



## PROJECT MEMORANDUM

Date: December 8, 2025

File: 00.6209.00

To: SCDES

Cc:

From: Heather Ponce *Heather Ponce*

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Subject: Manning Quarry Modeling Protocol

### SUMMARY

Air dispersion modeling of criteria pollutant emissions from the quarry has been performed for the proposed sources at the Manning Quarry. The results of the air quality analysis demonstrate that emissions of criteria pollutants will achieve the air quality standards stated in Standard No. 2.

### MODELING CONSIDERATIONS

The air dispersion modeling analysis was completed using the most recent version of the AERMOD model, version 22112, using BEEST version 12.09 as the operating interface. Building downwash was not considered as there are no on-Site buildings. The land-use within 3 kilometers of the facility was determined to be rural for air dispersion modeling purposes. A good engineering practice (GEP) stack height analysis was not completed, as the model calculates cavity effects as necessary.

The proposed quarry is located in Richland County, South Carolina; therefore, the meteorological data pertaining to Columbia for years 2015 through 2019 downloaded from the South Carolina Department of Environmental Services (SCDES) website was used for modeling. Per instructions on SCDES' website, the Digital Terrain Data National Elevation Dataset (NED) files pertaining to Richland County were used. To demonstrate compliance with Standard 2, the maximum modeled effect using five years of National Weather Service (NWS) meteorological dataset was added to the background data and compared with the National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Background levels for criteria pollutants were obtained from SCDES' "Background Concentrations for Modeling Purposes" spreadsheet available on SCDES' website and updated September 10, 2025.

Equipment and property line locations are expressed in Universal Transverse Mercator (UTM) Zone 17 (NAD83) coordinates.

Equipment at the quarry includes truck unloading, screens, crushers, feeders, bins, and conveyors. Sources of emissions were modeled as volume sources as is typical for fugitive dust from this type of equipment at an aggregate facility (per the National Stone, Sand and Gravel Association's "Modeling Fugitive Dust Sources with AERMOD", January 2007, hereinafter referred to as "NSSGA document"). The UTM Coordinates for the sources are at the center of the source. The release height for a volume source is the height of the center of the source. The release heights were estimated for the equipment. The initial lateral dimension ( $\sigma_{zy}$ ) and initial vertical dimension ( $\sigma_{zo}$ ) for the volume sources were also calculated per suggested procedures in the NSSGA document as summarized below. All sources were considered to be adjacent to a structure for the purposes of this calculation.

Equipment	Release Ht	Initial Vertical Dimension ( $\sigma_{zo}$ )	Initial Lateral Dimension ( $\sigma_{zy}$ )
Truck Unloading	Based on height of transfer	maximum height of unloading divided by 2.15	Width of truck divided by 4.3
Screens	Based on height of transfer	vertical dimension of volume divided by 2.15	Width of screen divided by 4.3
Crushers	Based on height of transfer	vertical dimension of volume divided by 2.15	Width of crusher divided by 4.3
Bins	Based on height of transfer	vertical dimension of volume divided by 2.15	Width of bin divided by 4.3
Conveyors	Based on height of transfer	vertical dimension of volume divided by 4.3	Width of the conveyor divided by 4.3

## REGULATORY CONSIDERATIONS

The baseline date for Richland County was set for PM<sub>10</sub> on May 20, 1981 and for PM<sub>2.5</sub> on June 12, 2023. Where the minor source baseline date has been set for a pollutant, any increase in emissions from a new or modified emission source must comply with the Standard 7 increment(s) for that pollutant and the facility must submit an analysis that demonstrates emissions increases caused by the facility will not cause an increase in pollutant concentration greater than the Standard 7 increment(s). The SCDES' "Guidance Concerning Prevention of Significant Deterioration (PSD) Ambient Air Increments" document updated April 15, 2019, states that SCDES will no longer require that facilities include an air quality analysis for PSD increments in permit applications for those pollutants that do not trigger PSD permit action. Since the facility does not trigger PSD permit action, a Standard 7 increment modeling analysis has not been submitted.

## **EMISSIONS CALCULATIONS**

Emissions were calculated at the operating rates (tons per hour) provided for each piece of equipment based on the potential to emit (8,760 hours per year). Emissions factors from AP-42 Table 11.19.2-2 were used to estimate emissions; the operating rate was multiplied by the emission factor to obtain the hourly emission rate for modeling. Wet suppression and carry-over moisture is used as control for all emission sources. Equipment that is part of the Wash Process has no uncontrolled or controlled emissions because soaking the material with water is an integral part of the process.

## **FUGITIVE EMISSIONS FROM STOCKPILES**

Fugitive emissions from stockpiles were calculated as rectangular area sources as is typical for fugitive dust from stockpiles at an aggregate facility per the NSSGA document. The stockpiles were modeled as AreaPoly sources.

## **RECEPTORS**

The receptor grid was set up as a “Special Grid” in BEEST. A Fenceline grid was created at 50 m spacing. Then the grid receptors were created as a Fenceline Grid with Fenceline Grid Spacing of 100 m and a Grid Distance of 1,500 m. Analysis of modeling results shows that the maximum modeled concentration occurs within this receptor grid.

## **MODELING RESULTS FOR STANDARD 2**

To demonstrate compliance with Standard 2, the following modifications were made in the model to the operating hours at the facility:

- The modeled quarry equipment operations may occur for 14 hours each day, between the hours of 6am and 8pm Monday through Sunday. This operating scenario was presented in the model by using the hour by day of week (HRDOW) source flag on the quarry equipment.

The maximum modeled effect using five years of National Weather Service (NWS) meteorological data was added to the background data and compared with the National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Background levels for criteria pollutants were obtained from DHEC’s “Background Concentrations for Modeling Purposes” spreadsheet available on DHEC’s website and updated September 10, 2025. The background sites used for each pollutant are documented on the Summation of Modeled Impacts table.

## **PM<sub>10</sub>**

Per Appendix A of South Carolina’s Modeling Guidelines for Air Quality Permits dated October 2018 (revised January 9, 2025) for the PM<sub>10</sub> NAAQS (SC Standard 2) are based on the High 6<sup>th</sup> High value over five years of meteorological data for the 24-hour PM<sub>10</sub> concentration. The AERMOD model was run using a single five-year meteorological data file.

**PM<sub>2.5</sub>**

Per Appendix A of South Carolina's Modeling Guidelines for Air Quality Permits dated October 2018 (revised January 9, 2025), modeling demonstrations for the PM<sub>2.5</sub> NAAQS (SC Standard 2) are based on the 8th high averaged over five years of meteorological data (5-year average 98th percentile) over five years of meteorological data for the 24-hour PM<sub>2.5</sub> concentration.

The annual modeled contribution is based on the 1<sup>st</sup> high value of the five-year average of meteorological data. In AERMOD, the special processing for the 24-hour and annual averages for PM<sub>2.5</sub> was triggered by using "PM2.5" as the pollutant ID. The AERMOD model was run using a single five-year meteorological data file. The results of the air quality analysis demonstrate that emissions of criteria pollutants will achieve the air quality standards stated in Standard No. 2.