentration (SMC) to implement the new 1-hour SO_2 standard.. The second memorandum, titled "Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard," includes specific modeling guidance for estimating ambient SO_2 concentrations and determining compliance with the new 1-hour SO_2 standard.

This guidance does not bind state and local governments and permit applicants as a matter of law. Nevertheless, we believe that state and local air agencies and industry will find this guidance useful for carrying out the PSD permit process and it will provide a consistent approach for estimating SO_2 air quality impacts from proposed construction or modification of SO_2 emissions sources. For the most part, the attached guidance focuses on how existing policy and guidance is relevant to and should be used for implementing the new 1-hour SO_2 NAAQS.

Please review the guidance included in the two attached memoranda. In the event of questions regarding the general implementation guidance contained in the first memorandum, please contact Raj Rao (rao.raj@epa.gov). For questions pertaining to the modeling guidance in the second memorandum, please contact Tyler Fox (fox.tyler@epa.gov). We are continuing our efforts to address permitting issues related to the implementation of new and revised NAAQS, and will issue additional guidance to address the NAAQS as appropriate.

Attachments:

1. Memorandum from Anna Marie Wood, Air Quality Policy Division, to EPA Regional Air Division Directors, "General Guidance for Implementing the 1-hour SO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour SO_2 Significant Impact Level" (August 23, 2010).
2. Memorandum from Tyler Fox, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard" (August 23, 2010).

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

August 23, 2010

MEMORANDUM

SUBJECT: General Guidance for Implementing the 1-hour SO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour SO_2 Significant Impact Level

FROM: Anna Marie Wood, Acting Director /s/
Air Quality Policy Division

TO: Regional Air Division Directors

INTRODUCTION

We are issuing the following guidance to explain and clarify the procedures that may be followed by applicants for Prevention of Significant Deterioration (PSD) permits, and permitting authorities reviewing such applications, to properly demonstrate that proposed projects to construct and operate will not cause or contribute to a modeled violation of the new 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standard (hereinafter, either the 1-hour SO_2 NAAQS or 1-hour SO_2 standard) that becomes effective on August 23, 2010. The EPA revised the primary SO_2 NAAQS by promulgating a 1-hour SO_2 NAAQS to provide the requisite protection of public health. Under section 165(a)(3) of the Clean Air Act (the Act) and sections 52.21(k) and 51.166(k) of EPA's PSD regulations, to obtain a permit, a source must demonstrate that its proposed emissions increase will not cause or contribute to a violation of "any NAAQS."

This guidance is intended to (1) highlight the importance of a 1-hour averaging period for setting an emissions limitation for SO_2 in the PSD permit (2) reduce the modeling burden to implement the 1-hour SO_2 standard where it can be properly demonstrated that a source will not have a significant impact on ambient 1-hour SO_2 concentrations, and (3) identify approaches that allow sources and permitting authorities to mitigate, in a manner consistent with existing regulatory requirements, potential modeled violations of the 1-hour SO_2 NAAQS, where appropriate. Accordingly, the techniques described in this memorandum may be used by permit applicants and permitting authorities to perform an acceptable 1-hour SO_2 NAAQS compliance modeling assessment and/or properly configure projects and permit conditions in order that a proposed source's emissions do not cause or contribute to modeled 1-hour SO_2 NAAQS violations, so that permits can be issued in accordance with the applicable PSD program requirements.

This guidance discusses existing provisions in EPA regulations and guidance, and focuses on the relevancy of this information for implementing the new NAAQS for SO_2. Importantly, however, this guidance also sets forth a recommended interim 1-hour SO_2 significant impact level (SIL) that EPA will use when it evaluates applications and issues permits under the federal PSD program, and that states may choose to rely upon to implement their PSD programs for SO_2 if they agree that the value represents a reasonable threshold for determining a significant ambient impact, and they incorporate into each permit record a rationale supporting this conclusion. This interim SIL is a useful screening tool that can be used to determine whether or not the predicted ambient impacts caused by a proposed source's emissions increase will be significant and, if so whether the source's emissions should be considered to "cause or contribute to" modeled violations of the new 1-hour SO_2 NAAQS.

BACKGROUND

On August 23, 2010, the new 1-hour SO_2 NAAQS will become effective. Regulations at 40 CFR 52.21 (the federal PSD program) require permit applicants to demonstrate compliance with "any" NAAQS that is in effect on the date a PSD permit is issued. (See, e.g., EPA memo dated April 1, 2010, titled "Applicability of the Federal Prevention of Significant Deterioration Permit Requirements to New and Revised National Ambient Air Quality Standards.") Due to the promulgation of this short-term averaging period (1-hour) for the SO_2 NAAQS, we anticipate that some new major stationary sources or major modifications, especially those involving relatively short stacks may experience increased difficulty demonstrating that emissions from proposed project will not cause or contribute to a modeled violation.

We believe that, in some instances, preliminary predictions of violations could result from the use of maximum modeled concentrations that do not adequately take into account the form of the 1-hour standard. To the extent that is the case, ambient SO_2 concentrations in the form of the new 1-hour NAAQS should be estimated by applying the recommended procedures that account for the statistical form of the standard. See EPA Memorandum from Tyler Fox, Air Quality Modeling Group, to EPA Regional Air Division Directors, "Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard" (August 23, 2010) for specific modeling guidance for estimating ambient SO_2 concentrations consistent with the new 1-hour SO_2 NAAQS.

It is EPA's expectation that currently available SO_2 guidance, including the guidance presented in this memorandum, will assist in resolving some of the issues arising from preliminary analyses that show potential exceedances of the new 1-hour SO_2 NAAQS that would not be present under more refined modeling applications. In addition, the techniques described in this memorandum may also help avoid violations of the standard through design of the proposed source or permit conditions, consistent with existing regulatory requirements. Moreover, the interim 1-hour SO_2 SIL that is included in this guidance will provide a reasonable screening tool for effectively implementing the PSD requirements for an air quality impact analysis.

The following discussion provides guidance for establishing a 1-hour emissions limitation to demonstrate compliance with the new NAAQS, and for possibly mitigating modeled violations using any of the following: air quality-based permit limits more stringent than what the Best Available Control Technology provisions may otherwise require, air quality offsets, "good engineering practice" (GEP) stack heights, and an interim 1-hour SO_2 SIL. The continued use of the existing SO_2 Significant Emissions Rate (SER) and Significant Monitoring Concentration (SMC) to implement the new 1-hour SO_2 standard is also discussed.

SCREENING VALUES

In the final rule establishing the 1-hour SO_2 standard, EPA discussed various implementation considerations for the PSD permitting program. 75 FR.35520 (June 22, 2010). That discussion included the following statements regarding particular screening values that have historically been used on a widespread basis to facilitate implementation of the PSD permitting program:

> We agree with the commenters that there may be a need for EPA to provide additional screening tools or to revise existing screening tools that are frequently used under the NSR/PSD program for reducing the burden of completing SO_2 ambient air impact analyses. These screening tools include the SILs, as mentioned by the commenter, but also include the SER for emissions of SO_2 and the SMC for SO_2. The existing screening tools apply to the periods used to define the existing NAAQS for SO_2, including the annual, 24-hour, and 3-hour averaging periods. EPA intends to evaluate the need for possible changes or additions to each of these useful screening tools for SO_2 due to the revision of the SO_2 NAAQS to provide for a 1-hour standard. We believe it is highly likely that in order to be most effective for implementing the new 1-hour averaging period for NSR purposes, new 1-hour screening values will be appropriate.

75 FR 35579. EPA intends to conduct an evaluation of these issues and submit our findings in the form of revised significance levels under notice and comment rulemaking if any revisions are deemed appropriate. In the interim, for the reasons provided below, we recommend the continued use of the existing SER for SO_2 emissions as well as an interim 1-hour SO_2 SIL that we are setting forth today for conducting air quality impact analyses for the 1-hour SO_2 NAAQS. As described in the section titled Introduction, EPA intends to implement the interim 1-hour SO_2 SIL contained herein under the federal PSD program and offers states the opportunity to use it in their PSD programs if they choose to do so. EPA is not addressing the significant monitoring concentration (SMC) for SO_2 in this memorandum; the existing SMC for SO_2, at 40 CFR 52.21(i)(5)(i) should continue to be used.

SIGNIFICANT EMISSIONS RATE

The PSD regulations define SER for various regulated NSR pollutants. When a proposed new source's potential to emit a pollutant, or a modified source's net emissions increase of a pollutant, would be less than the SER, the source is not required to undergo the requisite PSD analyses (BACT and air quality) for that particular emissions increase. Under the terms of existing EPA regulations, the applicable SER for SO_2 is 40 tons per year (tpy). 40 CFR 52.21(b)(23); 40 CFR 51.166(b)(23). Each of the significant emissions rates defined in those regulations is specific to an individual pollutant with no differentiation by averaging time with regard to NAAQS. The NAAQS for SO_2 have included standards with 3-hour and 24-hour and annual averaging times for many years. The EPA has applied the 40 tpy SER for SO_2 across all of these averaging times, and we are aware of no reason why it should not be used for the 1-hour averaging period for the present time. Therefore, until the evaluation described above and any associated rulemaking are completed, we will use 40 tpy as the SER for the 1-hour standard.

Under existing regulations, an ambient air quality impact analysis is required for "each pollutant that [a source] would have the potential to emit in significant amounts." [40 CFR 52.21(m)(1)(i)(a); 40 CFR. 51.166(m)(1)(i)(a)]. For modifications, these regulations require this analysis for "each pollutant for which [the modification] would result in a significant net emissions increase." 40 CFR.52.21(m)(1)(i)(b); 40 CFR.51.166(m)(1)(i)(b). EPA construes this regulation to mean that an ambient impact analysis is not necessary for pollutants with emissions rates below the significant emissions rates in paragraph (b)(23) of the regulations. No additional action by EPA or permitting authorities is necessary at this time to apply the 40 tpy significant emissions rate in existing regulations to the hourly SO_2 standard.

INTERIM 1-HOUR SO_2 SIGNIFICANT IMPACT LEVEL

Under the PSD program, a proposed new major stationary source or major modification must, among other things, complete an air quality impact analysis that involves performing an analysis of air quality modeling and ambient monitoring data, where appropriate, to demonstrate compliance with applicable NAAQS. In order to implement this requirement, EPA traditionally has provided a screening tool known as the Significant Impact Level (SIL) to help applicants and permitting authorities determine whether a source's modeled ambient impact is significant so as to warrant a comprehensive, cumulative air quality analysis to demonstrate compliance with the NAAQS. Accordingly, where a proposed source's modeled impact is deemed insignificant, or *de minimis*, using the SIL as a threshold for significance, the applicant is not required to model anything besides its own proposed emissions increase to show that the proposed source or modification will not cause or contribute to a violation of the NAAQS.[1]

If, on the other hand, the source's modeled impact is found to be significant, based on the SIL, the applicant will need to complete a comprehensive, cumulative air quality impact analysis to demonstrate that the source's emissions will not cause or contribute to a modeled violation of any NAAQS. To make this demonstration, EPA has recommended that a cumulative analysis cover a circular area measuring out from the source to the maximum distance where the source's impact is equal to the SIL. Within this modeling area, the source should also model the impacts of other sources (existing and newly permitted), including applicable SO_2 sources located outside the circular area described above, to account for the cumulative hourly SO_2 air quality impacts

[1] When a proposed source's impact by itself is not considered to be "significant," EPA has long maintained that any further effort on the part of the applicant to complete a cumulative source impact analysis involving other source impacts would only yield information of trivial or no value with respect to the required evaluation of the proposed source or modification. The concept of a SIL is grounded on the *de minimis* principles described by the court in *Alabama Power Co. v. Costle*, 636 F.2d 323, 360 (D.C. Cir. 1980); See also *Sur Contra La Contaminacion v. EPA*, 202 F.3d 443, 448-49 (1st Cir. 2000) (upholding EPA's use of SIL to allow permit applicant to avoid full impact analysis); *In re: Prairie State Gen. Co.*, PSD Appeal No. 05-05, Slip. Op. at 139 (EAB 2006).

that are predicted to occur. The applicant may also have to gather ambient monitoring data as part of the total air quality analysis that is required for demonstrating compliance with the NAAQS.[2] Accordingly, the source will evaluate its contribution to any modeled violation of the 1-hour SO_2 NAAQS to determine whether the source's emissions contribution will cause or contribute to the modeled violation at any receptor. Note that in the accompanying modeling guidance memorandum we are providing recommended procedures and guidance for completing the modeling analysis to demonstrate compliance with the new 1-hour SO_2 NAAQS.

We plan to undertake rulemaking to adopt a 1-hour SO_2 SIL value. However, until such time as a 1-hour SO_2 SIL is defined in the PSD regulations, we are providing an interim SIL of 3 ppb, which we intend to use as a screening tool for completing the required air quality analyses for the new 1-hour SO_2 NAAQS under the federal PSD program at 40 CFR 52.21. We are also making the interim SIL available to States with EPA-approved implementation plans containing a PSD program to use at their discretion. To support the application of this interim 1-hour SO_2 SIL in each instance, a permitting authority that utilizes it as part of an ambient air quality analysis should include in the permit record the analysis reflected in this memorandum and the referenced documents to demonstrate that a modeled air quality impact is *de minimis,* and thereby would not be considered to cause or contribute to a modeled violation of the NAAQS.[3]

States may also elect to choose another value that they believe represents a significant air quality impact relative to the 1-hour SO_2 NAAQS. The EPA-recommended interim 1-hour SO_2 SIL is not intended to supersede any interim SIL that any state chooses to rely upon to implement a state PSD program that is part of an approved SIP, or to impose the use of the SIL concept on any state that chooses to implement the PSD program—in particular the ambient air quality analysis—without using a SIL as a screening tool. Accordingly, states that implement the PSD program under an EPA-approved SIP may choose to use this interim SIL, another value that may be deemed more appropriate for PSD permitting purposes in the state of concern, or no SIL at all. The application of any SIL that is not reflected in a promulgated regulation should be supported by a record in each instance that shows the value represents a *de minimis* impact on the 1-hour SO_2 standard, as described above.

As indicated above, using the interim 1-hour SO_2 SIL, the permit applicant and permitting authority can determine: (1) whether, based on the proposed increase in SO_2 emissions, a cumulative air quality analysis is required; (2) the area of impact within which a cumulative air quality analysis should focus; and (3) whether, as part of a cumulative air quality analysis, the proposed source's SO_2 emissions will cause or contribute to any modeled violation of the 1-hour SO_2 NAAQS.

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[2] A screening tool known as the Significant Monitoring Concentration (SMC) for SO_2 already exists in the PSD regulations. EPA plans to evaluate the existing SMC in light of the new 1-hour SO_2 NAAQS; however, the existing value of 13 $\mu g/m^3$, 24-hour average, should continue to be used until and unless a revised value is issued through rulemaking.

[3] Where the cumulative air quality analysis identifies a modeled violation of the NAAQS or increments, and the proposed source is issued its permit by virtue of the fact that its proposed emissions increase is not considered to cause or contribute to the modeled violation, it is still the permitting authority's responsibility to address such modeled violations independently from the PSD permitting process to determine the nature of the problem and to mitigate it accordingly,

As mentioned above, we are providing an interim 1-hour SO_2 SIL value of 3 ppb to implement the federal PSD program. To determine initially whether a proposed project's emissions increase will have a significant impact (resulting in the need for a cumulative air quality analysis), this interim SIL should be compared to either of the following:

- The highest of the 5-year averages of the maximum modeled 1-hour SO_2 concentrations predicted each year at each receptor, based on 5 years of National Weather Service data; or
- The highest modeled 1-hour SO_2 concentration predicted across all receptors based on 1 year of site-specific meteorological data, or the highest of the multi-year averages of the maximum modeled 1-hour SO_2 concentrations predicted each year at each receptor, based on 2 or more, up to 5 complete years of available site-specific meteorological data.

Additional guidance will be forthcoming for the purpose of comparing a proposed source's modeled impacts to the interim 1-hour SO_2 SIL in order to make a determination about whether that source's contribution is significant when a cumulative air quality analysis identifies violations of the 1-hour SO_2 NAAQS (i.e., "causes or contributes to" a modeled violation).

We derived this interim 1-hour SO_2 SIL by using an impact equal to 4% of the 1-hour SO_2 NAAQS (which is 75 ppb). On June 29, 2010, we issued an interim 1-hour NO_2 SIL that used an impact equal to 4% of the 1-hour NO_2 standard. As explained in the June memorandum, we have chosen this approach because we believe it is reasonable to base the interim 1-hour SIL directly on consideration of impacts relative to the corresponding 1-hour NAAQS. In 1980, we defined SER for each pollutant subject to PSD. 45 FR 52676 (August 7, 1980) at 52705-52710. For PM and SO_2, we defined the SER as the emissions rate that resulted in an ambient impact equal to 4% of the applicable short-term NAAQS. The 1980 analysis focused on levels no higher than 5% of the primary standard because of concerns that higher levels were found to result in unreasonably large amounts of increment being consumed by a single source. Within the range of impacts analyzed, we considered two factors that had an important influence on the choice of the significant impact levels: (1) cumulative effect on increment consumption of multiple sources in an area, each making the maximum *de minimis* emissions increase; and (2) the projected consequence of a given significant impact level on administrative burden. As explained in the preamble to the 1980 rulemaking and the supporting documentation,[4] EPA decided to use 4% of the 24-hour primary NAAQS for PM and SO_2 to define the significant emissions rates (SERs) for those pollutants. See 45 FR 52708. Looking now at a 1-hour NAAQS for SO_2, we believe that it is reasonable as an interim approach to use a SIL value that represents 4% of the 1-hour SO_2 NAAQS. EPA will consider other possible alternatives for developing a 1-hour SO_2 SIL in a future rulemaking that will provide an opportunity for public participation in the development of a SIL as part of the PSD regulations.

AIR-QUALITY BASED EMISSIONS LIMITATIONS

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[4] EPA evaluated *de minimis* levels for pollutants for which NAAQS had been established in a document titled "Impact of Proposed and Alternative De Minimis Levels for Criteria Pollutants"; EPA-450/2-80-072, June 1980.

Once a level of control is determined by the PSD applicant via the Best Available Control Technology (BACT) top-down process, the applicant must model the proposed source's emissions at the BACT emissions rate(s) to demonstrate that those emissions will not cause or contribute to a violation of any NAAQS or PSD increment. However, the EPA 1990 Workshop Manual (page B.54) describes circumstances where a proposed source's emissions based on levels determined via the top-down process may not be sufficiently controlled to prevent modeled violations of an increment or NAAQS. In such cases, it may be appropriate for PSD applicants to propose a more stringent control option (that is, beyond the level identified via the top-down process) as a result of an adverse impact on the NAAQS or PSD increments. In addition, the use of certain dispersion techniques is permissible for certain proposed projects for SO_2 that may need to be considered where emissions limitations alone may not enable the source to demonstrate compliance with the new 1-hour SO_2 NAAQS. This is discussed in greater detail below in the section addressing GEP stack height requirements.

Because compliance with the new SO_2 NAAQS must be demonstrated on the basis of a 1-hour averaging period, the reviewing authority should ensure that the source's PSD permit defines a maximum allowable hourly emissions limitation for SO_2, regardless of whether it is derived from the BACT top-down approach or it is the result of an air-quality based emissions rate. Hourly limits are important because they are the foundation of the air quality modeling demonstration relative to the 1-hour SO_2 NAAQS. For estimating the impacts of existing sources, if necessary, existing SO_2 emission inventories used to support modeling for compliance with the 3-hour and 24-hour SO_2 standards should serve as a useful starting point, and may be adequate in many cases for use in assessing compliance with the new 1-hour SO_2 standard. The PSD applicant's coordination with the reviewing authority is important in this matter to obtain the most appropriate estimates of maximum allowable hourly SO_2 emissions.

DEMONSTRATING COMPLIANCE WITH THE NAAQS AND INCREMENTS & MITIGATING MODELED VIOLATIONS WITH AIR QUALITY OFFSETS

A 1988 EPA memorandum provides procedures to follow when a modeled violation is identified during the PSD permitting process. [See Memorandum from Gerald A. Emison , EPA OAQPS, to Thomas J. Maslany, EPA Air Management Division, "Air Quality Analysis for Prevention of Significant Deterioration (PSD)." (July 5, 1988.)] In cases where the air quality analysis predicts violations of the 1-hour SO_2 NAAQS, but the permit applicant can show that the SO_2 emissions increase from the proposed source will not have a significant impact *at the point and time of any modeled violation*, the permitting authority has discretion to conclude that the source's emissions will not contribute to the modeled violation. As provided in the July 5, 1988 guidance memo, because the proposed source only has a *de minimis* contribution to the modeled violation, the source's impact will not be considered to cause or contribute to such modeled violations, and the permit could be issued. This concept continues to apply, and the significant impact level (described further below) may be used as part of this analysis. A 2006 decision by the EPA Environmental Appeals Board (EAB) provides detailed reasoning that demonstrates the permissibility of a finding that a PSD source would not be considered to cause or contribute to a modeled NAAQS violation because its estimated air quality impact was insignificant at the time and place of the modeled violations.[5] [See In re *Prairie State Gen. Co.*, 13 E.A.D. ___, ___, PSD Appeal No. 05-05, Slip. Op. at 137-144 (EAB 2006)]

However, where it is determined that a source's impact does cause or contribute to a modeled violation, a permit cannot be issued without some action to mitigate the source's impact. In accordance with 40 CFR 51.165(b)[6], a major stationary source or major modification (as defined at §51.165(a)(1)(iv) and (v)) that locates in a SO_2 attainment area for the 1-hour SO_2 NAAQS and would cause or contribute to a violation of the 1-hour SO_2 NAAQS may "reduce the impact of its emissions upon air quality by obtaining sufficient emission reductions to, at a minimum, compensate for its adverse ambient [SO_2] impact where the major source or major modification would otherwise cause or contribute to a violation ...." An applicant can meet this requirement for obtaining additional emissions reductions either by reducing its emissions at the source (e.g., promoting more efficient production methodologies and energy efficiency) or by obtaining air quality offsets (see below). [See, e.g., In re *Interpower of New York, Inc.*, 5 E.A.D. 130, 141 (EAB 1994)].[7] A State may also provide the necessary emissions reductions by imposing emissions limitations on other sources through an approved SIP revision. These approaches may also be combined as necessary to demonstrate that a source will not cause or contribute to a violation of the NAAQS.

Unlike emissions offset requirements in areas designated as nonattainment, in addressing the air quality offset concept, it may not be necessary for a permit applicant to fully offset the proposed emissions increase if an emissions reduction of lesser quantity will mitigate the adverse air quality impact where the modeled violation was originally identified. ("Although full emission offsets are not required, such a source must obtain emission offsets sufficient to compensate for its air quality impact where the violation occurs." 44 FR 3274, January 16, 1979, at 3278.) To clarify this, the 1988 guidance memo referred to above states that:

> offsets sufficient to compensate for the source's significant impact must be obtained pursuant to an approved State offset program consistent with State Implementation Plan (SIP) requirements under 40 CFR 51.165(b). Where the source is contributing to an existing violation, the required offset may not correct the violation. Such existing violations must be addressed [through the SIP].

Note that additional guidance for this and other aspects of the modeling analysis for the impacts of SO_2 emissions on ambient concentrations of SO_2 are addressed in EPA modeling guidance, including the attached August 23, 2010 Memorandum titled "Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard."

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[5] While there is no 1-hour SO_2 significant impact level (SIL) currently defined in the PSD regulations, we believe that states may adopt interim values, with the appropriate justification for such values, to use for permitting purposes. In addition, we are recommending an interim SIL as part of this guidance for implementing the SO_2 requirements in the federal PSD program, and in state programs where states choose to use it.

[6] The same provision is contained in EPA's Interpretative Ruling at 40 CFR part 51 Appendix S, section III.

[7] In contrast to Nonattainment New Source Review permits, offsets are not mandatory requirements in PSD permits if it can otherwise be demonstrated that a source will not cause or contribute to a violation of the NAAQS. See, In re *Knauf Fiber Glass, GMBH*, 8 E.A.D. 121, 168 (EAB 1999).

Although EPA announced that it is revoking the annual and 24-hour SO_2 NAAQS, the June 22, 2010 preamble to the final rule announcing the new 1-hour SO_2 NAAQS explained that those standards will remain in effect for a limited period of time as follows: for current SO_2 nonattainment areas and SIP call areas, until attainment and maintenance SIPs are approved by EPA for the new 1-hour SO_2 NAAQS; for all other areas, for one year following the effective date of the initial designations under section 107(d)(1) for the new 1-hour SO_2 NAAQS. Accordingly, the annual and 24-hour SO_2 NAAQS must continue to be protected under the PSD program for as long as they remain in effect for a PSD area. There is a more detailed discussion of the transition from the existing SO_2 NAAQS to a revised SO_2 NAAQS in that preamble. Also, the same preamble includes a footnote listing the current nonattainment areas and SIP call areas. 75 FR 35520, at 35580-2.

In addition, the existing SO_2 increments (class I, II and III) for the annual and 24-hour averaging periods will not be revoked in conjunction with our decision to revoke the corresponding SO_2 NAAQS. Instead, the annual and 24-hour SO_2 increments (Class I, II and III increments) will remain in effect because they are defined in the Clean Air Act at title I, part C, section 163. The annual and 24-hour SO_2 increments in section 163 are considered part of the suite of statutory increments applicable to sulfur dioxide that Congress expressly included in the statutory provisions for PSD. As such, those increments cannot be revoked simply because we have decided to revoke the annual and 24-hour SO_2 NAAQS, upon which the SO_2 increments are based. Consequently, sources must continue to demonstrate that their proposed emissions increases of SO_2 emissions will not cause or contribute to any modeled violation of the existing annual and 24-hour SO_2 increments for as long as those statutory increments remain in effect. Increments for the 1-hour averaging period do not yet exist; the Act provides a specific schedule for the promulgation of additional regulations, which may include new increments, following the promulgation of new or revised NAAQS. EPA plans to begin that rulemaking process in the near future to consider the need for such increments.

"GOOD ENGINEERING PRACTICE" STACK HEIGHT AND DISPERSION TECHNIQUES

If a permit applicant is unable to show that the source's proposed emissions increase will not cause or contribute to a modeled violation of the new 1-hour SO_2 NAAQS, the problem could be the result of plume downwash effects causing high ambient concentrations near the source. In such cases, a source may be able to raise the height of its existing stacks (or designed stacks if not yet constructed) to a "good engineering practice" (GEP) stack height, or at least 65 meters, measured from the ground-level elevation at the base of the stack.

While not necessarily eliminating the full effect of downwash in all cases, raising stacks to GEP height may provide substantial air quality benefits in a manner consistent with statutory provisions (section 123 of the Act) governing acceptable stack heights to minimize excessive concentrations due to atmospheric downwash, eddies or wakes. Permit applicants should also be aware of the regulatory restrictions on stack heights for the purpose of modeling for compliance with NAAQS and increments. Section 52.21(h) of the PSD regulations currently prohibits the use of dispersion techniques, such as stack heights above GEP, merged gas streams, or intermittent controls for setting SO_2 emissions limits to meet the NAAQS and PSD increments.

However, stack heights in existence before December 31, 1970, and dispersion techniques implemented before then, are not affected by these limitations. EPA's general stack height regulations are promulgated at 40 CFR 51.100(ff), (gg), (hh), (ii), (jj), (kk) and (nn), and 40 CFR 51.118.

a. *Stack heights*: A source can include only the actual stack height up to GEP height when modeling to develop the SO_2 emissions limitations or to determine source compliance with the SO_2 NAAQS and increments. This is not a limit on the actual height of any stack constructed by a new source or modification, however, and there may be circumstances where a source owner elects to build a stack higher than GEP height. However, such additional height may not be considered when determining an emissions limitation or demonstrating compliance with an applicable NAAQS or PSD increment. Thus, when modeling, the following limitations apply in accordance with §52.21(h):

- For a stack height less than GEP, the actual stack height must be used in the source impact analysis for emissions;
- For a stack height equal to or greater than 65 meters the impact may be modeled using the greater of:
  - A *de minimis* stack height equal to 65 meters, as measured from the ground-level elevation at the base of the stack, without demonstration or calculation (40 CFR 51.100(ii)(1));
  - The refined formula height calculated using the dimensions of nearby structures in accordance with the following equation:

  GEP = H + 1.5L, where H is the height of the nearby structure and L is the lesser dimension of the height or projected width of the nearby structure (40 CFR 51.100(ii)(2)(ii)).[8]

- A GEP stack height exceeding the refined formula height may be approved when it can be demonstrated to be necessary to avoid "excessive concentrations" of SO_2 caused by atmospheric downwash, wakes, or eddy effects by the source, nearby structures, or nearby terrain features.
  (40 CFR 51.100(ii)(3), (jj), (kk));

- For purposes of PSD, "excessive concentrations" means a maximum ground-level concentration from a stack due in whole or in part to downwash, wakes, and eddy effects produced by nearby structures or nearby terrain features which individually is at least 40 percent in excess of the maximum concentration experienced in the absence of such effects and (a) which contributes to a total concentration due to emissions from all sources that is greater than the applicable NAAQS or (b) greater than the applicable PSD increments.
  (40 CFR 51.100(kk)(1)).

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[8] For stacks in existence on January 12, 1979, the GEP equation is GEP = 2.5 H (provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation for SO_2 (40 CFR 51.100(ii)(2)(i)

Reportedly, for economic and other reasons, many existing source stacks have been constructed at heights less than 65 meters, and source impact analyses may show that the source's emissions will cause or contribute to a modeled violation of the 1-hour SO_2 NAAQS. Where this is the case, sources should be aware that it is permissible for them to increase their stack heights up to 65 meters without a GEP demonstration.

b. *Other dispersion techniques*: The term "dispersion technique" includes any practice carried out to increase final plume rise, subject to certain exceptions (40 CFR 51.100(hh)(1), (2)(i) – (v)). Beyond the noted exceptions, such techniques are not allowed for getting credit for modeling source compliance with the NAAQS and PSD increments. One such exception is for sources of SO_2. Section 51.100(hh)(2)(v) provides that identified techniques that increase final exhaust gas plume rise are not considered prohibited dispersion techniques pursuant to section 51.100(hh)(1)(iii) "where the resulting allowable emissions of sulfur dioxide from the facility do not exceed 5,000 tons per year." Thus, proposed modifications that experience difficulty modeling compliance with the new 1-hour SO_2 NAAQS when relying on BACT or an air quality-based emissions limit alone may permissibly consider techniques to increase their final exhaust gas plume rise consistent with these provisions.

The definition of "dispersion technique" at 40 CFR 51.100(hh)(1)(iii) describes techniques that are generally prohibited, but which do not apply with respect to the exemption for SO_2. Accordingly, it is permissible for eligible SO_2 sources to make adjustments to source process parameters, exhaust gas parameters, stack parameters, or to combine exhaust gases from several existing stacks into one stack, so as to increase the exhaust gas plume rise. It is important to remember that the exemption applies to sources that have facility-wide allowable SO_2 emissions of less than 5,000 tpy resulting from the increase in final exhaust gas plume rise. Thus, proposed modifications should not base their eligibility to use dispersion on the amount of the proposed net emissions increase, but on the total source emissions of SO_2.

The EPA does not recommend or encourage sources to rely on dispersion to demonstrate compliance with the NAAQS; however, we acknowledge the fact that certain SO_2 sources may legally do so. For example, while increasing stack height is a method of dispersion, EPA's rules allow use of that approach to the extent the resulting height meets EPA's requirements defining "good engineering practice (GEP)" stack height. See 40 CFR 50.100(hh)(1)(i), 50.100(ii)(1)-(3). Nevertheless, EPA encourages PSD applicants to seek other remedies, including the use of the most stringent controls (beyond top-down BACT) feasible or the acquisition of emissions reductions (offsets) from other existing sources, to address situations where proposed emissions increases would result in modeled violations of the SO_2 NAAQS.

GENERAL START-UP CONDITIONS

We do not anticipate widespread problems associated with high short-term SO_2 emissions resulting from start-up/shutdown conditions. Many sources are capable of starting a unit with natural gas or low-sulfur fuel to avoid significant start-up emissions problems. However, some sources could experience short-term peaks of SO_2 during start-up or shutdown that could adversely affect the new 1-hour SO_2 NAAQS. The EPA currently has no provisions for exempting emissions occurring during equipment start-up/shutdown from the BACT requirements or for air quality analyses to demonstrate compliance with the SO_2 NAAQS and increments. Therefore, such emissions should be addressed in the required BACT and air quality analyses.

There are approaches to addressing issues related to start-up/shutdown emissions. For example, sources may be willing to accept enforceable permit conditions limiting equipment start-up/shutdown to certain hours of the day when impacts are expected to be lower than normal. Such permit limitations can be accounted for in the modeling of such emissions. Applicants should direct other questions arising concerning procedures for modeling start-up/shutdown emissions to the applicable permitting authority to determine the most current modeling guidance.

In the event of questions regarding the general implementation guidance contained in this memorandum, please contact Raj Rao (rao.raj@epa.gov).

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
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August 23, 2010

MEMORANDUM

SUBJECT: Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard

FROM: Tyler Fox, Leader /s/
Air Quality Modeling Group, C439-01

TO: Regional Air Division Directors

INTRODUCTION

On June 2, 2010, EPA announced a new 1-hour sulfur dioxide (SO_2) National Ambient Air Quality Standard (1-hour SO_2 NAAQS or 1-hour SO_2 standard) which is attained when the 3-year average of the 99th-percentile of the annual distribution of daily maximum 1-hour concentrations does not exceed 75 ppb at each monitor within an area. The final rule for the new 1-hour SO_2 NAAQS was published in the Federal Register on June 22, 2010 (75 FR 35520-35603), and the standard becomes effective on August 23, 2010 (EPA, 2010a). This memorandum clarifies the applicability of current guidance in the *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W) for modeling SO_2 impacts in accordance with the Prevention of Significant Deterioration (PSD) permit requirements to demonstrate compliance with the new 1-hour SO_2 standard.

SUMMARY OF CURRENT GUIDANCE

Current modeling guidance for estimating ambient impacts of SO_2 for comparison with applicable NAAQS is presented in Section 4 of Appendix W under the general heading of "Traditional Stationary Source Models." This guidance acknowledges the fact that ambient SO_2 impacts are largely a result of emissions from stationary sources. Section 4.2.2 provides specific recommendations regarding "Refined Analytical Techniques," stating that "For a wide range of regulatory applications in all types of terrain, the recommended model is AERMOD" (see Section 4.2.2.b). As described in Section 4.1.d, the AERMOD dispersion model "employs best state-of-practice parameterizations for characterizing the meteorological influences and dispersion" (Cimorelli, *et al.*, 2004; EPA, 2004; EPA, 2009).

Section 7.2.6 of Appendix W addresses the issue of chemical transformation for modeling SO_2 emissions, stating that:

> The chemical transformation of SO_2 emitted from point sources or single industrial plants in rural areas is generally assumed to be relatively unimportant to the estimation of maximum concentrations when travel time is limited to a few hours. However, in urban areas, where synergistic effects among pollutants are of considerable consequence, chemical transformation rates may be of concern. In urban area applications, a half-life of 4 hours may be applied to the analysis of SO_2 emissions. Calculations of transformation coefficients from site specific studies can be used to define a ''half-life'' to be used in a steady-state Gaussian plume model with any travel time, or in any application, if appropriate documentation is provided. Such conversion factors for pollutant half-life should not be used with screening analyses.

The AERMOD model incorporates the 4 hour half-life for modeling ambient SO_2 concentrations in urban areas under the regulatory default option.

General guidance regarding source emission input data requirements for modeling ambient SO_2 impacts is provided in Section 8.1 of Appendix W and guidance regarding determination of background concentrations for purposes of a cumulative ambient air quality impact analysis is provided in Section 8.2.

APPLICABILITY OF CURRENT GUIDANCE TO 1-HOUR SO_2 NAAQS

The current guidance in Appendix W regarding SO_2 modeling in the context of the previous 24-hour and annual primary SO_2 NAAQS and the 3-hour secondary SO_2 NAAQS is generally applicable to the new 1-hour SO_2 standard. Since short-term SO_2 standards ($\leq$ 24 hours) have been in existence for decades, existing SO_2 emission inventories used to support modeling for compliance with the 3-hour and 24-hour SO_2 standards should serve as a useful starting point, and may be adequate in many cases for use in assessing compliance with the new 1-hour SO_2 standard, since issues identified in Table 8-2 of Appendix W related to short-term vs. long-term emission estimates may have already been addressed. However, the PSD applicant and reviewing authority may need to reassess emission estimates for very short-term emission scenarios, such as start-up and shut-down operations, for purposes of estimating source impacts on the 1-hour SO_2 standard. This is especially true if existing emission estimates for 3-hour or 24-hour periods are based on averages that include zero (0) or reduced emissions for some of the hours.

Given the form of the new 1-hour SO_2 standard, we are providing clarification regarding the appropriate data periods for modeling demonstrations of compliance with the NAAQS vs. demonstrations of attainment of the NAAQS through ambient monitoring. While monitored design values for the 1-hour SO_2 standard are based on a 3-year average (in accordance with Section 1(c) of Appendix T to 40 CFR Part 50), Section 8.3.1.2 of Appendix W addresses the length of the meteorological data record for dispersion modeling, stating that "[T]he use of 5 years of NWS [National Weather Service] meteorological data or at least 1 year of site specific data is required." Section 8.3.1.2.b further states that "one year or more (including partial years), up to five years, of site specific data . . . are preferred for use in air quality analyses." Although the monitored design value for the 1-hour SO_2 standard is defined in terms of the 3-year average, this definition does not preempt or alter the Appendix W requirement for use of 5 years of NWS meteorological data or at least 1 year of site specific data. The 5-year average based on use of NWS data, or an average across one or more years of available site specific data, serves as an unbiased estimate of the 3-year average for purposes of modeling demonstrations of compliance with the NAAQS. Modeling of "rolling 3-year averages," using years 1 through 3, years 2 through 4, and years 3 through 5, is not required. Furthermore, since modeled results for SO_2 are averaged across the number of years modeled for comparison to the new 1-hour SO_2 standard, the meteorological data period should include complete years of data to avoid introducing a seasonal bias to the averaged impacts. In order to comply with Appendix W recommendations in cases where partial years of site specific meteorological data are available, while avoiding any seasonal bias in the averaged impacts, an approach that utilizes the most conservative modeling result based on the first complete-year period of the available data record vs. results based on the last complete-year period of available data may be appropriate, subject to approval by the appropriate reviewing authority. Such an approach would ensure that all available site specific data are accounted for in the modeling analysis without imposing an undue burden on the applicant and avoiding arbitrary choices in the selection of a single complete-year data period.

The form of the new 1-hour SO_2 standard also has implications regarding appropriate methods for combining modeled ambient concentrations with monitored background concentrations for comparison to the NAAQS in a cumulative modeling analysis. As noted in the March 23, 2010 memorandum regarding "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS" (EPA, 2010b), combining the 98th percentile monitored value with the 98th percentile modeled concentrations for a cumulative impact assessment could result in a value that is below the 98th percentile of the combined cumulative distribution and would, therefore, not be protective of the NAAQS. However, unlike the recommendations presented for $PM_{2.5}$, the modeled contribution to the cumulative ambient impact assessment for the 1-hour SO_2 standard should follow the form of the standard based on the 99th percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled. A "first tier" assumption that may be applied without further justification is to add the overall highest hourly background SO_2 concentration from a representative monitor to the modeled design value, based on the form of the standard, for comparison to the NAAQS. Additional refinements to this "first tier" approach based on some level of temporal pairing of modeled and monitored values may be considered on a case-by-case basis, subject to approval by the reviewing authority, with adequate justification and documentation.

Section 8.2.3 of Appendix W provides recommendations regarding the determination of background concentrations for multi-source areas. That section emphasizes the importance of professional judgment by the reviewing authority in the identification of nearby and other sources to be included in the modeled emission inventory, and establishes "a significant concentration gradient in the vicinity of the source" under consideration as the main criterion for this selection. Appendix W also indicates that "the number of such [nearby] sources is expected to be small except in unusual situations." See Section 8.2.3.b.

The representativeness of available ambient air quality data also plays an important role in determining which nearby sources should be included in the modeled emission inventory. Key issues to consider in this regard are the extent to which ambient air impacts of emissions from nearby sources are reflected in the available ambient measurements, and the degree to which emissions from those background sources during the monitoring period are representative of allowable emission levels under the existing permits. The professional judgments that are required in developing an appropriate inventory of background sources should strive toward the proper balance between adequately characterizing the potential for cumulative impacts of emission sources within the study area to cause or contribute to violations of the NAAQS, while minimizing the potential to overestimate impacts by double counting modeled source impacts that are also reflected in the ambient monitoring data.

We would also caution against the literal and uncritical application of very prescriptive procedures for identifying which background sources should be included in the modeled emission inventory for NAAQS compliance demonstrations, including those described in Chapter C, Section IV.C.1 of the draft *New Source Review Workshop Manual* (EPA, 1990), noting again that Appendix W emphasizes the importance of professional judgment in this process. While the draft workshop manual serves as a useful general reference that provides potential approaches for meeting the requirements of New Source Review (NSR) and PSD programs, it is not the only source of EPA modeling guidance. The procedures described in the manual may be appropriate in some circumstances for defining the spatial extent of sources whose emissions may need to be considered, but not in others. While the procedures described in the NSR Workshop Manual may appear very prescriptive, it should be recognized that "[i]t is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements." See, Preface.

Given the range of issues involved in the determination of an appropriate inventory of emissions to include in a cumulative impact assessment, the PSD applicant should consult with the appropriate reviewing authority early in the process regarding the selection and proper application of appropriate monitored background concentrations and the selection and appropriate characterization of modeled background source emission inventories for use in demonstrating compliance with the new 1-hour SO_2 standard.

SUMMARY

To summarize, we emphasize the following points:

1. Current guidance in Appendix W for modeling to demonstrate compliance with the previous 24-hour and annual primary SO_2 standards, and 3-hour secondary SO_2 standard, is generally applicable for the new 1-hour SO_2 NAAQS.
2. While the 1-hour NAAQS for SO_2 is defined in terms of the 3-year average for monitored design values to determine attainment of the NAAQS, this definition does not preempt or alter the Appendix W requirement for use of 5 years of NWS meteorological data or at least 1 year of site specific data.

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