DIVISION OF AIR QUALITY
February 2, 2021

MEMORANDUM

TO: Michael Koerschner, Environmental Engineer, ARO
Patrick Ballard, Permit Coordinator, ARO

FROM: Matthew Porter, Meteorologist, AQAB

THROUGH: Tom Anderson, AQAB Supervisor

SUBJECT: Review of Dispersion Modeling Air Toxics Analysis for Madison Asphalt, LLC
Facility ID: 5800063
Application ID: 5800063.19A – GREEN – 300
Marshall, NC Madison County

I have completed the review of the dispersion modeling analysis received April 2, 2019, and subsequently revised April 22, 2019. for the new hot mix asphalt facility owned and to be operated by Madison Asphalt, LLC located in Marshall, Madison County, NC. The dispersion modeling analysis was conducted to evaluate air toxics ambient impacts from the proposed construction and operation of a hot mix asphalt facility. The new facility will be located on leased land within the property boundaries of the existing small source McCrary Stone Service, Inc. quarry (Facility ID: 5800053). The initial version of the dispersion modeling analysis was revised and received April 22, 2019 (via email) to address DAQ comments on inclusion of the asphalt tank heater and additional modeling of nickel emissions. The proposed facility-wide emissions of arsenic, benzene, and formaldehyde were estimated to exceed toxic air pollutant (TAP) emission rates (TPERs) outlined in 15A NCAC 02Q .0711. Nickel emissions were found to be below the TPERs but were modeled to remain conservative. Ultimately, the dispersion modeling analysis of TAPs emissions adequately demonstrated compliance with Acceptable Ambient Levels (AALs) outlined in 15A NCAC 02D.1104, on a source-by-source basis.

Modeled source release parameters for three point sources and one volume source is provided in attached Tables A1 and A2, respectively. Modeled TAPs emissions are provided in attached Table A2. The emissions shown in Table A2 were modeled 8,760 hours/year for each year of the 3-year meteorological modeling period.

AERMOD (version 18081) dispersion modeling was conducted using three years (2013-2015) of EPA 12-km resolution Weather Research Forecasting (WRF version 3.8) prognostic meteorological data to evaluate ambient impacts in both simple and complex terrain. AERMET (version 16216) was used to process the WRF data to generate meteorological and atmospheric turbulence vertical profiles for hourly AERMOD dispersion modeling calculations during stable, neutral, and unstable conditions. The AERMET processing was conducted by NC DAQ after review of the project site location to determine the representativeness of the 12-km WRF gridded data. The EPA model performance evaluations of the 2013-2015 WRF datasets are available online here: https://www.epa.gov/scram/air-modeling-reports-and-journal-articles. Direction-specific building downwash parameters, calculated using EPA's BPIP-PRIME program (04274), were used as input to AERMOD to determine building downwash effects on plume rise and effects on entrainment of stack emissions into the cavity and turbulent wake zones downwind of existing buildings. The building downwash analysis included five buildings and three point sources. The asphalt facility ambient boundary was conservatively assumed to coincide with the asphalt facility lease property boundary (approximately 1.85 acres) which is positioned inside the larger quarry property area (134 acres). Receptors were modeled around the asphalt facility lease property boundary at 25-meter intervals. One receptor grid was modeled beyond the facility property with extending 0.5 km with 25-meter receptor spacing. In all, a total of 1,609 receptors were modeled. Building, source, and receptor elevations and receptor dividing streamline heights were calculated from 1-arc-second resolution USGS NED terrain data using the AERMOD terrain pre-processor AERMAP (version 18081). All model buildings, sources, and receptors were geo-located within the modeling domain based on the horizontal North American Datum of 1983 (NAD83) and Zone 17 of the Universal Transverse Mercator (UTM) coordinate system.

Baseline emissions impacts for each TAP and associated averaging period are shown in Table 1 below as a percentage of the applicable AAL.

Table 1.
Maximum Modeled Toxics Impacts from Baseline Emissions
Madison Asphalt, LLC, Marshall, NC

Pollutant	Averaging Period	AAL ($\mu g/m^3$)	Maximum Modeled Impacts % of AAL
Arsenic	Annual	0.0021	9.0%
Benzene	Annual	0.12	77.6%
Formaldehyde	1-hour	150	21.5%
Nickel	24-hour	6	1.6%

This review assumes the emissions scenarios, sources modeled, source parameters, and pollutant emission rates used in the dispersion modeling analysis are correct.

cc: Tom Anderson
Matthew Porter

Table A1. Modeled Release Parameters for Point Sources

Model ID	Source Description	X-Utm (m)	Y-Utm (m)	Elevation (m)	Stack Height (m)	Temp. (K)	Velocity (m/s)	Stack Diameter (m)	Release Configuration
DRYER	Dryer/baghouse	350121.70	3961925.90	599.80	8.10	436.00	19.40	1.03	Vertical
SILO	Silo Filling	350139.40	3961929.90	606.60	10.81	339.00	1.50	0.10	Horizontal
TANKHEAT	Asphalt Tank Heater	350126.10	3961939.70	604.30	2.22	450.00	6.50	0.30	Vertical

Table A2. Modeled Release Parameters for Volume Sources

Model ID	Source Description	X-Utm (m)	Y-Utm (m)	Elevation (m)	Release Height (m)	Init. Sigma-Y (m)	Init. Sigma-Z (m)	Drop Height AGL (m)	Drop Distance (m)
LOADOUT	Asphalt Silo Loadout	350138.90	3961927.90	606.60	3.50	0.70	1.60	5.25	3.44

Table A3. Modeled Hourly Emission Rates (lb/hr)

Model ID	Source Description	Arsenic	Benzene	Formaldehyde	Nickel
DRYER	Dryer/baghouse	9.52E-05	6.63E-02	5.27E-01	1.07E-02
SILO	Silo Filling	0.00E+00	6.67E-04	1.43E-02	0.00E+00
TANKHEAT	Asphalt Tank Heater	5.63E-06	2.78E-05	4.84E-04	4.21E-05
LOADOUT	Asphalt Silo Loadout	0.00E+00	3.65E-04	6.71E-04	0.00E+00