

April 22, 2016

Ms. Elizabeth Basil  
Director, Engineering Services Division  
Bureau of Air Quality  
SC DHEC  
2600 Bull Street  
Columbia, South Carolina 29201



APR 25 2016

**BUREAU OF AIR QUALITY**

**SUBJECT: Vulcan Construction Materials, LLC - Lexington Quarry  
Synthetic Minor Construction Permit Application  
Response to DHEC comments on modeling**

Dear Ms. Basil:

Vulcan Construction Materials, LLC submitted construction permit application on November 20, 2015. After review of the modeling files by Tracy Price and John Glass at DHEC, changes were suggested to the model setup. This letter presents the results of the suggested changes; revised modeling files have been included on the enclosed CD.

The following changes were made to the model setup:

- ↪ The NO<sub>2</sub> and SO<sub>2</sub> 1-hour and the PM<sub>2.5</sub> 24-hour models were run using the concatenated 5-year MET file.
- ↪ The release heights for the plant equipment were corrected in the models so that the release heights are the distance above the ground level.
- ↪ The emissions from the dewatering pump were changed in the model from a Point source to an Open Pit source. The release height for the pump was estimated to be 4 feet from the ground (as was used with the point source setup).
- ↪ The fugitive PM emissions from the Haul Road were changed from adjacent volume sources to an Open Pit source. The release height for the Haul Road source was considered to be the average of the top and bottom elevations in the pit.
- ↪ When modeling the dewatering pump in the Open Pit source, two scenarios were modeled. The first scenario was the final pit at the quarry, using the final planned dimensions and



depth. The second scenario was the initial pit at the quarry which was estimated to be 12 feet below the existing surface, with dimensions of about 391ft x 428ft. Only CO, SO<sub>2</sub>, and NO<sub>2</sub> were modeled for the initial pit.

The revised modeling results for Standard 2 are presented in tables D-2a and b; Table D-2a is for the full pit and Table D-2b is for the initial pit. The revised modeling results for Standard 7 are presented in D-3a and b; Table D-3a is for the full pit and Table D-3b is for the initial pit.

In order to maintain modeled impacts for all criteria pollutants below the National Ambient Air Quality Standard (NAAQS) primary value for Standard 2 compliance and to maintain the incremental increases below the allowable levels for Standard 7, the following modifications were made in the model to the equipment and operating hours at the facility:

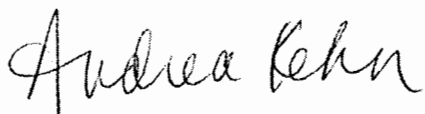
1. The modeled quarry equipment operations and travel on quarry roads may occur for 14 hours each day, between the hours of 6am and 8pm Monday through Saturday with no operations on Sunday. This approach is consistent with but more conservative than the requirements for extensive mining of Lexington County Zoning Ordinance which limits hours of mining operations to 7am to 7pm Monday through Saturday. This operating scenario was presented in the model by using the hour by day of week (HRDOW) source flag on the quarry equipment and open pit source for the haul road. This operating change only affects the particulate emissions.
2. The dewatering pump will be a Final Tier4/Stage IV pump similar to the pump specified in the original application, with a NO<sub>x</sub> emission factor of 1 g/kW-hr.

The attached modeling results demonstrate that the facility will be in compliance with Standard 2 and Standard 7.

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Please contact John Aultman at (864) 299-4785 or myself if you have any further questions or concerns regarding the permit application or this additional information.

Sincerely,  
SYNTERRA

A handwritten signature in cursive script that reads "Andrea Kehn".

Andrea Kehn, PE  
Project Engineer

Cc: John Aultman, Vulcan Construction Materials  
File

Attachments:  
Revised Tables - D-1 and D-2  
CD with Modeling files

## **Revised Tables**

TABLE D-2a - SUMMATION OF MODELED IMPACTS (STANDARD 2)

Vulcan Construction Materials, LLC - Lexington Quarry

Dewatering Pump located in Full Pit

Pollutant	2002 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	2003 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	2004 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	2005 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	2006 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	Background <sup>4</sup> ( $\mu\text{g}/\text{m}^3$ )	Total Impact ( $\mu\text{g}/\text{m}^3$ )	Standard ( $\mu\text{g}/\text{m}^3$ )	PASS?
PM <sub>10</sub> 24-hr <sup>1</sup>			50.25			38	88.25	150	YES
PM <sub>2.5</sub> 24-hr <sup>2</sup>			8.27			20	28.27	35	YES
PM <sub>2.5</sub> Annual <sup>3</sup>			1.06			9.7	10.76	12	YES
SO <sub>2</sub> 1-hr			1.88			30.5	32.42	196	YES
SO <sub>2</sub> 3-hr	1.36	1.13	1.18	1.39	1.29	31.4	32.79	1300	YES
CO 1-hr	6.88	8.74	7.25	6.54	6.24	1450.3	1459.08	40000	YES
CO 8-hr	3.06	2.91	2.97	3.97	3.08	916.0	919.97	10000	YES
NO <sub>2</sub> Annual Average	0.07	0.06	0.06	0.07	0.05	8.8	8.88	100	YES
NO <sub>2</sub> 1-hr			1.13			83.4	84.52	188	YES

The PM<sub>10</sub> 24-hr modeled impact is the maximum average high-6th-high 24-hr result over 5 years

The PM<sub>2.5</sub> 24-hr modeled impact is the maximum average high 24-hr result over 5 years

The PM<sub>2.5</sub> annual modeled impact is the maximum average high annual result over 5 years

The SO<sub>2</sub> 1-hr modeled impact is the 4th high result over 5 years

The SO<sub>2</sub> 3-hr modeled impact is the 2nd high result over 5 years

The CO 1-hr modeled impact is the 2nd high result over 5 years

The CO 8-hr modeled impact is the 2nd high result over 5 years

The NO<sub>2</sub> annual modeled impact is the high result over 5 years

The NO<sub>2</sub> 1-hr modeled impact is the 8th high result over 5 years

Background concentrations for pollutants obtained from "SC DHEC BACKGROUND CONCENTRATIONS FOR MODELING PURPOSES" spreadsheet updated 9/9/2015

PM<sub>10</sub> used Bates House site in Columbia.

PM<sub>2.5</sub> used Irmo site in Lexington, Co.

SO<sub>2</sub> used Parklane site in Richland

CO used Parklane site in Richland

NO<sub>2</sub> used Sandhill site in Richland

PM modeling completed during plant operating hours of 6am - 8 pm Monday - Saturday, no operations on Sunday

NO<sub>2</sub> modeling completed using the emission factor of 1g/kW-hr (John Deer Final Tier 4/Stage IV pump engine)

**TABLE D-3a - CLASS II PSD (STANDARD 7)**

**Vulcan Construction Materials, LLC - Lexington Quarry**

**Dewatering Pump located in Full Pit**

Pollutant	2002 Modeled Impact (µg/m³)	2003 Modeled Impact (µg/m³)	2004 Modeled Impact (µg/m³)	2005 Modeled Impact (µg/m³)	2006 Modeled Impact (µg/m³)	Maximum Modeled Conc (µg/m³)	Standard (µg/m³)	PASS?
PM <sub>10</sub> 24-hr	20.21	26.07	25.85	18.04	21.01	26.07	30	YES
PM <sub>10</sub> Annual	1.82	1.80	1.54	1.49	1.83	1.83	17	YES
PM <sub>2.5</sub> 24-hr	3.45	4.00	3.76	5.06	4.12	5.06	9	YES
PM <sub>2.5</sub> Annual	0.23	0.22	0.19	0.19	0.23	0.23	4	YES
SO <sub>2</sub> Annual	0.102	0.095	0.098	0.104	0.084	0.10	20	YES
SO <sub>2</sub> 24-hr	0.88	0.68	0.77	0.56	0.65	0.88	91	YES
SO <sub>2</sub> 3-hr	1.36	1.13	1.18	1.39	1.29	1.39	512	YES
NO <sub>2</sub> Annual	0.07	0.06	0.06	0.07	0.05	0.07	25	YES

The PM<sub>10</sub> 24-hr modeled impact is the maximum average high-2nd-high 24-hr results over 5 years.

The PM<sub>10</sub> and PM<sub>2.5</sub> annual modeled impact is the maximum average high result over 5 years.

The SO<sub>2</sub> 3-hr modeled impact is the maximum average high-2nd-high 24-hr results over 5 years.

The SO<sub>2</sub> 24-hr and annual modeled impact is high result over 5 years.

The NO<sub>2</sub> annual modeled impact is the high result over 5 years

PM modeling completed during plant operating hours of 6am - 8 pm Monday - Saturday, no operations on Sunday

NO<sub>2</sub> modeling completed using the emission factor of 1g/kW-hr (John Deer Final Tier 4/Stage IV pump engine)

TABLE D-2b - SUMMATION OF MODELED IMPACTS (STANDARD 2)

Vulcan Construction Materials, LLC - Lexington Quarry

Dewatering Pump located in Initial Pit - PM not modeled

Pollutant	2002 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	2003 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	2004 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	2005 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	2006 Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	Background <sup>4</sup> ( $\mu\text{g}/\text{m}^3$ )	Total Impact ( $\mu\text{g}/\text{m}^3$ )	Standard ( $\mu\text{g}/\text{m}^3$ )	PASS?
PM <sub>10</sub> 24-hr <sup>1</sup>						38	38.00	150	YES
PM <sub>2.5</sub> 24-hr <sup>2</sup>						20	20.00	35	YES
PM <sub>2.5</sub> Annual <sup>3</sup>						9.7	9.70	12	YES
SO <sub>2</sub> 1-hr	113.09					30.5	143.63	196	YES
SO <sub>2</sub> 3-hr	74.05	67.75	79.49	68.54	67.71	31.4	110.89	1300	YES
CO 1-hr	391.98	363.05	383.09	382.02	390.06	1450.3	1842.31	40000	YES
CO 8-hr	148.17	151.45	162.59	130.76	166.06	916.0	1082.06	10000	YES
NO <sub>2</sub> Annual Average	1.27	1.34	1.41	1.19	1.36	8.8	10.22	100	YES
NO <sub>2</sub> 1-hr	68.33					83.4	151.72	188	YES

The PM<sub>10</sub> 24-hr modeled impact is the maximum average high-6th-high 24-hr result over 5 years

The PM<sub>2.5</sub> 24-hr modeled impact is the maximum average high 24-hr result over 5 years

The PM<sub>2.5</sub> annual modeled impact is the maximum average high annual result over 5 years

The SO<sub>2</sub> 1-hr modeled impact is the 4th high result over 5 years

The SO<sub>2</sub> 3-hr modeled impact is the 2nd high result over 5 years

The CO 1-hr modeled impact is the 2nd high result over 5 years

The CO 8-hr modeled impact is the 2nd high result over 5 years

The NO<sub>2</sub> annual modeled impact is the high result over 5 years

The NO<sub>2</sub> 1-hr modeled impact is the 8th high result over 5 years

Background concentrations for pollutants obtained from "SC DHEC BACKGROUND CONCENTRATIONS FOR MODELING PURPOSES" spreadsheet updated 9/9/2015

PM<sub>10</sub> used Bates House site in Columbia.

PM<sub>2.5</sub> used Irmo site in Lexington, Co.

SO<sub>2</sub> used Parklane site in Richland

CO used Parklane site in Richland

NO<sub>2</sub> used Sandhill site in Richland

NO<sub>2</sub> modeling completed using the emission factor of 1g/kW-hr (John Deer Final Tier 4/Stage IV pump engine)

**TABLE D-3b - CLASS II PSD (STANDARD 7)**

**Vulcan Construction Materials, LLC - Lexington Quarry**

**Dewatering Pump located in Initial Pit PM not modeled**

Pollutant	2002 Modeled Impact (µg/m³)	2003 Modeled Impact (µg/m³)	2004 Modeled Impact (µg/m³)	2005 Modeled Impact (µg/m³)	2006 Modeled Impact (µg/m³)	Maximum Modeled Conc (µg/m³)	Standard (µg/m³)	PASS?
PM <sub>10</sub> 24-hr						0.00	30	YES
PM <sub>10</sub> Annual						0.00	17	YES
PM <sub>2.5</sub> 24-hr						0.00	9	YES
PM <sub>2.5</sub> Annual						0.00	4	YES
SO <sub>2</sub> Annual	1.98	2.09	2.20	1.86	2.12	2.20	20	YES
SO <sub>2</sub> 24-hr	19.75	20.74	21.75	28.82	24.23	28.82	91	YES
SO <sub>2</sub> 3-hr	74.05	67.75	79.49	68.54	67.71	79.49	512	YES
NO <sub>2</sub> Annual	1.27	1.34	1.41	1.19	1.36	1.41	25	YES

The PM<sub>10</sub> 24-hr modeled impact is the maximum average high-2nd-high 24-hr results over 5 years.

The PM<sub>10</sub> and PM<sub>2.5</sub> annual modeled impact is the maximum average high result over 5 years.

The SO<sub>2</sub> 3-hr modeled impact is the maximum average high-2nd-high 24-hr results over 5 years.

The SO<sub>2</sub> 24-hr and annual modeled impact is high result over 5 years.

The NO<sub>2</sub> annual modeled impact is the high result over 5 years

NO<sub>2</sub> modeling completed using the emission factor of 1g/kW-hr (John Deer Final Tier 4/Stage IV pump engine)