

DIVISION OF AIR QUALITY

August 24, 2020

MEMORANDUM

TO: Michael Pjetraj, Deputy Director, Division of Air Quality

FROM: Nancy Jones, Meteorologist, Air Quality Analysis Branch (AQAB)

THROUGH: Tom Anderson, Supervisor, AQAB

SUBJECT: Criteria Pollutant Air Dispersion Modeling Analysis for Carolina Sunrock, LLC
Burlington North, Caswell County, North Carolina Facility ID: 1700016
Prospect Hill Quarry, Caswell County, North Carolina Facility ID: 1700017

Per your request, we conducted a criteria pollutant air dispersion modeling analysis for two proposed greenfield Carolina Sunrock Facilities in Caswell County, North Carolina. Carolina Sunrock submitted air dispersion modeling analyses for toxic air pollutants (TAP) together with permit applications for a new hot mix asphalt plant and concrete batch plant near Burlington called Burlington North, and for a new quarry, hot mix asphalt plant and concrete batch plant in Prospect Hill called the Prospect Hill Quarry. Those analyses adequately demonstrated compliance with 15A NCAC 2D .1104 for Toxic Air Pollutants emitted above the Toxic Permitting Emission Rates listed in 15A NCAC 2Q .0711 documented in memos dated January 21, 2020 and February 6, 2020, respectively.

We conducted an analysis for criteria pollutants using inputs provided by the Winston Salem Regional Office based on the permit applications along with source locations/parameters and property boundaries submitted with the toxics modeling analyses described above. AERMOD (version 19191) and five years (2014-2018) of surface meteorological data for Burlington, NC (for Burlington North) and Danville, VA (for Prospect Hill) were used with upper air data from Greensboro, NC to estimate air concentrations to compare to the EPA National Ambient Air Quality Standards (NAAQS). The following criteria pollutants were evaluated: sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and carbon monoxide (CO). Table 1 presents the NAAQS values, averaging periods, and forms of the standards.

**Table 1. Class II Area NAAQS Modeled
Carolina Sunrock, Caswell County, North Carolina**

Pollutant	Averaging Period	NAAQS (µg/m³)	Model Design Value
SO ₂	1-hour	196	multi-year H4H
NO ₂	1-hour	188	multi-year H8H
	Annual	100	H1H
CO	1-hour	40,000	H2H
	8-hour	10,000	H2H

Direction-specific building dimensions were used as input to EPA's BPIP-Prime program (04274) for building wake effect determination. For Prospect Hill, fence line receptors were spaced 25 meters apart. Discrete gridded receptors were modeled outward to approximately 2,000 meters from the facility. For Burlington North, fence line receptors were spaced 50 meters apart and discrete gridded receptors were modeled outward to approximately 7,500 meters. Emission rates and release parameters for Burlington North are contained in Attachment A and for Prospect Hill are contained in attachment B.

AERMOD was run initially assuming continuous 24-hour per day operations. The results of the modeling are presented in Table 2 for Burlington North and in Table 3 for Prospect Hill.

**Table 2. Model Results
Carolina Sunrock - Burlington North
Caswell County, NC**

Pollutant	Averaging Period	NAAQS (µg/m³)	Modeled Air Conc. (µg/m³)	Percent of NAAQS
SO ₂	1-hour	196	790	403 %
NO ₂	1-hour	188	170 ¹	90 %
	Annual	100	3.54	4 %
CO	1-hour	40,000	520	1 %
	8-hour	10,000	179	2 %

**Table 3. Model Results
Carolina Sunrock - Prospect Hill
Caswell County, NC**

Pollutant	Averaging Period	NAAQS (µg/m³)	Modeled Air Conc. (µg/m³)	Percent of NAAQS
SO ₂	1-hour	196	474	242 %
NO ₂	1-hour	188	303	161 %
	Annual	100	12.41	12 %
CO	1-hour	40,000	435	1 %
	8-hour	10,000	279	3 %

¹ The 1-hr NO₂ background concentration is about 60 µg/m³ and when added to the modeled concentration will predict an exceedance of the NAAQS.

cc: Tom Anderson
Nancy Jones

Attachment A

Model inputs for Carolina Sunrock - Burlington North

Release Parameters and Emission Rates, Carolina Sunrock, Burlington North, Caswell County, North Carolina

Point Source ID	Stack Release Type	Easting (X)	Northing (Y)	Base Elevation	Stack Height	Temp	Exit Velocity	Stack Diameter
		(m)	(m)	(m)	(ft)	(°F)	(fps)	(ft)
CD 1	DEFAULT	650207.9	4013087	201.32	30.2	240	96.5	3.1
CD 2	DEFAULT	650220.9	4013028	203.17	35	77	80	1.5
ESH 2	DEFAULT	650203.8	4013069	201.5	9	325	0.03	1
ESH 1	DEFAULT	650190.2	4013088	200.3	15	325	0.03	0.2

Volume Source ID	Source Description	Easting (X)	Northing (Y)	Base Elevation	Release Height	Initial Hor. Dimension	Initial Vert. Dimension
		(m)	(m)	(m)	(ft)	(ft)	(ft)
F1	Silo Loadout	650185.2	4013059	200.9	40.00	5.81	18.6

Source ID	SO2	NO2	CO
	(lb/hr)	(lb/hr)	(lb/hr)
CD 1	20.93	13.75	32.5
CD 2			
ESH 2	0.61	0.17	0.04
ESH 1	0.56	0.16	0.04
F1			0.632

Attachment B

Model inputs for Carolina Sunrock - Prospect Hill

Point Source Release Parameters, Carolina Sunrock, Prospect Hill, Caswell County, North Carolina

#	Point Source ID	Stack Release Type	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (ft)	Temp. (°F)	Exit Velocity (fps)	Stack Diameter (ft)
1	PGEN1	DEFAULT	664047.9	4018680	205	17	960	72.24	0.49
2	PGEN2	DEFAULT	664050.7	4018673	205	17	960	72.24	0.49
3	PGEN3	DEFAULT	664053.4	4018667	205	17	960	72.24	0.49
4	CD1	DEFAULT	664069.6	4018719	205	30	240	96.49	3.15
5	IES4	DEFAULT	664066.8	4018732	205	9	325	0.03	0.98
6	IES5	DEFAULT	664071.1	4018735	205	15	325	0.03	0.16
7	HMASILO1	DEFAULT	664109.1	4018719	205	65	77	0.03	0.98
8	HMASILO2	DEFAULT	664112	4018721	205	65	77	0.03	0.98
9	HMASILO3	DEFAULT	664115	4018724	205	60	77	0.03	0.98
10	HMASILO4	DEFAULT	664117.9	4018726	205	60	77	0.03	0.98
11	HMASILO5	DEFAULT	664106.1	4018717	205	60	77	0.03	0.98
12	CD2	DEFAULT	664155.2	4018787	202	35	77	79.99	1.51
13	GEN1	DEFAULT	664799	4018997	191	12	975	95.51	0.49
14	GEN1A	DEFAULT	665048.1	4018924	187	12	975	95.51	0.49
15	GEN2	DEFAULT	664815.4	4019139	191	12	975	95.51	0.49
16	GEN3	DEFAULT	664617.9	4018936	199	12	975	95.51	0.49
17	GEN4	HORIZONTAL	665031.3	4019119	188	6	942	49.44	0.49
18	GEN5	DEFAULT	664627.5	4018930	198	12	975	95.51	0.49
19	GEN7	DEFAULT	664636.8	4018891	197	12	975	95.51	0.49

Volume Source Release Parameters, Carolina Sunrock, Prospect Hill, Caswell County, North Carolina

#	Volume Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Release Height (ft)	Initial Hor. Dimension (ft)	Initial Vert. Dimension (ft)
20	HMALO1		664109.1	4018719	205	12	0.49	5.58
21	HMALO2		664112	4018721	205	12	0.49	5.58
22	HMALO3		664115	4018724	205	12	0.49	5.58
23	HMALO4		664117.9	4018726	205	12	0.49	5.58
24	HMALO5		664106.1	4018717	205	12	0.49	5.58

Emission Rates, Carolina Sunrock, Prospect Hill, Caswell County, North Carolina

Source ID	SO2	NO2	CO
	(lb/hr)	(lb/hr)	(lb/hr)
PGEN1	0.0085	2.73	3.18
PGEN2	0.0085	2.73	3.18
PGEN3	0.00708	2.65	2.65
CD1	20.93	13.75	32.5
IES4	0.609	0.171	0.0429
IES5	0.558	0.157	0.0393
HMASILO1			
HMASILO2			
HMASILO3			
HMASILO4			
HMASILO5			0.295
CD2			
GEN1	0.004	0.23	2.01
GEN1A	0.004	0.23	2.01
GEN2	0.002	0.08	1.03
GEN3	0.005	0.29	2.53
GEN4	0.002	0.08	1.03
GEN5	0.005	0.3	2.59
GEN7	0.004	0.23	2.01
HMALO1	0.15	1.7	
HMALO2			
HMALO3			
HMALO4			
HMALO5			0.337

