



May 18, 2016

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

**SUBJECT: Vulcan Construction Materials, LLC - Lexington Quarry
Synthetic Minor Construction Permit Application
Clarification of 4-22-2016 Submittal**

Dear Ms. Basil:

Vulcan Construction Materials, LLC submitted a 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. The results of the suggested changes were submitted to DHEC on April 22, 2016. The purpose of this letter is to clarify that submittal.

As presented on April 22, 2016, the following changes were made to the model setup:

- The NO₂ and SO₂ 1-hour and the PM_{2.5} 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.

With the change in model setup for the pump and haul road to the Open Pit source, DHEC requested that Vulcan examine different scenarios to determine the worst case concentration for all pollutants. The results presented on April 22, 2016 demonstrate the worst case for all pollutants.

When modeling the dewatering pump and the haul road in the Open Pit source, two scenarios were modeled. The first scenario modeled was the final pit at the quarry, using the final planned dimensions and depth. When the pit at the quarry reaches the final size (many years after initial construction), the sources of emissions include the dewatering pump, fugitive emissions from haul roads in the pit and customer roads at base elevation, storage piles, and the equipment associated with crushing operations. The modeling results for the final pit scenario are presented in Tables D-2a (for Standard 2) and Table D-3a (for Standard 7). The concentrations for PM₁₀ and PM_{2.5} for the final pit scenario prove to be the worst case as shown in the tables below.

The second scenario modeled 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. Initially work at the quarry site will consist of removal of overburden in the proposed pit location. The dewatering pump will be used as necessary to remove groundwater and stormwater; rock processing is expected to begin when the overburden is removed. For the initial pit scenario, only emissions from the dewatering pump were modeled. With the April 22, 2016 submittal, the modeling results for PM were not included in the results tables; PM emissions have been added with this submittal. The modeling results for the initial pit scenario are presented in Tables D-2b (for Standard 2) and Table D-3b (for Standard 7). The concentrations for CO, NO_x, SO₂ for the initial pit scenario prove to be the worst case as shown in the tables below.

Standard 2 Worst Case

Pollutant	Initial Pit Modeled Impact (µg/m³)	Final Pit Modeled Impact (µg/m³)	Worst Case Modeled Impact (µg/m³)	Background (µg/m³)	Worst Case Total Impact (µg/m³)	Standard (µg/m³)	Does Worst Case PASS?
PM ₁₀ 24-hr	0.80	50.25	50.25	38.00	88.25	150	YES
PM _{2.5} 24-hr	0.92	8.27	8.27	20.00	28.27	35	YES
PM _{2.5} Annual	0.08	1.06	1.06	9.70	10.76	12	YES
SO ₂ 1-hr	113.09	1.88	113.09	30.54	143.63	196	YES
SO ₂ 3-hr	79.5	1.4	79.5	31.40	110.89	1300	YES
CO 1-hr	392.0	8.7	392	1450.33	1842.31	40000	YES
CO 8-hr	166.1	4.0	166	916.00	1082.06	10000	YES
NO ₂ Annual Average	1.4	0.1	1.41	8.81	10.22	100	YES
NO ₂ 1-hr	68.3	1.1	68.33	83.39	151.72	188	YES

Standard 7 Worst Case

Pollutant	Initial Pit Maximum Modeled Conc (µg/m³)	Final Pit Maximum Modeled Conc (µg/m³)	Worst Case Maximum Modeled Conc (µg/m³)	Standard (µg/m³)	Does Worst Case PASS?
PM ₁₀ 24-hr	0.80	26.10	26.10	30	YES
PM ₁₀ Annual	0.09	1.83	1.83	17	YES
PM _{2.5} 24-hr	1.15	5.06	5.06	9	YES
PM _{2.5} Annual	0.09	0.24	0.24	4	YES
SO ₂ Annual	2.20	0.10	2.20	20	YES
SO ₂ 24-hr	28.82	0.88	28.82	91	YES
SO ₂ 3-hr	79.49	1.39	79.49	512	YES
NO ₂ Annual	1.41	0.07	1.41	25	YES

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 final pit 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 Tier 4/Stage IV pump similar to the pump specified in the original application, with a NO_x 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.

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



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 (µg/m³)	2003 Modeled Impact (µg/m³)	2004 Modeled Impact (µg/m³)	2005 Modeled Impact (µg/m³)	2006 Modeled Impact (µg/m³)	Background (µg/m³)	Total Impact (µg/m³)	Standard (µg/m³)	PASS?
PM ₁₀ 24-hr	50.25					38	88.25	150	YES
PM _{2.5} 24-hr	8.27					20	28.27	35	YES
PM _{2.5} Annual	1.06					9.7	10.76	12	YES
SO ₂ 1-hr	1.88					30.5	32.42	196	YES
SO ₂ 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 ₂ Annual Average	0.07	0.06	0.06	0.07	0.05	8.8	8.88	100	YES
NO ₂ 1-hr	1.13					83.4	84.52	188	YES

Notes:

The PM₁₀ 24-hr modeled impact is the maximum average high-6th-high 24-hr result over 5 years

The PM_{2.5} 24-hr modeled impact is the maximum average high 24-hr result over 5 years

The PM_{2.5} annual modeled impact is the maximum average high annual result over 5 years

The SO₂ 1-hr modeled impact is the 4th high result averaged over 5 years

The SO₂ 3-hr modeled impact is the 2nd high result for each year

The CO 1-hr modeled impact is the 2nd high result for each year

The CO 8-hr modeled impact is the 2nd high result for each year

The NO₂ annual modeled impact is the high result for each year

The NO₂ 1-hr modeled impact is the 8th high result averaged over 5 years

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

PM₁₀ used Bates House site in Columbia.

PM_{2.5} used Irmo site in Lexington, Co.

SO₂ used Parklane site in Richland

CO used Parklane site in Richland

NO₂ used Sandhill site in Richland

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

NO₂ modeling completed using the emission factor of 1g/kW-hr (John Deere 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 (µg/m³)	2003 Modeled Impact (µg/m³)	2004 Modeled Impact (µg/m³)	2005 Modeled Impact (µg/m³)	2006 Modeled Impact (µg/m³)	Background (µg/m³)	Total Impact (µg/m³)	Standard (µg/m³)	PASS?
PM ₁₀ 24-hr	0.80					38	38.80	150	YES
PM _{2.5} 24-hr	0.92					20	20.92	35	YES
PM _{2.5} Annual	0.0815					9.7	9.78	12	YES
SO ₂ 1-hr	113.09					30.5	143.63	196	YES
SO ₂ 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 ₂ Annual Average	1.27	1.34	1.41	1.19	1.36	8.8	10.22	100	YES
NO ₂ 1-hr	68.33					83.4	151.72	188	YES

Notes:

The PM₁₀ 24-hr modeled impact is the maximum average high-6th-high 24-hr result over 5 years

The PM_{2.5} 24-hr modeled impact is the maximum average high 24-hr result over 5 years

The PM_{2.5} annual modeled impact is the maximum average high annual result over 5 years

The SO₂ 1-hr modeled impact is the 4th high result averaged over 5 years

The SO₂ 3-hr modeled impact is the 2nd high result for each year

The CO 1-hr modeled impact is the 2nd high result for each year

The CO 8-hr modeled impact is the 2nd high result for each year

The NO₂ annual modeled impact is the high result for each year

The NO₂ 1-hr modeled impact is the 8th high result averaged over 5 years

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

PM₁₀ used Bates House site in Columbia.

PM_{2.5} used Irmo site in Lexington, Co.

SO₂ used Parklane site in Richland

CO used Parklane site in Richland

NO₂ used Sandhill site in Richland

NO₂ modeling completed using the emission factor of 1g/kW-hr (John Deere 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 ($\mu\text{g}/\text{m}^3$)	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 ($\mu\text{g}/\text{m}^3$)	Maximum Modeled Conc ($\mu\text{g}/\text{m}^3$)	Standard ($\mu\text{g}/\text{m}^3$)	PASS?
PM ₁₀ 24-hr	20.24	26.10	25.86	18.24	21.02	26.10	30	YES
PM ₁₀ Annual	1.82	1.80	1.55	1.49	1.83	1.83	17	YES
PM _{2.5} 24-hr	3.45	4.00	3.76	5.06	4.13	5.06	9	YES
PM _{2.5} Annual	0.24	0.22	0.19	0.19	0.23	0.24	4	YES
SO ₂ Annual	0.102	0.095	0.098	0.104	0.084	0.10	20	YES
SO ₂ 24-hr	0.88	0.68	0.77	0.56	0.65	0.88	91	YES
SO ₂ 3-hr	1.36	1.13	1.18	1.39	1.29	1.39	512	YES
NO ₂ Annual	0.07	0.06	0.06	0.07	0.05	0.07	25	YES

Notes:

The PM₁₀ 24-hr modeled impact is the maximum high-2nd-high 24-hr result over 5 years.

The PM₁₀ and PM_{2.5} annual modeled impact is the maximum high result over 5 years.

The SO₂ 3-hr modeled impact is the maximum high-2nd-high 24-hr result over 5 years.

The SO₂ 24-hr and annual modeled impact is the maximum high result over 5 years.

The NO₂ annual modeled impact is the maximum high result over 5 years

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

NO₂ modeling completed using the emission factor of 1g/kW-hr (John Deere 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 ($\mu\text{g}/\text{m}^3$)	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 ($\mu\text{g}/\text{m}^3$)	Maximum Modeled Conc ($\mu\text{g}/\text{m}^3$)	Standard ($\mu\text{g}/\text{m}^3$)	PASS?
PM ₁₀ 24-hr	0.73	0.74	0.72	0.75	0.80	0.80	30	YES
PM ₁₀ Annual	0.08	0.08	0.09	0.07	0.08	0.09	17	YES
PM _{2.5} 24-hr	0.79	0.83	0.87	1.15	0.97	1.15	9	YES
PM _{2.5} Annual	0.08	0.08	0.09	0.07	0.08	0.09	4	YES
SO ₂ Annual	1.98	2.09	2.20	1.86	2.12	2.20	20	YES
SO ₂ 24-hr	19.75	20.74	21.75	28.82	24.23	28.82	91	YES
SO ₂ 3-hr	74.05	67.75	79.49	68.54	67.71	79.49	512	YES
NO ₂ Annual	1.27	1.34	1.41	1.19	1.36	1.41	25	YES

Notes:

The PM₁₀ 24-hr modeled impact is the maximum high-2nd-high 24-hr result over 5 years.

The PM₁₀ and PM_{2.5} annual modeled impact is the maximum high result over 5 years.

The SO₂ 3-hr modeled impact is the maximum high-2nd-high 24-hr result over 5 years.

The SO₂ 24-hr and annual modeled impact is the maximum high result over 5 years.

The NO₂ annual modeled impact is the maximum high result over 5 years

NO₂ modeling completed using the emission factor of 1g/kW-hr (John Deere Final Tier 4/Stage IV pump engine)