DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

Permit Application Analysis
A0001313

August 7, 2015

NAME OF FIRM:	Mullinax Concrete Service Company
NAME OF MINE:	Pee Gee Mine
LOCATION OF MINE:	N½SW¼ of Section 10, T56N, R77W Sheridan County, Wyoming
TYPE OF OPERATION:	Sand & Gravel Mine
RESPONSIBLE OFFICIAL:	Nathan Mullinax, President
MAILING ADDRESS:	P.O. Box 2044 Sheridan, WY 82801
TELEPHONE:	(307) 674-4466
REVIEWING ENGINEER:	Nick Meeker, Air Quality Engineer

1. PURPOSE OF APPLICATION

On July 17, 2015, the Division of Air Quality received an application from Mullinax Concrete Service Company to establish the Pee Gee Mine, which will include sand and gravel crushing, screening, exposed acreage, stockpiling and haul activity, located in the N½SW¼ of Section 10, T56N, R77W, approximately fourteen (14) miles north of Arvada, in Sheridan County, Wyoming. The applicant estimates an annual production rate of 100,000 tons. No hot mix asphalt plants or concrete batch plants are planned for this site.

A facility location map is included in Appendix A.

2. REPORTED MINE INFORMATION

Annual Production Rate:	100,000 tons
Material Mined:	Sand & Gravel
Size of Mine:	10 acres
# of Blasts per Year:	None
Crushing and Screening Proposed:	Yes
Distance to Nearest Residence:	Unknown
Number of Residences within One (1) Mile Radius:	None
Distance Material Hauled Until Reaching Pavement:	0.25 miles
Proper Land Use Documentation Submitted:	Yes

3. ESTIMATED EMISSIONS

As stated previously in the analysis, Mullinax Concrete Service Company plans to locate and operate crushing/screening equipment at the Pee Gee Mine. The Division issues separate valid 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.

Mine Emissions - Pee Gee Mine

The pollutant of main concern at the Pee Gee Mine will be fugitive particulate matter (TSP and PM_{10}) emitted primarily from exposed acreage, stockpiling and haul truck activity. 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 100,000 tpy of mined material, 15,000 tpy of overburden and 10,000 tpy of topsoil. The mined material will not be stockpiled at the Pee Gee Mine and instead it will be hauled offsite as it is mined. Exposed acreage is based on ten (10) acres. Table 2 lists emissions from haul road activities based on a haul road length of 0.5 miles (total miles to and from the mine). Emission calculations are detailed in Appendix B.

Table 1: Pee Gee Mine – Estimated Emissions, tpy [1]		
Source	TSP	PM_{10}
Exposed Acreage	1.9	0.6
Truck Loading & Stockpiling	1.9	0.9
Total Emissions	**3.8**	**1.5**

[1] Emissions estimated to nearest 0.1.

Table 2: Haul Road Emissions, tpy [1]		
Source	TSP	PM_{10}
Haul Road	4.5	1.3

[1] Emissions estimated to nearest 0.1.

Crushing/Screening Emissions

The pollutant of main concern during crushing/screening operations 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 100,000 tpy of mined material. Emission calculations are detailed in Appendix B.

Table 3: Crushing/Screening Emissions, tpy [1]		
Source	TSP	PM_{10}
Crushing	0.1	0.1
Screening	0.6	0.2
Total Emissions	**0.7**	**0.3**

[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 requires the use of generator power. The major pollutants emitted from the generator include nitrogen oxides (NO_x) with some carbon monoxide (CO) from incomplete combustion. The Division averaged the emissions of generators used in conjunction with crushing/screening equipment from previous air quality permits issued from January 1, 2010 until July 1, 2011. Many different generators were used in determining the average estimated emissions. Table 4 lists the average estimated emissions for generators used in conjunction with crushing/screening equipment. Estimated emissions from generator(s) that may relocate to this site are listed in the associated air quality permit.

Table 4: Generator Emissions, tpy [1]

Source	NO_x	CO	VOC	SO_2	PM_{10}
Generator(s)	17.5	5.5	0.8	0.6	0.8

[1] Emissions estimated to nearest 0.1.

4. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

The Division considers the use of water and/or chemical dust suppressants on the work areas, disturbed areas, stock piles, access roads and haul roads to represent BACT for this type of operation.

The Division considers limiting the maximum production rate at the mine 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 mine. 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 mine 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. CHAPTER 6, SECTION 3 APPLICABILITY

The Pee Gee Mine is not a "major source" as defined by Chapter 6, Section 3 of the Wyoming Air Quality Standards and Regulations (WAQSR). Therefore, further analysis is not required under this section.

6. PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

The Pee Gee Mine is not a "major emitting facility" as defined by Chapter 6, Section 4 of the Wyoming Air Quality Standards and Regulations. Therefore, further analysis is not required under this section.

7. AMBIENT AIR QUALITY

The Division generally does not require modeling or monitoring for rock pits/mines or multiple pits/mines in an area. In previous permitting actions, the Division has modeled large surface coal mines with production rates in the millions of tons per year and the results have demonstrated compliance with particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2) annual ambient standards, which are health based 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.

Emission estimates for pits/mines range from 10 tpy to 200 tpy particulate matter depending on the operational activity at the pit/mine. In comparison, a coal mine that produces 40 million tpy (MM tpy) of coal annually has estimated particulate emissions in the range of 1,500 tpy. The large surface coal mines in the Powder River Basin (PRB) are adjacent and the emissions from all mines in the modeling domain are considered in the modeling analysis, which can total 7,000 tpy particulate matter and 5,000 tpy NO_x. As discussed, large surface coal mines in the PRB have demonstrated compliance with Wyoming Air Quality Standards and Regulations health-based standards through modeling and/or monitoring.

Based on this experience, the Division concludes the cumulative impact from properly controlled pits/mines, as required through the application of BACT, will not result in an exceedance of air quality standards.

8. GOVERNOR'S SAGE GROUSE EXECUTIVE ORDER 2011-5

The Division determined that the proposed Pee Gee Mine will be located outside of any sage grouse core areas, and greater than two (2) miles from any known occupied leks.

9. COUNTY ZONING

Mullinax Concrete Service Company submitted a letter to the Division from Sheridan County Public Works Department dated September 2, 2008, approving the construction and operation of the Pee Gee Mine with associated permit conditions.

10. PROPOSED PERMIT CONDITIONS

The Division is proposing to issue an Air Quality Permit to Mullinax Concrete Service Company to establish the Pee Gee Mine 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. That all notifications, reports and correspondence required by this permit shall be submitted to the Stationary Source Compliance Program Manager, Air Quality Division, 122 West 25th Street, Cheyenne, WY 82002 and a copy shall be submitted to the District Engineer, Air Quality Division, 2100 West 5th Street, Sheridan, WY 82801. Submissions may also be done electronically through https://airimpact.wyo.gov to satisfy requirements of this permit.

4. 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.

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. Any crushing/screening equipment shall have separate valid air quality permit(s) prior to locating/operating at this site.

7. Hot mix asphalt plants and concrete batch plants cannot be located/operated at this site unless authorized by an appropriate permit modification.

8. The amount of material crushed or hauled from the quarry shall not exceed 100,000 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.

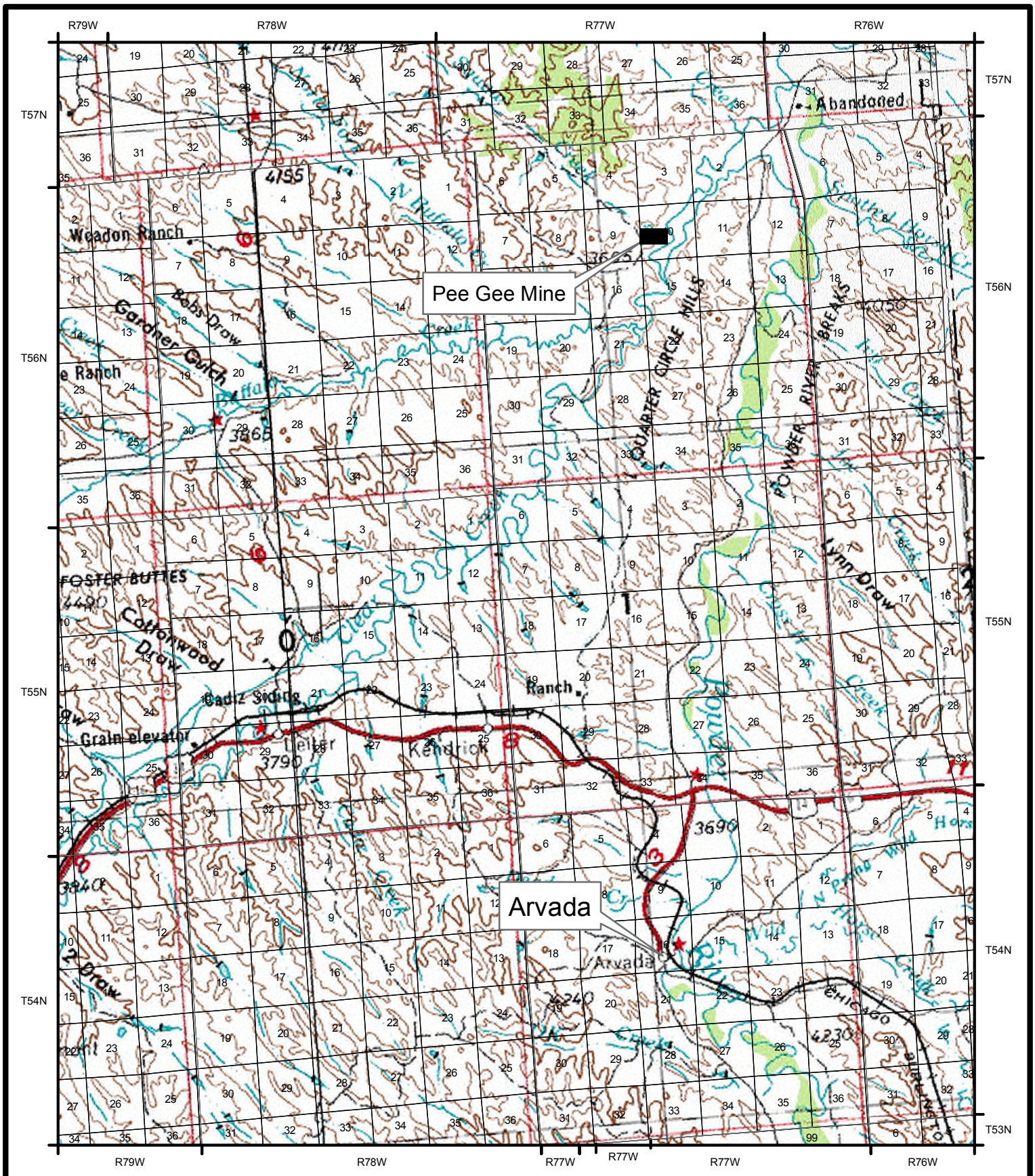
9. Mullinax Concrete Service Company shall stabilize the exposed areas against wind erosion at the quarry. Newly disturbed areas shall be treated within sixty (60) days of completion of stripping unless otherwise approved by the Division. Reclamation areas shall be stabilized against wind erosion within 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.

10. That all work areas and stockpiles shall be treated with water and/or chemical dust suppressants on a schedule sufficient to control fugitive dust.

11. All unpaved haul roads shall be treated with water and/or chemical dust suppressants on a schedule sufficient to control fugitive dust from vehicular traffic.

APPENDIX A

Facility Location Map



Mullinax Concrete Service Company
Pee Gee Mine
N½SW¼ of Section 10, T56N, R77W
Sheridan County, Wyoming

0 0.75 1.5 3 4.5 Miles

DEPARTMENT OF ENVIRONMENTAL QUALITY
WYOMING

APPENDIX B

Emission Estimates

CRUSHING EMISSIONS:

Based on 100,000 tpy production rate, TSP and PM_{10} emissions associated with crushing operations were estimated as follows:

Crushing: 0.0054 lb/ton TSP, 0.0024 lb/ton PM_{10}
AP-42 Table 11.19.2-2 8/04

$$\text{TSP Emissions} = \frac{100{,}000\frac{ton}{year}\ x0.0054\frac{lb}{ton}\ x(1-0.50)}{2{,}000\frac{lb}{ton}} = 0.14\frac{ton}{year} \text{ (50\% control)}$$

$$PM_{10}\text{ Emissions} = \frac{100{,}000\frac{ton}{year}\ x0.0024\frac{lb}{ton}\ x(1-0.50)}{2{,}000\frac{lb}{ton}} = 0.06\frac{ton}{year} \text{ (50\% control)}$$

SCREENING EMISSIONS:

Based on 100,000 tpy maximum production rate, TSP and PM_{10} emissions associated with screening operations were estimated as follows:

Screening: 0.025 lb/ton TSP, 0.0087 lb/ton PM_{10}
AP-42 Table 11.19.2-2 8/04

$$\text{TSP Emissions} = \frac{100{,}000\frac{ton}{year}\ x0.025\frac{lb}{ton}\ x(1-0.50)}{2{,}000\frac{lb}{ton}} = 0.63\frac{ton}{year} \text{ (50\% control)}$$

$$PM_{10}\text{ Emissions} = \frac{100{,}000\frac{ton}{year}\ x0.0087\frac{lb}{ton}\ x(1-0.50)}{2{,}000\frac{lb}{ton}} = 0.22\frac{ton}{year} \text{ (50\% control)}$$

EXPOSED ACREAGE:

Based on 10.0 acres exposed to wind erosion annually, TSP and PM_{10} emissions were estimated as follows:

Exposed Acreage: TSP: 0.38 tons/acre/year, PM_{10}: 0.11 tons/acre/year
AP-42 Table 11.9-4, PM_{10} = TSP x 0.3

TSP Emissions = 10.0 acres x 0.38 tons/acre/year x (1-0.50) = 1.90 tpy (50% control)

PM_{10} Emissions = 10.0 acres x 0.11 tons/acre/year x (1-0.50) = 0.55 tpy (50% control)

TRUCK LOADING AND STOCKPILING EMISSIONS:

Based on 100,000 tpy of mined material, 15,000 tpy of overburden and 10,000 tpy of topsoil, TSP and PM_{10} 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= 11.6 mph (average wind speed for Arvada, WY)
M=0.7%

$$E = 0.74(0.0032)\frac{\left(\frac{11.6}{5}\right)^{1.3}}{\left(\frac{0.7}{2}\right)^{1.4}} = 0.0307\frac{lb}{ton}$$

$$\text{TSP Emissions} = \frac{125{,}000\frac{ton}{yr}\,x0.0307\frac{lb}{ton}\,x(1-0.50)}{2{,}000\frac{lb}{ton}} = 0.96\frac{ton}{year}\,x2\frac{drops}{trip} = 1.92\frac{ton}{year}\ \text{(50\% control)}$$

PM_{10}:

k=0.35
U= 11.6 mph (average wind speed for Arvada, WY)
M=0.7%

$$E = 0.35(0.0032)\frac{\left(\frac{11.6}{5}\right)^{1.3}}{\left(\frac{0.7}{2}\right)^{1.4}} = 0.0145\frac{lb}{ton}$$

$$PM_{10}\ \text{Emissions} = \frac{125{,}000\frac{ton}{year}\,x0.0145\frac{lb}{ton}\,x(1-0.50)}{2{,}000\frac{lb}{ton}} = 0.45\frac{ton}{year}\,x2\frac{drops}{trip} = 0.90\frac{ton}{year}\ \text{(50\%control)}$$

HAUL ROAD ACTIVITY EMISSIONS:

Fugitive TSP and PM_{10} 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=36 tons
b=0.45

$$E = 4.9\left(\frac{8.3}{12}\right)^{0.7}\left(\frac{36}{3}\right)^{0.45} = 11.58\frac{lb}{VMT}$$

$$\text{Amount of trips per year} = 100{,}000\frac{ton}{year}\,x\,\frac{1}{32}\frac{trip}{ton} = 3{,}125\frac{trip}{year}$$

$$\text{TSP Emissions} = 3{,}125\frac{trip}{year}\,x0.5\frac{mile}{trip}\,x11.58\frac{lb}{VMT}\,x\,\frac{ton}{2{,}000lb}\,x(1-0.50) = 4.52\frac{ton}{year}\ \text{(50\% control)}$$

PM_{10}:

k=1.5
s=8.3
a=0.9
W=36 tons
b=0.45

$$E = 1.5\left(\frac{8.3}{12}\right)^{0.9}\left(\frac{36}{3}\right)^{0.45} = 3.29\frac{lb}{VMT}$$

$$\text{Amount of trips per year} = 100{,}000\frac{ton}{year}\,x\,\frac{1}{32}\frac{trip}{ton} = 3{,}125\frac{trip}{year}$$

$$PM_{10}\ \text{Emissions} = 3{,}125\frac{trip}{year}\,x0.5\frac{mile}{trip}\,x3.29\frac{lb}{VMT}\,x\,\frac{ton}{2{,}000lb}\,x(1-0.50) = 1.29\frac{ton}{year}\ \text{(50\% control)}$$