



**DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION**

**Permit Application Analysis
A0006524**

May 3, 2021

NAME OF FIRM: Asphalt Specialties Company, Inc. (CMP100493)

NAME OF QUARRY: Lone Tree Creek Quarry (F028222)

LOCATION OF QUARRY: SW¼ of Section 24, T13N, R70W &
E½ SE¼ of Section 23, T13N, R70W
Lat: 41.07964 Long: -105.19189
Laramie County, Wyoming

TYPE OF OPERATION: Aggregate Quarry

RESPONSIBLE OFFICIAL: Greg Geras, Land Resource Manager

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REVIEWER: Jack Burton, Natural Resource Program Principal

1.0 PURPOSE OF APPLICATION

On May 8, 2018, the Division of Air Quality received an application from Asphalt Specialties Company, Incorporated to construct the Lone Tree Creek Quarry, a fifteen (15) acre aggregate quarry. The Lone Tree Creek Quarry will include aggregate crushing, screening, exposed acreage, stockpiling, blasting, and haul activity, located in the SW¼ of Section 24, T13N, R70W and E½ SE¼ of Section 23, T13N, R70W, approximately nineteen (19) miles west of Cheyenne, in Laramie County, Wyoming. The applicant estimates an annual production rate of 500,000 tons per year. No hot mix asphalt plants or concrete batch plants are planned for this site.

Additional information was received on March 1, 2021 and March 9, 2021.

2.0 REPORTED QUARRY INFORMATION

Annual Production Rate:	500,000 tons
Material Mined:	Aggregate
Size of Quarry:	15 acres
# of Blasts per Year:	42
Crushing and Screening Proposed:	Yes
Number of Residences within One (1) Mile Radius:	41
Distance Material Hauled Until Reaching Pavement:	0.39 mile
Proper Land Use Documentation Submitted:	Yes

Exhibit DEQ 07

3.0 ESTIMATED EMISSIONS

As stated previously in the analysis, Asphalt Specialties Company, Inc. plans to locate and operate crushing/screening equipment at the Lone Tree Creek Quarry. The Division issues separate air quality permits for any crushing/screening equipment prior to locating/operating at the site. The estimated emissions of the following sources are listed below.

Quarry Emissions – Lone Tree Creek Quarry

The pollutant of main concern from the Quarry itself will be fugitive particulate matter; total suspended particulate (TSP) and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM₁₀) emitted primarily from blasting, exposed acreage, stockpiling, and haul truck activity. Nitrogen oxide (NO_x), carbon monoxide (CO) and sulfur dioxide (SO₂) will be emitted from blasting activities. The Division estimated emissions based on EPA document, AP-42, Compilation of Emission Factors. Application of water during stockpiling operations is credited for fifty percent (50%) control efficiency. Table 1 lists the estimated emissions for exposed acreage and stockpiling based on a maximum production rate of 500,000 tons per year (tpy) of mined material, 50,000 tpy of stockpiled material, 15,000 tpy of overburden, and 38,250 tpy of topsoil (see Appendix A for AP-42 emission factors). Exposed acreage is based on fifteen (15) acres. Table 2 lists emissions from paved haul road activities based on a haul road length of 1.78 miles (total miles to and from the quarry). The haul road from the facility to Harriman road will be paved. Haul road emissions were calculated using AP-42 Chapter 13.2.1.3 factors for paved roads. Haul road emissions for the first 90 days, while the haul road is being paved, were calculated using AP-42 Chapter 13.2.2 factors for unpaved haul roads. Emission calculations are detailed in Appendix A. Emissions for particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers (PM_{2.5}) are estimated using the same ratios that are used for coal mines. PM_{2.5} emissions for the quarry are based on ratios applied to the PM₁₀ emissions. These ratios were derived from AP-42, and consist of a ratio of 0.1 for most sources.

Table 1: Quarry - Estimated Emissions (tpy) ¹						
Source	TSP	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂
Blasting	<0.1	--	--	<0.1	0.1	<0.1
Exposed Acreage	2.9	0.8	0.1	--	--	--
Truck Loading & Stockpiling	10.0	4.7	0.5	--	--	--
Total Emissions	12.9	5.5	0.6	<0.1	0.1	<0.1

¹ Emissions estimated to nearest 0.1.

Table 2: Haul Road Estimated Emissions (tpy) ¹			
Source	TSP	PM ₁₀	PM _{2.5}
Paved Haul Road	7.1	1.4	0.1
Unpaved Haul Road ²	0.5	0.1	<0.1

¹ Emissions estimated to nearest 0.1.

² Emissions estimated for unpaved haul roads for 90 days while the haul road is being paved.

Crushing/Screening Emissions

The pollutant of main concern from crushing/screening operations at the Quarry will be fugitive particulate matter. The Division estimated emissions based on EPA document, AP-42, Compilation of Emission Factors. Application of water during portable crushing/screening operations is credited for fifty percent (50%) control efficiency. Table 3 lists the estimated emissions for crushing/screening operations based on a maximum production rate of 500,000 tpy of mined material. Emission calculations are detailed in Appendix A.

Table 3: Crushing/Screening Estimated Emissions, tpy ¹			
Source	TSP	PM ₁₀	PM _{2.5}
Crushing	0.7	0.3	<0.1
Screening	3.1	1.1	0.1
Total Emissions	3.8	1.4	0.1

¹ Emissions estimated to nearest 0.1.

Generator Emissions

The power source for the crushing/screening equipment may include line power or generator power. Not all crushing/screening equipment require the use of generator power. The major pollutants emitted from the generator include NO_x, CO, volatile organic compounds (VOC) and PM₁₀ from incomplete combustion. To estimate emissions the Division averaged the emissions of generators used in conjunction with crushing/screening equipment from previous air quality permits issued from January 1, 2017 until April 1, 2020. Sixty-four (64) different generators from Tier 1 to Tier 4 and uncontrolled were used in determining the average estimated emissions. Table 4 lists the average estimated emissions for generators used in conjunction with crushing/screening equipment. SO₂ Emissions are considered insignificant. Estimated emissions from generator(s) that may relocate to this site will be listed in the associated air quality permit.

Table 4: Generator Estimated Emissions, tpy ¹				
Source	NO _x	CO	VOC	PM ₁₀
Generator	2.9	2.0	0.3	0.2

¹ Emissions estimated to nearest 0.1.

4.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Per the requirements of Chapter 6 Section 2 of the Wyoming Air Quality Standards and Regulations (WAQSR), all facilities must demonstrate the use of BACT for new or modified equipment.

The Division considers the use of two (2) applications of chemical dust suppressant to be applied annually in accordance with the manufacturer’s recommendations on the work areas, disturbed areas and stockpiles to represent BACT for this type of operation.

The Division considers the paving of the haul road from the quarry to Harriman road to represent BACT.

The Division considers limiting the maximum production rate at the quarry as BACT for this type of operation since it is the basis for the emission estimates in the Division’s analysis and it will limit the potential-to-emit (PTE) emissions at the quarry. Therefore, any crushing/screening equipment operating at this quarry will be limited to the maximum production rate. If multiple crushers/screens operate at this quarry during a calendar year, the total amount of material crushed/screened shall not exceed this limit.

The Division considers areas within the quarry boundary that are subject to wind erosion as disturbed areas and reclamation areas. BACT for the treatment and stabilization practices of the disturbed areas and reclamation areas may consist of ripping or chiseling to create a roughened surface, seeding with a temporary vegetative cover, or other practices which effectively stabilize against wind erosion. Localized areas identified for equipment storage/staging, work areas and required buffers for haul roads and reclamation are not required to be stabilized. These practices are also required BACT for coal mines.

5.0 CHAPTER 6, SECTION 3 APPLICABILITY

The Division determines major source applicability based on point sources and includes fugitive emissions from sources which are subject to new source performance standards which were in effect as of August 7, 1980. The Lone Tree Creek Quarry has no point source emissions and no sources that are subject to a new source performance standard. Therefore, Lone Tree Creek Quarry is not a “major source” as defined under Chapter 6, Section 3 of the WAQSR, as emissions of any criteria pollutant from point sources and applicable fugitive emissions are less than 100 tpy. As a result the Lone Tree Creek Quarry will not need to obtain a major source operating permit. Instead, Asphalt Specialties Company, Inc. will be required to obtain an operating permit under Chapter 6, Section 2(a)(iii) of the WAQSR.

6.0 PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

A major stationary source under Chapter 6, Section 4 of the WAQSR is a named facility which emits, or has the potential to emit, 100 tpy or more of any air pollutant or any stationary source which emits or has the potential to emit 250 tpy or more of any pollutant for which standards are established. Applicable emissions are emissions from point sources and fugitive emissions from named sources or from sources which were subject to an NSPS as of August 7, 1980. The Lone Tree Creek Quarry is not a named source under Chapter 6, Section 4; therefore, the 250 tpy threshold is applicable to this facility. The Lone Tree Creek Quarry also has no point source emissions and no sources that are subject to a new source performance standard. The proposed permitting action is not subject to PSD review under Chapter 6, Section 4 of the WAQSR as applicable emissions are not 250 tpy or greater for any air pollutant.

7.0 AMBIENT AIR QUALITY

Applicants must demonstrate that a proposed facility will not prevent the attainment or maintenance of any ambient air quality standard. The Division generally does not require modeling or monitoring for rock pits/quarries or multiple pits/quarries located in an area. In previous permitting actions, the Division has modeled large rock pit/quarries with production rates in the millions of tons per year and the results have demonstrated compliance with particulate matter (PM₁₀ and PM_{2.5}) annual ambient standards, which are health-based standards. In addition, the Division looked at nearby monitored values for the short-term averaging periods (24-hour) for PM₁₀ and PM_{2.5} which also shows compliance with the primary ambient standards. Primary ambient air quality standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly.

The Lone Tree Creek Quarry is located in Laramie County. The EPA has designated Laramie County as attainment/unclassified for all ambient standards. Asphalt Specialties Company Inc. provided the Division with an alternative demonstration to show compliance with ambient air quality standards. Emission estimates for most pits/quarries range from 10 tpy to 200 tpy of particulate matter depending on the operational activity at the pit/quarry. In comparison, the neighboring Harriman Quarry is permitted to produce 1.5 million tons per year (MMtpy) of product and annually has estimated particulate emissions in the range of 50 tpy. The Harriman Quarry modeled emissions to demonstrated compliance with Wyoming Air Quality Standards and Regulations health-based standards. Modeling for the Harriman Quarry showed PM₁₀ levels to be below the applicable NAAQS/WAAQS. With predominant wind in the area, comparison to modeling results and monitor data from facilities with similar source types and maximum impacts at the fence line, the Division concludes the cumulative impact from properly controlled pits/quarries, as required through the application of BACT, will not result in an exceedance of air quality standards.

8.0 LAND USE PLANNING

Asphalt Specialties Company, Inc. provided the Division with a letter dated February 10, 2021, from the Laramie County Planning and Development Department approving the use. Therefore, Asphalt Specialties Company, Inc. has demonstrated, to the satisfaction of the Division of Air Quality, that the proposed facility will be located in accordance with proper land use planning as determined by the appropriate state or local agency charged with such responsibility.

9.0 GREATER SAGE-GROUSE PROTECTION AND MULE DEER / ANTELOPE MIGRATION CORRIDOR PROTECTION

The Division has determined that the proposed Lone Tree Creek Quarry is in accordance with applicable stipulations for the management and protection of greater sage-grouse habitat and migration corridors of mule deer and antelope as required by the Division of Air Quality in accordance with Executive Orders, including Executive Order 2019-3 and 2020-1. Therefore, the Division has determined that the requirements of the greater sage-grouse habitat and migration corridors of mule deer and antelope Executive Orders 2019-3 and 2020-1 have been met.

10.0 PROPOSED PERMIT CONDITIONS

The Division is proposing to issue an Air Quality Permit to Asphalt Specialties Company, Inc. to establish the Lone Tree Creek Quarry subject to the following conditions:

1. That authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being constructed or installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance or non-compliance with any rules, standards, permits or orders.
2. That all substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as conditions of this permit.
3. Asphalt Specialties Company, Inc. shall obtain an operating permit in accordance with Chapter 6, Section 2(a)(iii) of the WAQSR 120 days after startup in order to operate this facility.

4. That all notifications, reports and correspondences associated with this permit shall be submitted to the Stationary Source Compliance Program Manager. Submissions may be done electronically through <https://airimpact.wyo.gov> to satisfy requirements of this permit.
5. That the date of commencement of construction shall be reported to the Administrator within thirty (30) days of commencement. In accordance with Chapter 6, Section 2(h) of the WAQSR, approval to construct or modify shall become invalid if construction is not commenced within twenty-four (24) months after receipt of such approval or if construction is discontinued for a period of twenty-four (24) months or more. The Administrator may extend the period based on satisfactory justification of the requested extension.
6. The owner or operator shall furnish the Administrator written notification of: (i) the anticipated date of initial startup not more than sixty (60) days or less than thirty (30) days prior to such date, and; (ii) the actual date of initial start-up within fifteen (15) days after such date in accordance with Chapter 6, Section 2(i) of the WAQSR.
7. Any crushing/screening equipment shall have separate air quality permit(s) prior to locating/operating at this site.
8. Concrete batch plants and hot mix asphalt plants cannot be located/operated at this site unless authorized by an appropriate permit modification.
9. The amount of material crushed or hauled from the quarry shall not exceed 500,000 tons per year. Records shall be kept for a period of five (5) years to demonstrate compliance with this condition and shall be made available to the Division upon request.
10. Asphalt Specialties Company, Inc. shall stabilize the exposed areas against wind erosion at the quarry. Newly disturbed areas shall be treated within sixty (60) days of completion of stripping unless otherwise approved by the Division. Reclamation areas shall be stabilized against wind erosion within sixty (60) days of reaching the approved post mining topography, unless otherwise approved by the Division. Stabilization practices may consist of ripping or chiseling to create a roughened surface, seeding with a temporary vegetative cover or other practices which effectively stabilize against wind erosion. Localized areas identified for equipment storage/staging, work areas and required buffers for haul roads and reclamation are not required to be stabilized.
11. That all work areas and stockpiles shall be treated with water and/or chemical dust suppressants on a schedule sufficient to control fugitive dust. At a minimum, two (2) applications of chemical dust suppressant shall be applied annually to all work areas in accordance with the manufacturer's recommendations. The chemical dust suppressant shall be maintained continuously to the extent that it remains a viable control measure, which may require additional applications. All work areas shall receive an initial treatment of chemical dust suppressant prior to any activities at the beginning of each construction season.
12. Asphalt Specialties Company, Inc. shall maintain a log book listing the dates, amount of dust suppressant applied, areas treated, water usage and operating hours of the water trucks. The log shall be maintained on site for a period of at least five (5) years and shall be made available to the Division upon request.
13. Asphalt Specialties Company, Inc. shall pave the haul road from the quarry to Harriman road within ninety (90) days of initial startup.

APPENDIX A

Emission Estimates

CRUSHING EMISSIONS:

Based on 500,000 tpy production rate, TSP and PM₁₀ emissions associated with crushing operations were estimated as follows:

Crushing: 0.0054 lb/ton TSP, 0.0024 lb/ton PM₁₀
AP-42 Table 11.19.2-2 8/04

$$\text{TSP Emission} = \frac{500,000 \frac{\text{ton}}{\text{year}} \times 0.0054 \frac{\text{lb}}{\text{ton}} \times (1 - 0.50)}{2000 \frac{\text{lb}}{\text{ton}}} = 0.68 \frac{\text{ton}}{\text{year}} \text{ (50\% control)}$$

$$\text{PM}_{10} \text{ Emission} = \frac{500,000 \frac{\text{ton}}{\text{year}} \times 0.0024 \frac{\text{lb}}{\text{ton}} \times (1 - 0.50)}{2000 \frac{\text{lb}}{\text{ton}}} = 0.30 \frac{\text{ton}}{\text{year}} \text{ (50\% control)}$$

SCREENING EMISSIONS:

Based on 500,000 tpy maximum production rate, TSP and PM₁₀ emissions associated with screening operations were estimated as follows:

Screening: 0.025 lb/ton TSP, 0.0087 lb/ton PM₁₀
AP-42 Table 11.19.2-2 8/04

$$\text{TSP Emission} = \frac{500,000 \frac{\text{ton}}{\text{year}} \times 0.025 \frac{\text{lb}}{\text{ton}} \times (1 - 0.50)}{2000 \frac{\text{lb}}{\text{ton}}} = 3.13 \frac{\text{ton}}{\text{year}} \text{ (50\% control)}$$

$$\text{PM}_{10} \text{ Emission} = \frac{500,000 \frac{\text{ton}}{\text{year}} \times 0.0087 \frac{\text{lb}}{\text{ton}} \times (1 - 0.50)}{2000 \frac{\text{lb}}{\text{ton}}} = 1.09 \frac{\text{ton}}{\text{year}} \text{ (50\% control)}$$

BLASTING EMISSIONS

Emissions from blasting operations were calculated using AP-42 Table 13.3-1 and Table 11.9-1.

Emission Factors:

NO_x: 17 lb/ton
CO: 67 lb/ton
SO₂: 2 lb/ton
TSP: 0.000014(A)^{1.5} lb/blast
A = Horizontal area (ft²) = 100 ft²

Amount of Blasting Agent used: 2.1 tons of ANFO or Titan

$$NO_x \text{ Emissions} = 17 \frac{\text{lb}}{\text{ton}} \times 2.1 \frac{\text{ton}}{\text{year}} = 35.7 \frac{\text{lb}}{\text{year}} \times \frac{\text{ton}}{2000\text{lb}} = 0.02 \frac{\text{ton}}{\text{year}}$$

$$CO \text{ Emissions} = 67 \frac{\text{lb}}{\text{ton}} \times 2.1 \frac{\text{ton}}{\text{year}} = 140.7 \frac{\text{lb}}{\text{year}} \times \frac{\text{ton}}{2000\text{lb}} = 0.07 \frac{\text{ton}}{\text{year}}$$

$$SO_2 \text{ Emissions} = 2 \frac{\text{lb}}{\text{ton}} \times 2.1 \frac{\text{ton}}{\text{year}} = 4.2 \frac{\text{lb}}{\text{year}} \times \frac{\text{ton}}{2000\text{lb}} = 0.002 \frac{\text{ton}}{\text{year}}$$

TSP Emissions:

$$0.000014(A)^{1.5} \text{ lb/blast} = 0.000014(100)^{1.5} \text{ lb/blast} = 0.014 \text{ lb/blast}$$

$$\text{TSP Emissions} = 0.014 \frac{\text{lb}}{\text{blast}} \times 42 \frac{\text{blasts}}{\text{year}} = 0.588 \frac{\text{lb}}{\text{year}} \times \frac{\text{ton}}{2000\text{lb}} = 0.0003 \frac{\text{ton}}{\text{year}}$$

EXPOSED ACREAGE:

Based on 15.0 acres exposed to wind erosion annually, TSP and PM₁₀ emissions were estimated as follows:

Exposed Acreage: TSP: 0.38 tons/acre/year, PM₁₀: 0.11 tons/acre/year
AP-42 Table 11.9-4, PM₁₀ = TSP x 0.3

$$\text{TSP Emissions} = 15.0 \text{ acres} \times 0.38 \text{ tons/acre/year} \times (1-0.50) = 2.85 \text{ tpy (50\% control)}$$

$$\text{PM}_{10} \text{ Emissions} = 15.0 \text{ acres} \times 0.11 \text{ tons/acre/year} \times (1-0.50) = 0.83 \text{ tpy (50\% control)}$$

TRUCK LOADING AND STOCKPILING EMISSIONS:

Based on 500,000 tpy of mined material, 50,000 tpy of stockpiled material, 35,250 tpy of topsoil, and 15,000 tpy overburden, TSP and PM₁₀ emissions associated with stockpiling operations were estimated as follows, using AP-42 13.2.4 Equation 1:

$$E = k(0.0032) \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Where:

k=particle size multiplier

U=average wind speed, mph

M=material moisture content, %

TSP:

$$k=0.74$$

U= 12.4 mph (average wind speed for Cheyenne, WY)

$$M=0.7\%$$

$$E = 0.74(0.0032) \frac{\left(\frac{12.4}{5}\right)^{1.3}}{\left(\frac{0.7}{2}\right)^{1.4}} = 0.034 \frac{lb}{ton}$$

$$\text{TSP Emissions} = \frac{597,250 \frac{ton}{yr} \times 0.034 \frac{lb}{ton} \times (1 - 0.50)}{2000 \frac{lb}{ton}} = 5.01 \frac{ton}{year} \times 2 \frac{drops}{trip} = 10.01 \frac{ton}{year} \text{ (50\% control)}$$

PM₁₀:

$$k=0.35$$

U= 12.4 mph (average wind speed for Cheyenne, WY)

$$M=0.7\%$$

$$E = 0.35(0.0032) \frac{\left(\frac{12.4}{5}\right)^{1.3}}{\left(\frac{0.7}{2}\right)^{1.4}} = 0.016 \frac{lb}{ton}$$

$$\text{PM}_{10} \text{Emissions} = \frac{597,250 \frac{ton}{yr} \times 0.016 \frac{lb}{ton} \times (1 - 0.50)}{2000 \frac{lb}{ton}} = 2.37 \frac{ton}{year} \times 2 \frac{drops}{trip} = 4.74 \frac{ton}{year} \text{ (50\% control)}$$

PAVED HAUL ROAD ACTIVITY EMISSIONS:

Fugitive TSP and PM₁₀ emissions per Vehicle Mile Traveled (VMT) associated with paved haul roads are estimated using AP-42 Chapter 13.2.1.3, equation (1a) as follows:

$$E = k(sL)^{0.91}(W)^{1.02}$$

Where:

k=empirical constant

sL= road surface silt loading (grams per square meter) (g/m²)

W=mean vehicular weight

TSP:

$$k=0.011$$

$$sL=2.4$$

$$W=29.5 \text{ tons}$$

$$E = 0.011(2.4)^{0.91}(29.5)^{1.02} = 0.77 \frac{lb}{VMT}$$

$$\text{Amount of trips per year} = 500,000 \frac{ton}{year} \times \frac{1 \text{ trip}}{24 \text{ ton}} = 20,833 \frac{trip}{year}$$

$$\text{TSP Emissions} = 20,833 \frac{trip}{year} \times 1.78 \frac{mile}{trip} \times 0.77 \frac{lb}{VMT} \times \frac{ton}{2000lb} \times (1 - 0.50) = 7.14 \frac{ton}{year} \text{ (50\% control)}$$

PM₁₀:

$$k=0.0022$$

$$sL=2.4$$

$$W=29.5 \text{ tons}$$

$$E = 0.22(2.4)^{0.91}(29.5)^{1.02} = 0.15 \frac{lb}{VMT}$$

$$\text{Amount of trips per year} = 500,000 \frac{ton}{year} \times \frac{1 \text{ trip}}{24 \text{ ton}} = 20,833 \frac{trip}{year}$$

$$\text{PM}_{10} \text{ Emissions} = 20,833 \frac{trip}{year} \times 1.78 \frac{mile}{trip} \times 0.15 \frac{lb}{VMT} \times \frac{ton}{2000lb} \times (1 - 0.50) = 1.43 \frac{ton}{year} \text{ (50\% control)}$$

UNPAVED HAUL ROAD ACTIVITY EMISSIONS:

Fugitive TSP and PM₁₀ emissions per Vehicle Mile Traveled (VMT) associated with haul roads are estimated using AP-42 Chapter 13.2.2, equation (1a) as follows:

$$E = k \left(\frac{s}{12} \right)^a \left(\frac{W}{3} \right)^b$$

Where:

k=empirical constant
s=surface material silt content, %
a=empirical constant
W=mean vehicular weight
b=empirical constant

TSP:

k=4.9
s=8.3
a=0.7
W=29.5 tons
b=0.45

$$E = 4.9 \left(\frac{8.3}{12} \right)^{0.7} \left(\frac{29.5}{3} \right)^{0.45} = 10.59 \frac{lb}{VMT}$$

$$\text{Amount of trips per year} = 2,500 \frac{ton}{year} \times \frac{1 \text{ trip}}{24 \text{ ton}} = 104 \frac{trip}{year}$$

$$\text{TSP Emissions} = 104 \frac{trip}{year} \times 1.78 \frac{mile}{trip} \times 10.59 \frac{lb}{VMT} \times \frac{ton}{2000lb} \times (1 - 0.50) = 0.49 \frac{ton}{year} \text{ (50\% control)}$$

PM₁₀:

k=1.5
s=8.3
a=0.9
W=29.5 tons
b=0.45

$$E = 1.5 \left(\frac{8.3}{12} \right)^{0.9} \left(\frac{29.5}{3} \right)^{0.45} = 3.01 \frac{lb}{VMT}$$

$$\text{Amount of trips per year} = 2,500 \frac{ton}{year} \times \frac{1 \text{ trip}}{24 \text{ ton}} = 104 \frac{trip}{year}$$

$$\text{PM}_{10} \text{ Emissions} = 104 \frac{trip}{year} \times 1.78 \frac{mile}{trip} \times 3.01 \frac{lb}{VMT} \times \frac{ton}{2000lb} \times (1 - 0.50) = 0.14 \frac{ton}{year} \text{ (50\% control)}$$