Section 6

All Calculations

Show all calculations used to determine both the hourly and annual controlled and uncontrolled emission rates. All calculations shall be performed keeping a minimum of three significant figures. Document the source of each emission factor used (if an emission rate is carried forward and not revised, then a statement to that effect is required). If identical units are being permitted and will be subject to the same operating conditions, submit calculations for only one unit and a note specifying what other units to which the calculations apply. All formulas and calculations used to calculate emissions must be submitted. The "Calculations" tab in the UA2 has been provided to allow calculations to be linked to the emissions tables. Add additional "Calc" tabs as needed. If the UA2 or other spread sheets are used, all calculation spread sheet(s) shall be submitted electronically in Microsoft Excel compatible format so that formulas and input values can be checked. Format all spread sheets and calculations such that the reviewer can follow the logic and verify the input values. Define all variables. If calculation spread sheets are not used, provide the original formulas with defined variables. Additionally, provide subsequent formulas showing the input values for each variable in the formula. All calculations, including those calculations are imbedded in the Calc tab of the UA2 portion of the application, the printed Calc tab(s), should be submitted under this section.

Tank Flashing Calculations: The information provided to the AQB shall include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., NOI, permit, or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis. If Hysis is used, all relevant input parameters shall be reported, including separator pressure, gas throughput, and all other relevant parameters necessary for flashing calculation.

SSM Calculations: It is the applicant's responsibility to provide an estimate of SSM emissions or to provide justification for not doing so. In this Section, provide emissions calculations for Startup, Shutdown, and Routine Maintenance (SSM) emissions listed in the Section 2 SSM and/or Section 22 GHG Tables and the rational for why the others are reported as zero (or left blank in the SSM/GHG Tables). Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on calculating SSM emissions. If SSM emissions are greater than those reported in the Section 2, Requested Allowables Table, modeling may be required to ensure compliance with the standards whether the application is NSR or Title V. Refer to the Modeling Section of this application for more guidance on modeling requirements.

Glycol Dehydrator Calculations: The information provided to the AQB shall include the manufacturer's maximum design recirculation rate for the glycol pump. If GRI-Glycalc is used, the full input summary report shall be included as well as a copy of the gas analysis that was used.

Road Calculations: Calculate fugitive particulate emissions and enter haul road fugitives in Tables 2-A, 2-D and 2-E for:

1. If you transport raw material, process material and/or product into or out of or within the facility and have PER emissions greater than 0.5 tpy.
2. If you transport raw material, process material and/or product into or out of the facility more frequently than one round trip per day.

Significant Figures:

A. All emissions standards are deemed to have at least two significant figures, but not more than three significant figures.

B. At least 5 significant figures shall be retained in all intermediate calculations.

C. In calculating emissions to determine compliance with an emission standard, the following rounding off procedures shall be used:

(1) If the first digit to be discarded is less than the number 5, the last digit retained shall not be changed;

(2) If the first digit discarded is greater than the number 5, or if it is the number 5 followed by at least one digit other than the number zero, the last figure retained shall be increased by one unit; **and**

(3) If the first digit discarded is exactly the number 5, followed only by zeros, the last digit retained shall be rounded upward if it is an odd number, but no adjustment shall be made if it is an even number.

(4) The final result of the calculation shall be expressed in the units of the standard.

Control Devices: In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions. The applicant can indicate in this section of the

application if they chose to not take credit for the reduction in emission rates. For notices of intent submitted under 20.2.73 NMAC, only uncontrolled emission rates can be considered to determine applicability unless the state or federal Acts require the control. This information is necessary to determine if federally enforceable conditions are necessary for the control device, and/or if the control device produces its own regulated pollutants or increases emission rates of other pollutants.

Aggregate Crushing/Screening Plant and Scalping Screen Plant

Pre-Control Particulate Emission Rates

Material Handling ($PM_{2.5}$, PM_{10}, and PM)

To estimate material handling pre-control particulate emissions rates for crushing, screening, and conveyor transfer operations, emission factors were obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Aug. 2004, Section 11.19.2, Table 11.19.2-2. To determine missing $PM_{2.5}$ emission factors the ratio of 0.35/0.053 from $PM_{10}/PM_{2.5}$ *k* factors found in AP-42 Section 13.2.4 (11/2006) were used.

To estimate material handling pre-control particulate emission rates for aggregate handling operations (mining/aggregate piles/ loading feed bins), an emission equation was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 13.2.4 (11/2004), where the k (PM = 0.74, PM_{10} = 0.35, $PM_{2.5}$ = 0.053), wind speed for determining the maximum hourly emission rate is the NMED default of 11 MPH and for determining annual emission rate is based on the average wind speed for Santa Fe for the years of 1996 through 2006 of 9.5 mph, and the NMED default moisture content of 2 percent.

Maximum hourly production for each plant is as follows:

Material Throughputs for Each Plant

Plant	Tons Per Hour	Tons Per Day	Tons Per Year
Aggregate Crusher/Screen Plant	200	2000	400,000
Scalping Screen Plant	50	500	100,000

Uncontrolled annual emissions for tons per year (tpy) were calculated assuming daylight operation for 4380 hours per year. This limit is based on the natural limitation of daylight hours for the safety of AAM personnel.

Aggregate Material Handling – Storage Piles, and Feed Bin Loading Emission Equation:

Maximum Hour Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00660 lbs/ton;

E_{PM10} (lbs/ton) = 0.00312 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

Annual Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00545 lbs/ton;

E_{PM10} (lbs/ton) = 0.00258 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00039 lbs/ton

AP-42 Section 11.19.2 Table 11.19.2-2 Emission Factors:

All Bin Unloading and Conveyor Transfers = Uncontrolled Conveyor Transfer Point Emission Factor
Crushing = Uncontrolled Tertiary Crushing Emission Factor
Screening = Uncontrolled Screening Emission Factor

Material Handling Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Uncontrolled Crushing	0.00540	0.00240	0.00036
Uncontrolled Screening	0.02500	0.00870	0.00130
Feed Bin Unloading, and Conveyor Transfers	0.00300	0.00110	0.00017
Uncontrolled Hourly Aggregate Storage Piles, Aggregate Feeder Loading	0.00660	0.00312	0.00047
Uncontrolled Annual Aggregate Storage Piles, Aggregate Feeder Loading	0.00545	0.00258	0.00039

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-1 Pre-Controlled Regulated Process Equipment Emission Rates

Unit #	Process Unit Description	Process Rate (tph)	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
CH_F	Crusher/Screen Plant Feeder	200	1.32	2.39	0.62	1.13	0.095	0.17
CH	Crusher/Screen Plant Crusher	200	1.08	2.37	0.48	1.05	0.073	0.16
CH_C1	Crusher/Screen Plant Conveyor	200	0.60	1.31	0.22	0.48	0.033	0.073
CH_S	Crusher/Screen Plant Screen	200	5.00	10.95	1.74	3.81	0.26	0.58
CH_SC1	Crusher/Screen Plant Screen Conveyor	200	0.60	1.31	0.22	0.48	0.033	0.073
CH_RC	Crusher/Screen Plant Return Conveyor	200	0.60	1.31	0.22	0.48	0.033	0.073
CH_SC2	Crusher/Screen Plant Screen Conveyor	200	0.60	1.31	0.22	0.48	0.033	0.073
CH_C2	Crusher/Screen Plant Conveyor	200	0.60	1.31	0.22	0.48	0.033	0.073
CH_C3	Crusher/Screen Plant Conveyor	200	0.60	1.31	0.22	0.48	0.033	0.073
CH_STK	Stacker Conveyor Drop to Pile	200	1.32	2.39	0.62	1.13	0.095	0.17
SS_F	Scalping Screen Plant Feeder	50	0.33	0.60	0.16	0.28	0.024	0.043
SS	Scalping Screen Plant Screen	50	1.25	2.74	0.44	0.95	0.066	0.14
SS_C	Scalping Screen Plant Conveyor	50	0.15	0.33	0.055	0.12	0.0083	0.018
SS_STK	Scalping Screen Conveyor Drop to Pile	50	0.33	0.60	0.16	0.28	0.024	0.043
		TOTALS	**14.38**	**30.24**	**5.59**	**11.63**	**0.85**	**1.76**

Table 6-2 Pre-Controlled Material Handling Fugitive Emission Rates

Emission Unit #	Process Unit Description	Process Rate (tph)	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
CH_RAW	Crusher/Screen Plant Raw Material	200	1.32	2.39	0.62	1.13	0.095	0.17
CH_FP	Finish Product Storage Pile	200	1.32	2.39	0.62	1.13	0.095	0.17
SS_RAW	Scalping Screen Plant Raw Material	50	0.33	0.60	0.16	0.28	0.024	0.043
SS_FP	Scalping Screen Finish Product Storage Pile	50	0.33	0.60	0.16	0.28	0.024	0.043
	TOTALS		**3.30**	**5.97**	**1.56**	**2.82**	**0.24**	**0.43**

Aggregate Crusher/Screen Plant and Scalping Screen Plant Haul Truck Travel

Haul truck travel emissions were estimated using AP-42, Section 13.2.1 (ver.01/11) "Paved Roads" emission. The main haul road in and out of the site will be paved. See Figures 4-2 and 4-3 for identification of haul roads. Table 6-3 summarizes the emission rate for haul truck travel.

Paved Roads

AP-42, Section 13.2.1 (ver.01/11) "Paved Roads"

E = k(sL)^0.91*(W)^1.02*[1-P/4N] *Annual emissions only include p factor*

k PM	0.011			
k PM10	0.0022			
k PM25	0.00054			
sL	0.6	Ubiquitous Baseline g/m^2 <500		
P = days with precipitation over 0.01 inches	70			
N = number of days in averaging period	365			
Truck weight	28.75	tons – 17.5 tons truck, 22.5 tons load		
Haul Truck VMT Paved Main Access Road	1145	meter/round trip vehicle	0.71	miles/vehicle
Max. Paved Main Access Road Truck/hr	11.1	truck/hr		
Max. Paved Main Access Road Truck/yr	38,933	truck/yr		
	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved Main Access Road In	7.91	miles/hr	27,706	miles/yr

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor
PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor
PM = 0.20229 lbs/VMT
PM10 = 0.04046 lbs/VMT
PM2.5 = 0.00993 lbs/VMT

Table 6-3: Pre-Controlled Haul Road Fugitive Dust Emission Rates – Crusher/Screen and Scalping Screen

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Crusher Haul Truck Paved	7.91 miles/hr; 27,706 miles/yr	1.68	2.80	0.34	0.56	0.082	0.14

Controlled Particulate Emission Rates

No controls or emission reductions for combustion emissions (NO_X, CO, SO_2, VOC, or PM) are proposed for the crush and screen plant engine (Unit CH_E), or scalping screen plant engine (Unit SS_E) with the exception of limiting annual hours of operation.

Controlled Material Handling ($PM_{2.5}$, PM_{10}, and PM)

No fugitive dust controls or emission reductions are proposed for the aggregate storage piles or loading of the aggregate feed bins with the exception of limiting annual production rates.

Fugitive dust control for unloading the aggregate feed bins onto conveyors will be controlled, as needed, with enclosures and/or water sprays at the exit of the feed bins. Fugitive dust control for the transfer conveyors will be controlled with material moisture content and/or enclosure. It is estimated that these methods will control to an efficiency of 95.3 percent per AP-42 Section 11.19.2, Table 11.19.2-2. Additional emission reductions include limiting annual production rates.

Fugitive dust control from the plant crusher will be controlled, as needed, with enclosures and/or water sprays. It is estimated that these methods will control to an efficiency of 77.8 percent for crushing operations per AP42 Section 11.19.2, Table 11.19.2-2. Additional emission reductions include limiting annual production rates.

Fugitive dust control from the plant screens will be controlled, as needed, with enclosures and/or water sprays. It is estimated that these methods will control to an efficiency of 91.2 percent for screening operations per AP42 Section 11.19.2, Table 11.19.2-2. Additional emission reductions include limiting annual production rates.

Fugitive dust control for the stacker conveyor transfer to storage piles will be controlled with material moisture content and/or enclosure. It is estimated that the additional moisture during processing will increase the moisture content from the default of 2% to the high moisture content value found in footnote b of AP-42 Table 11.19.2-2 of 2.88%. This will control fugitive emissions to an efficiency of 40 percent. Additional emission reductions include limiting annual production rates.

To estimate material handling control particulate emissions rates for crushing, screening, and conveyor transfer operations, emission factors were obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Aug. 2004, Section 11.19.2, Table 11.19.2-2.

To estimate material handling particulate emission rates for aggregate handling operations (mining/aggregate storage piles/ loading feed bins), an emission equation was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 13.2.4 (11/2004), where the k (TSP = 0.74, PM_{10} = 0.35, $PM_{2.5}$ = 0.053), wind speed for determining the maximum hourly emission rate is the NMED default of 11 MPH and for determining annual emission rate is based on the average wind speed for Farmington for the years of 1996 through 2006 of 8.4 mph, and the NMED default moisture content of 2 percent.

Maximum production for each plant is as follows:

Material Throughputs for Each Plant

Plant	Tons Per Hour	Tons Per Day	Tons Per Year
Aggregate Crusher/Screen Plant	200	2000	400,000
Scalping Screen Plant	50	500	100,000

Mining, Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Maximum Hour Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00660 lbs/ton;

E_{PM10} (lbs/ton) = 0.00312 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

Aggregate Storage Pile Loading from Stacker Conveyor Emission Equation:

Maximum Hour Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2.88/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2.88/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2.88/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00396 lbs/ton;

E_{PM10} (lbs/ton) = 0.00187 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00028 lbs/ton

Mining, Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Annual Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00545 lbs/ton;

E_{PM10} (lbs/ton) = 0.00258 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00039 lbs/ton

Aggregate Storage Pile Loading from Stacker Conveyor Emission Equation:

Annual Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2.88/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2.88/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2.88/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00327 lbs/ton;

E_{PM10} (lbs/ton) = 0.00155 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00023 lbs/ton

AP-42 Emission Factors:

Feed Bin Unloading = Controlled Conveyor Transfer Point Emission Factor
Crusher = Controlled Tertiary Crusher Emission Factor
Screen = Controlled Screening Emission Factor
Transfer Conveyor = Controlled Conveyor Transfer Point Emission Factor

Material Handling Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Controlled Crushing	0.00120	0.00054	0.00010
Controlled Screening	0.00220	0.00074	0.00005
Controlled Feeder Unloading and Conveyor Transfers	0.00014	0.00005	0.000013
Mining, Aggregate Storage Piles, Feeder Loading Maximum Hourly	0.00660	0.00312	0.00047
Mining, Aggregate Storage Piles, Feeder Loading Annual Hourly	0.00545	0.00258	0.00039
Stacker Conveyor to Pile Maximum Hourly	0.00396	0.00187	0.00028
Stacker Conveyor to Pile Annual Hourly	0.00327	0.00155	0.00023

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Hourly Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-4 Allowable Regulated Process Equipment Emission Rates

Unit #	Process Unit Description	Process Rate (tph)	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
CH_F	Crusher/Screen Plant Feeder	200	1.32	1.09	0.62	0.52	0.095	0.078
CH	Crusher/Screen Plant Crusher	200	0.24	0.24	0.11	0.11	0.020	0.020
CH_C1	Crusher/Screen Plant Conveyor	200	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_S	Crusher/Screen Plant Screen	200	0.44	0.44	0.15	0.15	0.010	0.010
CH_SC1	Crusher/Screen Plant Screen Conveyor	200	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_RC	Crusher/Screen Plant Return Conveyor	200	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_SC2	Crusher/Screen Plant Screen Conveyor	200	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_C2	Crusher/Screen Plant Conveyor	200	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_C3	Crusher/Screen Plant Conveyor	200	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_STK	Stacker Conveyor Drop to Pile	200	0.79	0.65	0.37	0.31	0.057	0.047
SS_F	Scalping Screen Plant Feeder	50	0.33	0.27	0.16	0.13	0.024	0.020
SS	Scalping Screen Plant Screen	50	0.11	0.11	0.037	0.037	0.0025	0.0025
SS_C	Scalping Screen Plant Conveyor	50	0.0070	0.0070	0.0023	0.0023	0.00065	0.00065
SS_STK	Scalping Screen Conveyor Drop to Pile	50	0.20	0.16	0.094	0.077	0.014	0.012
TOTALS			**3.61**	**3.15**	**1.60**	**1.38**	**0.24**	**0.21**

Table 6-5 Allowable Material Handling Fugitive Emission Rates

Emission Unit #	Process Unit Description	Process Rate (tph)	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
CH_RAW	Crusher/Screen Plant Raw Material	200	1.32	1.09	0.62	0.52	0.095	0.078
CH_FP	Finish Product Storage Pile	200	1.32	1.09	0.62	0.52	0.095	0.078
SS_RAW	Scalping Screen Plant Raw Material	50	0.33	0.27	0.16	0.13	0.024	0.020
SS_FP	Scalping Screen Finish Product Storage Pile	50	0.33	0.27	0.16	0.13	0.024	0.020
	TOTALS		**3.30**	**2.73**	**1.56**	**1.29**	**0.24**	**0.20**

Aggregate Crusher/Screen Plant and Scalping Screen Plant Haul Truck Travel

Haul truck travel emissions were estimated using AP-42, Section 13.2.1 (ver.01/11) "Paved Roads" emission. The main haul road in and out of the site will be paved. See Figure 5-1 for identification of haul roads. Paved haul road traffic emission rates will be controlled by maintaining the silt loading by sweeping and/or watering washing. Table 6-6 summarizes the emission rate for each haul truck category.

Paved Roads

AP-42, Section 13.2.1 (ver.01/11) "Paved Roads"

E = k(sL)^0.91*(W)^1.02*[1-P/4N] *Annual emissions only include p factor*

k PM	0.011			
k PM10	0.0022			
k PM25	0.00054			
sL	0.6	Ubiquitous Baseline g/m^2 <500		
P = days with precipitation over 0.01 inches	70			
N = number of days in averaging period	365			
Truck weight	28.75	tons – 17.5 tons truck, 22.5 tons load		
Haul Truck VMT Paved Main Access Road	1145	meter/round trip vehicle	0.71	miles/vehicle
Max. Paved Main Access Road Truck/hr	11.1	truck/hr		
Max. Paved Main Access Road Truck/yr	17,778	truck/yr		
	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved Main Access Road In	7.91	miles/hr	12,651	miles/yr

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor
PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor
PM = 0.20229 lbs/VMT
PM10 = 0.04046 lbs/VMT
PM2.5 = 0.00993 lbs/VMT

Table 6-6: Allowable Haul Road Fugitive Dust Emission Rates – Crusher/Screen and Scalping Screen

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Crusher Haul Truck Paved	7.91 miles/hr; 12,651 miles/yr	1.68	1.28	0.34	0.26	0.082	0.063

Estimates for 360 hp Aggregate Crushing and Screening Plant Diesel-Fired Engine (NO_X, CO, SO_2, VOC, PM, and CO_2)

A 360 horsepower (hp), 269 kilowatt (kW) engine (Unit CH_E) provides power to the aggregate crushing and screening plant. Emission rates for NO_X, CO, PM and NMHC are based on EPA Tier 4i emission factors. Sulfur dioxide (SO_2) emissions are estimated based on sulfur content of diesel fuel, not to exceed 0.0015% fuel content and a fuel usage rate of 17.5 gal/hr. CO_2 emission rates are found in AP-42 Section 3.3. Uncontrolled annual emissions in tons per year (tpy) were calculated assuming daylight operation of 4380 hours per year. Controlled annual emissions in tons per year (tpy) were calculated assuming operation of 3650 hours per year.

EPA Tier 4i:

Pollutant	Emission Factor (g/kW-hr)
Nitrogen Oxide (NO_X+NMHC)	4.00
Carbon Monoxides	3.50
Particulate	0.02
Hydrocarbons (10% of NO_X+NMHC)	0.40

Sulfur dioxide emission rate was calculated using the fuel consumption rate for this engine of 17.5 gallons per hour, a fuel density of 7.0 pounds per gallon, a fuel sulfur content of 15 PPM, and a sulfur to sulfur dioxide conversion factor of two (2). The following equation calculates the emission rate for sulfur dioxide (SO_2).

Emission Rate (lbs/hr) = Fuel (gal/hr) * Density lbs/gal * % Sulfur Content * Factor

$$\text{Emission Rate (lbs/hr)} = \frac{17.5 \text{ gallons}}{\text{hr}} \left| \frac{7.0 \text{ lbs}}{\text{gallon}} \right| \frac{0.000015 \text{ lbs Sulfur}}{\text{lbs of fuel}} \left| \frac{2 \text{ lbs Sulfur Dioxide}}{1 \text{ lb Sulfur}} \right.$$

Emission Rate (lbs/hr) = 0.0037 lbs/hr

Carbon Dioxide emissions were estimated using AP-42 Table 3.3-1 emission factor of 1.15 lbs/hp-hr.

The following equation was used to calculate the annual emission rate for each engine pollutant:

$$\text{Emission Rate (tons/year)} = \frac{\text{Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{2000 \text{ lbs/ton}}$$

Table 6-7: Pre-Controlled Combustion Emission Rates

Process Unit Number	Pollutant	Generator Rating (kW)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
CH_E	NO_X	269	2.37	5.19
	CO	269	2.08	4.55
	SO_2	269	0.0037	0.0080
	VOC	269	0.24	0.52
	PM	269	0.012	0.026
	PM_{10}	269	0.012	0.026
	$PM_{2.5}$	269	0.012	0.026
	CO_2	269	414.0	906.7

Table 6-8: Controlled Combustion Emission Rates

Process Unit Number	Pollutant	Generator Rating (kW)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
CH_E	NO_X	269	2.37	4.33
	CO	269	2.08	3.79
	SO_2	269	0.0037	0.0067
	VOC	269	0.24	0.43
	PM	269	0.012	0.022
	PM_{10}	269	0.012	0.022
	$PM_{2.5}$	269	0.012	0.022
	CO_2	269	414.0	755.6

Estimates for 55 hp Scalping Screen Plant Diesel-Fired Engine (NO_X, CO, SO_2, VOC, PM, and CO_2)

A 55 horsepower (hp), 41 kilowatt (kW) engine (Unit SS_E) provides power to the scalping screen plant. Emission rates for NO_X are based on EPA Tier 1 emission factor. Emission rates for CO, PM and NMHC are based on EPA AP-42 Section 3.3 emission factors. Sulfur dioxide (SO_2) emissions are estimated based on sulfur content of diesel fuel, not to exceed 0.0015% fuel content and a fuel usage rate of 3.3 gal/hr. CO_2 emission rates are found in AP-42 Section 3.3. Uncontrolled annual emissions in tons per year (tpy) were calculated assuming daylight operation of 4380 hours per year. Controlled annual emissions in tons per year (tpy) were calculated assuming operation of 3650 hours per year.

EPA Tier 1:

Pollutant	Emission Factor (g/kW-hr)
Nitrogen Oxide	9.2

EPA AP-42 Section 3.3:

Pollutant	Emission Factor (lb/hp-hr)
Carbon Monoxides	0.00668
Particulate	0.00220
Hydrocarbons	0.00247

Sulfur dioxide emission rate was calculated using the fuel consumption rate for this engine of 5.5 gallons per hour, a fuel density of 7.0 pounds per gallon, a fuel sulfur content of 15 PPM, and a sulfur to sulfur dioxide conversion factor of two (2). The following equation calculates the emission rate for sulfur dioxide (SO_2).

Emission Rate (lbs/hr) = Fuel (gal/hr) * Density lbs/gal * % Sulfur Content * Factor

$$\text{Emission Rate (lbs/hr)} = \frac{3.3 \text{ gallons}}{\text{hr}} \left| \frac{7.0 \text{ lbs}}{\text{gallon}} \right| \frac{0.000015 \text{ lbs Sulfur}}{\text{lbs of fuel}} \left| \frac{2 \text{ lbs Sulfur Dioxide}}{1 \text{ lb Sulfur}} \right.$$

Emission Rate (lbs/hr) = 0.00069 lbs/hr

Carbon Dioxide emissions were estimated using AP-42 Table 3.3-1 emission factor of 1.15 lbs/hp-hr.

The following equation was used to calculate the annual emission rate for each engine pollutant:

$$\text{Emission Rate (tons/year)} = \frac{\text{Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{2000 \text{ lbs/ton}}$$

Table 6-9: Pre-Controlled Combustion Emission Rates

Process Unit Number	Pollutant	Generator Rating (hp)[kW]	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
SS_E	NO_X	(55)[41]	0.83	1.82
	CO	(55)[41]	0.37	0.80
	SO_2	(55)[41]	0.00069	0.0015
	VOC	(55)[41]	0.14	0.30
	PM	(55)[41]	0.12	0.26
	PM_{10}	(55)[41]	0.12	0.26
	$PM_{2.5}$	(55)[41]	0.12	0.26
	CO_2	(55)[41]	63.3	138.5

Table 6-10: Controlled Combustion Emission Rates

Process Unit Number	Pollutant	Generator Rating (hp)[kW]	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
SS_E	NO_X	(55)[41]	0.83	1.52
	CO	(55)[41]	0.37	0.67
	SO_2	(55)[41]	0.00069	0.0013
	VOC	(55)[41]	0.14	0.25
	PM	(55)[41]	0.12	0.22
	PM_{10}	(55)[41]	0.12	0.22
	$PM_{2.5}$	(55)[41]	0.12	0.22
	CO_2	(55)[41]	63.3	115.4

Table 6-11 Summary of Uncontrolled NOx, CO, SO2, VOC, and PM Emission Rates

Uncontrolled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
CH_RAW	Crusher/Screen Plant Raw Material	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17
CH_F	Crusher/Screen Plant Feeder	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17
CH	Crusher/Screen Plant Crusher	-	-	-	-	-	-	-	-	1.08	2.37	0.48	1.05	0.073	0.16
CH_C1	Crusher/Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.033	0.073
CH_S	Crusher/Screen Plant Screen	-	-	-	-	-	-	-	-	5.00	10.95	1.74	3.81	0.26	0.58
CH_SC1	Crusher/Screen Plant Screen Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.033	0.073
CH_RC	Crusher/Screen Plant Return Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.033	0.073
CH_SC2	Crusher/Screen Plant Screen Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.033	0.073
CH_C2	Crusher/Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.033	0.073
CH_C3	Crusher/Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.60	1.31	0.22	0.48	0.033	0.073
CH_STK	Crusher/Screen Stacker Conveyor Drop to Pile	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17
CH_FP	Crusher/Screen Finish Product Storage Pile	-	-	-	-	-	-	-	-	1.32	2.39	0.62	1.13	0.095	0.17
CH_E	Crusher/Screen Plant Generator	2.37	5.19	2.08	4.55	0.0037	0.0080	0.24	0.52	0.012	0.026	0.012	0.026	0.012	0.026
SS_RAW	Scalping Screen Plant Raw Material	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043
SS_F	Scalping Screen Plant Feeder	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043
SS	Scalping Screen Plant Screen	-	-	-	-	-	-	-	-	1.25	2.74	0.44	0.95	0.066	0.14
SS_C	Scalping Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.15	0.33	0.055	0.12	0.0083	0.018

Table 6-11 Summary of Uncontrolled NOx, CO, SO2, VOC, and PM Emission Rates

Uncontrolled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
SS_STK	Scalping Screen Conveyor Drop to Pile	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043
SS_FP	Scalping Screen Finish Product Storage Pile	-	-	-	-	-	-	-	-	0.33	0.60	0.16	0.28	0.024	0.043
SS_E	Scalping Screen Plant Engine	0.83	1.82	0.37	0.80	0.00069	0.0015	0.14	0.30	0.12	0.26	0.12	0.26	0.12	0.26
CSHTRCK	Paved Haul Road Traffic - Crushing	-	-	-	-	-	-	-	-	1.68	2.80	0.34	0.56	0.082	0.14
	Total	**3.20**	**7.02**	**2.44**	**5.35**	**0.0044**	**0.0096**	**0.37**	**0.82**	**19.49**	**39.3**	**7.62**	**15.33**	**1.30**	**2.62**

Table 6-12 Summary of Allowable NOx, CO, SO2, VOC, and PM Emission Rates

Controlled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
CH_RAW	Crusher/Screen Plant Raw Material	-	-	-	-	-	-	-	-	1.32	1.09	0.62	0.52	0.095	0.078
CH_F	Crusher/Screen Plant Feeder	-	-	-	-	-	-	-	-	1.32	1.09	0.62	0.52	0.095	0.078
CH	Crusher/Screen Plant Crusher	-	-	-	-	-	-	-	-	0.24	0.24	0.11	0.11	0.020	0.020
CH_C1	Crusher/Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_S	Crusher/Screen Plant Screen	-	-	-	-	-	-	-	-	0.44	0.44	0.15	0.15	0.010	0.010
CH_SC1	Crusher/Screen Plant Screen Conveyor	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_RC	Crusher/Screen Plant Return Conveyor	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_SC2	Crusher/Screen Plant Screen Conveyor	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_C2	Crusher/Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_C3	Crusher/Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.028	0.028	0.0092	0.0092	0.0026	0.0026
CH_STK	Crusher/Screen Stacker Conveyor Drop to Pile	-	-	-	-	-	-	-	-	0.79	0.65	0.37	0.31	0.057	0.047
CH_FP	Crusher/Screen Finish Product Storage Pile	-	-	-	-	-	-	-	-	1.32	1.09	0.62	0.52	0.095	0.078
CH_E	Crusher/Screen Plant Generator	2.37	4.33	2.08	3.79	0.0037	0.0067	0.24	0.43	0.012	0.022	0.012	0.022	0.012	0.022
SS_RAW	Scalping Screen Plant Raw Material	-	-	-	-	-	-	-	-	0.33	0.27	0.16	0.13	0.024	0.020
SS_F	Scalping Screen Plant Feeder	-	-	-	-	-	-	-	-	0.33	0.27	0.16	0.13	0.024	0.020
SS	Scalping Screen Plant Screen	-	-	-	-	-	-	-	-	0.11	0.11	0.037	0.037	0.0025	0.0025
SS_C	Scalping Screen Plant Conveyor	-	-	-	-	-	-	-	-	0.0070	0.0070	0.0023	0.0023	0.00065	0.00065
SS_STK	Scalping Screen Conveyor Drop to Pile	-	-	-	-	-	-	-	-	0.20	0.16	0.094	0.077	0.014	0.012

Table 6-12 Summary of Allowable NOx, CO, SO2, VOC, and PM Emission Rates

Controlled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
SS_FP	Scalping Screen Finish Product Storage Pile	-	-	-	-	-	-	-	-	0.33	0.27	0.16	0.13	0.024	0.020
SS_E	Scalping Sreen Plant Engine	0.83	1.52	0.37	0.67	0.00069	0.0013	0.14	0.25	0.12	0.22	0.12	0.22	0.12	0.22
CSHTRCK	Paved Haul Road Traffic - Crushing	-	-	-	-	-	-	-	-	1.68	1.28	0.34	0.26	0.082	0.063
	Total	**3.20**	**5.85**	**2.44**	**4.46**	**0.0044**	**0.0080**	**0.37**	**0.68**	**8.72**	**7.40**	**3.63**	**3.17**	**0.69**	**0.71**

Estimates for Federal HAPs Air Pollutants

The aggregate plant crushing and screening generator (Unit CH_E) and aggregate scalping screen plant engine (Unit SS_E) are sources of HAPs as it appears in Section 112 (b) of the 1990 CAAA. Emissions of HAPs were determined for Units CH_E and SS_E generator/engines using AP-42 Section 3.3 and Section 1.3.

The following tables summarize the HAPs emission rates from the aggregate plant crushing and screening generator and aggregate scalping screen plant engine. Total combined HAPs emissions from Aggregate Plants is 0.017 pounds per hour and 0.0024 tons per year.

Table 6-13: HAPs Emission Rates from the Aggregate Crushing and Screening Plant Generator (CH_E)

Horsepower Rating:	360	horsepower	
Fuel Usage:	17.5	gallons/hr	
MMBtu/hr:	2.24	Btu	(based on 128000 Btu/gallon)
Btu x 10^-12/hr:	0.00000224	Btu x10^-12	(based on 128000 Btu/gallon)
Yearly Operating Hours:	3650	hours per year	

Type of Fuel: Diesel
Emission Factors AP-42 Section 3.3 and Section 1.3

Non-PAH HAPS	CAS#	Emission Factor (lbs/mmBtu)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Acetalehyde	75-07-0	7.67E-04	0.001718	0.003135
Acrolein	107-02-8	9.25E-05	0.000207	0.000378
Benzene	71-43-2	9.33E-04	0.002090	0.003814
1,3-Butadiene	106-99-0	3.91E-05	0.000088	0.000160
Formaldehyde	50-00-0	1.18E-03	0.002643	0.004824
Propylene	115-07-1	2.58E-03	0.005779	0.010547
Toluene	108-88-3	4.09E-04	0.000916	0.001672
Xylene	1330-20-7	2.85E-04	0.000638	0.001165
	Total Non-PAH HAPS	6.29E-03	0.014080	0.025696

PAH HAPS	CAS#	Emission Factor (lbs/mmBtu)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Acenaphthene	83-32-9	1.42E-06	0.000003	0.000006
Acenaphthylene	208-96-8	5.06E-06	0.000011	0.000021
Anthracene	120-12-7	1.87E-06	0.000004	0.000008
Benzo(a)anthracene	56-55-3	1.68E-06	0.000004	0.000007
Benzo(a)pyrene	50-32-8	1.88E-07	0.000000	0.000001
Benzo(b)fluoranthene	205-99-2	9.91E-08	0.000000	0.000000
Benzo(a)pyrene	192-97-2	1.55E-07	0.000000	0.000001
Benzo(g,h,I)perylene	191-24-2	4.89E-07	0.000001	0.000002
Benzo(k)fluoranthene	207-08-9	1.55E-07	0.000000	0.000001
Dibenz(a,h)anthracene		5.83E-07	0.000001	0.000002
Chrysene	218-01-9	3.53E-07	0.000001	0.000001
Fluoranthene	206-44-0	7.61E-06	0.000017	0.000031
Fluorene	86-73-7	2.92E-05	0.000065	0.000119
Indeno(1,2,3-cd)pyrene	193-39-5	3.75E-07	0.000001	0.000002
Naphthalene	91-20-3	8.48E-05	0.000190	0.000347
Phenanthrene	85-01-8	2.94E-05	0.000066	0.000120
Pyrene	129-00-0	4.78E-06	0.000011	0.000020
	Total PAH HAPS	1.68E-04	0.000377	0.000688

HAPS Metals		Emission Factor (lbs/Btu^12)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Arsenic		4	0.000009	0.000016
Beryllium		3	0.000007	0.000012
Cadmium		3	0.000007	0.000012
Chromium		3	0.000007	0.000012
Lead		9	0.000020	0.000037
Manganese		6	0.000013	0.000025
Mercury		3	0.000007	0.000012
Nickel		3	0.000007	0.000012
Selenium		15	0.000034	0.000061
	Total Metals HAPS	49	0.000110	0.000200
	Total HAPS		**0.0146**	**0.00205**

Table 6-14: HAPs Emission Rates from the Aggregate Scalping Screen Engine (SS_E)

Horsepower Rating:	55	horsepower	
Fuel Usage:	3.3	gallons/hr	
MMBtu/hr:	0.4224	Btu	(based on 128000 Btu/gallon)
Btu x 10^-12/hr:	4.224E-07	Btu x10^-12	(based on 128000 Btu/gallon)
Yearly Operating Hours:	3650	hours per year	

Type of Fuel: Diesel
Emission Factors AP-42 Section 3.3 and Section 1.3

Non-PAH HAPS	CAS#	Emission Factor (lbs/mmBtu)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Acetalehyde	75-07-0	7.67E-04	0.000324	0.000591
Acrolein	107-02-8	9.25E-05	0.000039	0.000071
Benzene	71-43-2	9.33E-04	0.000394	0.000719
1,3-Butadiene	106-99-0	3.91E-05	0.000017	0.000030
Formaldehyde	50-00-0	1.18E-03	0.000498	0.000910
Propylene	115-07-1	2.58E-03	0.001090	0.001989
Toluene	108-88-3	4.09E-04	0.000173	0.000315
Xylene	1330-20-7	2.85E-04	0.000120	0.000220
	Total Non-PAH HAPS	6.29E-03	0.002655	0.004845

PAH HAPS	CAS#	Emission Factor (lbs/mmBtu)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Acenaphthene	83-32-9	1.42E-06	0.000001	0.000001
Acenaphthylene	208-96-8	5.06E-06	0.000002	0.000004
Anthracene	120-12-7	1.87E-06	0.000001	0.000001
Benzo(a)anthracene	56-55-3	1.68E-06	0.000001	0.000001
Benzo(a)pyrene	50-32-8	1.88E-07	0.000000	0.000000
Benzo(b)fluoranthene	205-99-2	9.91E-08	0.000000	0.000000
Benzo(a)pyrene	192-97-2	1.55E-07	0.000000	0.000000
Benzo(g,h,I)perylene	191-24-2	4.89E-07	0.000000	0.000000
Benzo(k)fluoranthene	207-08-9	1.55E-07	0.000000	0.000000
Dibenz(a,h)anthracene		5.83E-07	0.000000	0.000000
Chrysene	218-01-9	3.53E-07	0.000000	0.000000
Fluoranthene	206-44-0	7.61E-06	0.000003	0.000006
Fluorene	86-73-7	2.92E-05	0.000012	0.000023
Indeno(1,2,3-cd)pyrene	193-39-5	3.75E-07	0.000000	0.000000
Naphthalene	91-20-3	8.48E-05	0.000036	0.000065
Phenanthrene	85-01-8	2.94E-05	0.000012	0.000023
Pyrene	129-00-0	4.78E-06	0.000002	0.000004
	Total PAH HAPS	1.68E-04	0.000071	0.000130

HAPS Metals		Emission Factor (lbs/Btu^12)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Arsenic		4	0.000002	0.000003
Beryllium		3	0.000001	0.000002
Cadmium		3	0.000001	0.000002
Chromium		3	0.000001	0.000002
Lead		9	0.000004	0.000007
Manganese		6	0.000003	0.000005
Mercury		3	0.000001	0.000002
Nickel		3	0.000001	0.000002
Selenium		15	0.000006	0.000012
	Total Metals HAPS	49	0.000021	0.000038
	Total HAPS		**0.0028**	**0.00039**

Hot Mix Asphalt Plant #2

Pre-Control Particulate Emission Rates

Material Handling ($PM_{2.5}$, PM_{10}, and PM)

To estimate material handling pre-control particulate emissions rates for conveyor transfer operations, emission factors were obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Aug. 2004, Section 11.19.2, Table 11.19.2-2. To determine missing $PM_{2.5}$ emission factors the ratio of 0.35/0.053 from $PM_{10}/PM_{2.5}$ *k* factors found in AP-42 Section 13.2.4 (11/2006) were used.

To estimate material handling pre-control particulate emission rates for aggregate handling operations (aggregate piles/ loading cold feed bins), an emission equation was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 13.2.4 (11/2004), where the k (PM = 0.74, PM_{10} = 0.35, $PM_{2.5}$ = 0.053), wind speed for determining the maximum hourly emission rate is the NMED default of 11 MPH and for determining annual emission rate is based on the average wind speed for Santa Fe for the years of 1996 through 2006 of 9.5 mph, and the NMED default moisture content of 2 percent.

The asphalt will contain 1.5% mineral filler. Pre-control particulate emissions rates for mineral filler silo loading was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 11.12 (06/06), Table 11.12-2 "Cement Unloading to Elevated Storage Silo". To determine missing $PM_{2.5}$ emission factors the ratio of 5.90/0.38 from $PM/PM_{2.5}$ uncontrolled k factors found in AP-42 Section 11.12 (06/06), Table 11.12-4 "Central Mix Operation" was used.

Maximum hourly asphalt production is 150 tons per hours. Virgin aggregate/Mineral filler/Asphalt cement ratios used in estimating material handling particulate emission rates is equal to 92.7/1.5/5.8. These ratios are estimates and ratios may change with mix requirements, these are not requested permit conditions.

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Maximum Hour Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00660 lbs/ton;

E_{PM10} (lbs/ton) = 0.00312 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Annual Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00545 lbs/ton;

E_{PM10} (lbs/ton) = 0.00258 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00039 lbs/ton

AP-42 Emission Factors:

All Bin Unloading and Conveyor Transfers = Uncontrolled Conveyor Transfer Point Emission Factor

Material Handling Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Uncontrolled Feed Bin Unloading, and Conveyor Transfers	0.00300	0.00110	0.00017
Uncontrolled Aggregate Storage Piles, Cold Aggregate Feeder Loading Max Hourly	0.00660	0.00312	0.00047
Uncontrolled Aggregate Storage Piles, Cold Aggregate Feeder Loading Annual	0.00545	0.00258	0.00039

AP-42 Section 11.12 Table 11.12-2 Uncontrolled Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Mineral Filler Silo Loading	0.73	0.47	0.047

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-15 Pre-Controlled Regulated Process Equipment Emission Rates

Unit #	Process Unit Description	Process Rate (tph)	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
P2HMAP	Cold Aggregate Storage Pile	139.1	0.92	3.32	0.43	1.57	0.066	0.24
P2HMABIN	Feed Bin Loading	139.1	0.92	3.32	0.43	1.57	0.066	0.24
P2HMATP1	Feed Bin Unloading	139.1	0.42	1.83	0.15	0.67	0.024	0.10
P2HMATP2	Feed Bin Conveyor to Scale Conveyor	141.3	0.42	1.86	0.16	0.68	0.024	0.11
P2HMATP3	Scale Conveyor to Sling Conveyor	141.3	0.42	1.86	0.16	0.68	0.024	0.11
P2HMAFIL	Mineral Filler Silo Loading	25 tph, 19,710 tpy	18.25	7.19	11.75	4.63	1.18	0.46
	TOTALS		**21.35**	**19.38**	**13.08**	**9.81**	**1.38**	**1.25**

HMA Plant #2 Haul Truck Travel

Haul truck travel emissions were estimated using AP-42, Section 13.2.1 (ver.01/11) "Paved Roads" emission equation and AP-42, Section 13.2.2 (ver.11/06) "Unpaved Roads" emission equation. The haul road to the plant will be paved. For the aggregate loop road, the road will be unpaved. See Figure 5-1 for identification of haul roads. Table 6-16 summarizes the emission rate for each haul truck category.

Paved Roads Plant #2 HMA

AP-42, Section 13.2.1 (ver.01/11) "Paved Roads"

E = k(sL)^0.91*(W)^1.02*[1-P/4N] *Annual emissions only include p factor*

k PM	0.011	
k PM10	0.0022	
k PM25	0.00054	
sL	0.6	Ubiquitous Baseline g/m^2 <500
P = days with precipitation over 0.01 inches	70	
N = number of days in averaging period	365	
Truck weight	28.75	tons – 17.5 tons truck, 22.5 tons load

Haul Truck VMT Paved Mineral Filler	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Asphalt Cement	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Asphalt	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Aggregate	640.5	meter/round trip vehicle	0.39805	miles/vehicle

Max. Paved Main Access Road Truck/hr	13.4	truck/hr
Max. Paved Main Access Road Truck/yr	117,676	truck/yr

	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved Main Access Road	7.59019	miles/hr	66,490	miles/yr

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor
PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor
PM = 0.20229 lbs/VMT
PM10 = 0.04046 lbs/VMT
PM2.5 = 0.00993 lbs/VMT

Unpaved Roads Plant #2 HMA

AP-42, Section 13.2.2 (ver.11/06) "Unpaved Roads"

$$E = k * (s/12)^a * (W/3)^b * [(365 - p)/365] * VMT$$

Where k = constant PM2.5 = 0.15
PM10 = 1.5
PM = 4.9
s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)
W = mean vehicle weight (28.75 tons – 17.5 tons truck, 22.5 tons load)
p = number of days with at least 0.01 in of precip. (70 days)
a = Constant PM2.5 = 0.9
PM10 = 0.9
PM = 0.7
b = Constant PM2.5 = 0.45
PM10 = 0.45
PM = 0.45
Vehicle Dust Control 0%

Trucks per Hour
Mineral Fill Trucks = 0.1 truck per hour average
Asphalt Cement Trucks = 0.4 truck per hour average
Aggregate Trucks = 6.3 truck per hour average

Trucks per Year
Mineral Fill Trucks = 876 truck per year
Asphalt Cement Trucks = 3387 truck per year
Aggregate Trucks = 55013 truck per year

VMT =Vehicle Miles Traveled
Mineral Fill Trucks Unpaved – 0.22206 miles per vehicle
Asphalt Cement Trucks Unpaved – 0.22206 miles per vehicle
Aggregate Trucks Unpaved – 0.22206 miles per vehicle

–

Miles Traveled
HMA Plant #2 Unpaved – 1.5026 miles per hour; 13,163 miles per year

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor – 0% Control
PM = 7.13379 lbs/VMT
PM10 = 1.81814 lbs/VMT
PM2.5 = 0.18181 lbs/VMT

Annual Emission Rate Factor – 0% Control
PM = 5.76567 lbs/VMT
PM10 = 0.95483 lbs/VMT
PM2.5 = 0.09548 lbs/VMT

Table 6-16: Pre-Controlled Haul Road Fugitive Dust Emission Rates

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Mineral Filler Truck Emissions Paved	0.07116 miles/hr; 623 miles/yr	0.01512	0.06305	0.00302	0.01261	0.00074	0.00310
Asphalt Cement Truck Emissions Paved	0.27516 miles/hr; 2410 miles/yr	0.05847	0.24380	0.01169	0.04876	0.00287	0.01197
Asphalt Truck Emissions Paved	4.74412 miles/hr; 41558 miles/yr	1.00804	4.20351	0.20161	0.84070	0.04949	0.20635
Aggregate Truck Emissions Paved	2.49975 miles/hr; 21898 miles/yr	0.53115	2.21490	0.10623	0.44298	0.02607	0.10873
Mineral Filler Truck Emissions Unpaved	0.02221 miles/hr; 195 miles/yr	0.15841	0.56077	0.04037	0.14292	0.00404	0.01429
Asphalt Cement Truck Emissions Unpaved	0.08586 miles/hr; 752 miles/yr	0.61252	2.16832	0.15611	0.55263	0.01561	0.05526
Aggregate Truck Emissions Unpaved	1.39451 miles/hr; 12216 miles/yr	9.94818	35.21656	2.53543	8.97541	0.25354	0.89754
	Total	**12.33**	**44.67**	**3.05**	**11.02**	**0.35**	**1.30**

Drum Mix Hot Mix Asphalt Plant

Drum mix hot mix asphalt plant uncontrolled emissions were estimated using AP-42, Section 11.1 "Hot Mix Asphalt Plants" (revised 03/04), tables 11.1-1, -2, -5, -6 and -14 emission equations. The drum dryer will be permitted to combust natural gas. Hourly emission rates are based on maximum hourly asphalt production (150 tph) and maximum annual emission rates are based on operating 8760 hours per year. To determine missing $PM_{2.5}$ emission factor the sum of uncontrolled filterable from Table 11.1-4 plus uncontrolled organic and inorganic condensable in Table 11.1-1 was used. Silo filling and plant loadout emission factors were calculated using the default value of –0.5 for asphalt volatility and a tank temperature setting of 325˚ F for HMA mix temperature. Yard emissions were found in AP-42 Section 11.1.2.5. TOC emission equation is 0.0015 lbs/ton of asphalt produced and CO is equal to the TOC emission rate times 0.32.

Emissions of VOCs (TOCs) from the asphalt cement storage tanks were determined with EPA's TANK 4.0.9d program and the procedures found in EPA's "Emission Factor Documentation for AP-42 Section 11.1 (12/2000) Section 4.4.5" for input to the TANK program.

AP-42 Section 11.1 Table 11.1-1, 5, 6, and 14 Uncontrolled Emission Factors:

Process Unit	Pollutant	Emission Factor (lbs/ton)
Drum Mixer	NO_X	0.025
	CO	0.40
	SO_2	0.0046
	VOC	0.0082
	TOC	0.015
	PM	32.0
	PM_{10}	4.5
	$PM_{2.5}$	0.287
Asphalt Mixer Loadout	CO	0.001349240
	TOC	0.004158948
	PM	0.000521937
	PM_{10}	0.000521937
	$PM_{2.5}$	0.000521937
Yard	CO	0.000352
	TOC	0.0011

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-17: Pre-Controlled Hot Mix Plant Emission Rates

Process Unit Number	Process Unit Description	Pollutant	Average Hourly Process Rate (tons/hour)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P2HMASTK	Aggregate Drum Dryer	NO_X	150	3.75	16.43
		CO	150	60.0	262.80
		SO_2	150	0.69	3.02
		VOC	150	1.23	5.39
		PM	150	4800	21024
		PM_{10}	150	675	2957
		$PM_{2.5}$	150	43.1	189
P2BATCHUL	Asphalt Mixer Unloading	CO	150	0.20	0.89
		TOC	150	0.62	2.73
		PM	150	0.078	0.34
		PM_{10}	150	0.078	0.34
		$PM_{2.5}$	150	0.078	0.34
P2HMAS	Asphalt Cement Storage Tanks	TOC	50,000 gallons	0.023	0.099
P2YARD	YARD	TOC	150	0.17	0.72
		CO	150	0.053	0.23

Controlled Particulate Emission Rates

No controls or emission reductions for combustion emissions (NO_X, CO, SO_2, VOC, or TOC) are proposed for the drum dryer (P2HMASTK), unloading the asphalt mixer (P2BATCHUL), and asphalt heater (P2HMAHT) with the exception of limiting annual production rates for production equipment.

Controlled Material Handling ($PM_{2.5}$, PM_{10}, and PM)

No fugitive dust controls or emission reductions are proposed for the aggregate storage piles (P2HMAP) or loading of the cold aggregate feed bins (P2HMABIN) with the exception of limiting annual production rates.

Fugitive dust control for unloading the cold aggregate feed bins onto the cold aggregate feed bin conveyor (P2HMATP1), feed bin conveyor to transfer conveyor (P2HMATP2), and transfer conveyor to sling conveyor (P2HMATP3) will be controlled, as needed, with enclosures and/or water sprays at the exit of the feed bins. It is estimated that these methods will control to an efficiency of 95.3 percent per AP42 Section 11.19.2, Table 11.19.2-2. Additional emission reductions include limiting annual production rates.

Particulate emissions from loading the mineral filler silo (P2HMAFIL) will be controlled with a baghouse dust collector on the exhaust vent. This dust collector consists of filter bags and is passive with no fan. It functions only when material is loaded into the silo. The filter bags are cleaned by air pulses at set intervals. Baghouse fines are dumped back into the silo. It is estimated that this method will control to an efficiency of 99 percent or greater based on information from filter bag specifications. To determine missing $PM_{2.5}$ emission factors the ratio of 0.19/0.03 from $PM/PM_{2.5}$ controlled k factors found in AP-42 Section 11.12 (06/06), Table 11.12-4 "Central Mix Operation" was used. Additional emission reductions include limiting annual production rates.

Particulate emissions from the drum dryer/mixer (P2HMASTK) will be controlled with a baghouse dust collector (P2HMASTK) on the exhaust vent. It is estimated that this method will control to an efficiency of 99.87 percent per AP42 Section 11.1, Table 11.1-1 "controlled emission factor vs. uncontrolled emission factor". Baghouse fines are sent to a dust box. Additional emission reductions include limiting annual production rates.

No fugitive controls or emission reductions are proposed for unloading the asphalt mixer (P2BATCHUL) with the exception of limiting annual production rates. No fugitive controls are proposed for yard emissions (P2YARD) or asphalt storage tanks (P2HMAS).

To estimate material handling control particulate emissions rates for pug mill and conveyor transfer operations, emission factors were obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Aug. 2004, Section 11.19.2, Table 11.19.2-2.

To estimate material handling pre-control particulate emission rates for aggregate handling operations (aggregate storage piles and cold aggregate loading feed bins), an emission equation was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 13.2.4 (11/2004), where the k (PM = 0.74, PM_{10} = 0.35, $PM_{2.5}$ = 0.053), wind speed for determining the maximum hourly emission rate is the NMED default of 11 MPH and for determining annual emission rate is based on the average wind speed for Santa Fe for the years of 1996 through 2006 of 9.5 mph, and the NMED default moisture content of 2 percent.

The asphalt will contain approximately 1.5% mineral filler. Control particulate emissions rates for mineral filler silo loading was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 11.12 (06/06), Table 11.12-2 uncontrolled "Cement Unloading to Elevated Storage Silo" and a control efficiency of 99% for the baghouse. To determine missing $PM_{2.5}$ emission factors the k factor ratio of 0.8/0.048 from $PM/PM_{2.5}$ controlled emission equations found in AP-42 Section 11.12 (06/06), Table 11.12-3 "Cement Unloading to Elevated Storage Silo" was used.

Maximum hourly asphalt production is 150 tons per hours. Virgin aggregate/Mineral filler/Asphalt cement ratios used in estimating material handling particulate emission rates is equal to 92.7/1.5/5.8. These ratios are estimates and ratios may change with mix requirements, these are not requested permit conditions. Annual emissions in tons per year (tpy) were calculated assuming an annual production throughput of 190,000 tons of asphalt per year.

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Maximum Hour Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00660 lbs/ton;

E_{PM10} (lbs/ton) = 0.00312 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Annual Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00545 lbs/ton;

E_{PM10} (lbs/ton) = 0.00258 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00039 lbs/ton

AP-42 Emission Factors:

Feed Bin Unloading = Controlled Conveyor Transfer Point Emission Factor

Transfer Conveyor = Controlled Conveyor Transfer Point Emission Factor

Material Handling Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Feed Bin Unloading	0.00014	0.00005	0.000013
Transfer Conveyor	0.00014	0.00005	0.000013
Uncontrolled Aggregate Storage Piles, Cold Aggregate Bin Loading Max Hourly	0.00660	0.00312	0.00047
Uncontrolled Aggregate Storage Piles, Cold Aggregate Bin Loading Annual	0.00545	0.00258	0.00039

AP-42 Section 11.12 Table 11.12-2 Uncontrolled Emission Factors with 99% Control Efficiency:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Mineral Filler Silo Loading	0.0073	0.0047	0.0012

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Hourly Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-18 Controlled Regulated Process Equipment Emission Rates

Unit #	Process Unit Description	Process Rate (tph)	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
P2HMAP	Cold Aggregate Storage Pile	139.1	0.92	0.48	0.43	0.23	0.066	0.034
P2HMABIN	Feed Bin Loading	139.1	0.92	0.48	0.43	0.23	0.066	0.034
P2HMATP1	Feed Bin Unloading	139.1	0.019	0.012	0.0064	0.0041	0.0018	0.0011
P2HMATP2	Feed Bin Conveyor to Transfer Conveyor	141.3	0.020	0.013	0.0065	0.0041	0.0018	0.0012
P2HMATP3	Transfer Conveyor to Sling Conveyor	141.3	0.020	0.013	0.0065	0.0041	0.0018	0.0012
P2HMAFIL	Mineral Filler Silo Loading	25 tph, 5625 tpy	0.18	0.010	0.12	0.0067	0.029	0.0016
		TOTALS	**2.08**	**1.01**	**1.00**	**0.47**	**0.17**	**0.074**

Controlled Haul Truck Travel

Haul truck travel emissions were estimated using AP-42, Section 13.2.1 (ver.01/11) "Paved Roads" emission equation and AP-42, Section 13.2.2 (ver.11/06) "Unpaved Roads" emission equation. The haul road in and out of the plant will be paved. All other haul roads throughout the plant are unpaved that will be controlled with surfactants or millings, and water. Haul road traffic emission rates controlled by surfactants or millings, and water have applied a control efficiency of 90%. Table 6-19 summarizes the emission rate for each haul truck category.

Paved Roads Plant #2 HMA

AP-42, Section 13.2.1 (ver.01/11) "Paved Roads"

E = k(sL)^0.91*(W)^1.02*[1-P/4N] *Annual emissions only include p factor*

k PM	0.011	
k PM10	0.0022	
k PM25	0.00054	
sL	0.6	Ubiquitous Baseline g/m^2 <500
P = days with precipitation over 0.01 inches	70	
N = number of days in averaging period	365	
Truck weight	28.75	tons – 17.5 tons truck, 22.5 tons load

Haul Truck VMT Paved Mineral Filler	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Asphalt Cement	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Asphalt	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Aggregate	640.5	meter/round trip vehicle	0.39805	miles/vehicle

Max. Paved Main Access Road Truck/hr	13.4	truck/hr
Max. Paved Main Access Road Truck/yr	17,016	truck/yr

	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved Main Access Road	7.59019	miles/hr	9,614	miles/yr

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor
PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor
PM = 0.20229 lbs/VMT
PM10 = 0.04046 lbs/VMT
PM2.5 = 0.00993 lbs/VMT

Unpaved Roads Plant #2 HMA

AP-42, Section 13.2.2 (ver.11/06) "Unpaved Roads"

$$E = k * (s/12)^a * (W/3)^b * [(365 - p)/365] * VMT$$

Where k = constant PM2.5 = 0.15
PM10 = 1.5
PM = 4.9

s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)

W = mean vehicle weight (28.75 tons – 17.5 tons truck, 22.5 tons load)

p = number of days with at least 0.01 in of precip. (70 days)

a = Constant PM2.5 = 0.9
PM10 = 0.9
PM = 0.7

b = Constant PM2.5 = 0.45
PM10 = 0.45
PM = 0.45

Vehicle Dust Control 90% Surfactants, Millings, Watering

Trucks per Hour

Mineral Fill Trucks = 0.1 truck per hour average
Asphalt Cement Trucks = 0.4 truck per hour average
Aggregate Trucks = 6.3 truck per hour average

Trucks per Year

Mineral Fill Trucks = 127 truck per year
Asphalt Cement Trucks = 490 truck per year
Aggregate Trucks = 7,955 truck per year

VMT =Vehicle Miles Traveled

Mineral Fill Trucks	Unpaved – 0.22206 miles per vehicle
Asphalt Cement Trucks	Unpaved – 0.22206 miles per vehicle
Aggregate Trucks	Unpaved – 0.22206 miles per vehicle

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Miles Traveled

HMA Plant #2 Unpaved – 1.5026 miles per hour; 1,903 miles per year

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor – 90% Control

PM = 0.71338 lbs/VMT
PM10 = 0.18181 lbs/VMT
PM2.5 = 0.01818 lbs/VMT

Annual Emission Rate Factor – 90% Control

PM = 0.57657 lbs/VMT
PM10 = 0.09548 lbs/VMT
PM2.5 = 0.00955 lbs/VMT

Table 6-19: Controlled Haul Road Fugitive Dust Emission Rates

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Mineral Filler Truck Emissions Paved	0.07116 miles/hr; 90 miles/yr	0.01512	0.00912	0.00302	0.00182	0.00074	0.00045
Asphalt Cement Truck Emissions Paved	0.27516 miles/hr; 349 miles/yr	0.05847	0.03525	0.01169	0.00705	0.00287	0.00173
Asphalt Truck Emissions Paved	4.74412 miles/hr; 6,009 miles/yr	1.00804	0.60781	0.20161	0.12156	0.04949	0.02984
Aggregate Truck Emissions Paved	2.49975 miles/hr; 3,166 miles/yr	0.53115	0.32027	0.10623	0.06405	0.02607	0.01572
Mineral Filler Truck Emissions Unpaved	0.02221 miles/hr; 28 miles/yr	0.01584	0.00811	0.00404	0.00207	0.00040	0.00021
Asphalt Cement Truck Emissions Unpaved	0.08586 miles/hr; 109 miles/yr	0.06125	0.03135	0.01561	0.00799	0.00156	0.00080
Aggregate Truck Emissions Unpaved	1.39451 miles/hr; 1,766 miles/yr	0.99482	0.50922	0.25354	0.12978	0.02535	0.01298
	Total	**2.68**	**1.52**	**0.60**	**0.33**	**0.11**	**0.062**

Drum Mix Hot Mix Asphalt Plant

Particulate emissions from the aggregate drum dryer/aggregate hot screens/aggregate weigh hopper/asphalt mixer (P2HMASTK) will be controlled with a baghouse dust collector (P2HMASTK) on the exhaust vent. This dust collector consists of filter bags and a fan that draws all the drum mixer exhaust through the dust collector. It is estimated that this method will control to an efficiency of 99.87 percent per AP42 Section 11.1, Table 11.1-3. Additional emission reductions include limiting annual production rates. No fugitive controls are proposed for unloading the asphalt mixer (P2BATCHUL) with the exception of limiting annual production rates. No fugitive controls are proposed for yard emissions or asphalt storage tank emissions.

Drum mix hot mix asphalt plant controlled emissions were estimated using AP-42, Section 11.1 "Hot Mix Asphalt Plants" (revised 03/04), tables 11.1-1, -2, -5, -6 and -14 emission rates for all pollutants. The drum dryer will be permitted to combust natural gas. Hourly emission rates are based on maximum hourly asphalt production (150 tph) and annual emission rates are based on maximum annual asphalt production (190,000 tpy). PM (PM, PM_{10}) emission rates were estimated using the controlled Total PM emission factor found in Table 11.1-1, Fabric Filter. $PM_{2.5}$ emission rates were estimated using the controlled filterable $PM_{2.5}$ emission factor found in Table 11.1-2, Fabric Filter and condensable PM emission factor found in Table 11.1-1, Fabric Filter. Asphalt mixer unloading emission factor was calculated using the default value of –0.5 for asphalt volatility and a tank temperature setting of 325˚ F for HMA mix temperature. Yard emissions were found in AP-42 Section 11.1.2.5. TOC emission equation is 0.0011 lbs/ton of asphalt produced and CO is equal to the TOC emission rate times 0.32.

Emissions of VOCs (TOCs) from the asphalt cement storage tank (P2HMAS) were determined with EPA's TANK 4.0.9d program and the procedures found in EPA's "Emission Factor Documentation for AP-42 Section 11.1 (12/2000) Section 4.4.5" for input to the TANK program.

AP-42 Section 11.1 Table 11.1-1, 5, 6, and 14 Controlled Emission Factors:

Process Unit	Pollutant	Emission Factor (lbs/ton)
Drum Mixer	NO_X	0.025
	CO	0.400
	SO_2	0.0046
	VOC	0.0082
	TOC	0.015
	PM	0.042
	PM_{10}	0.027
	$PM_{2.5}$	0.0254
Asphalt Mixer Loadout	CO	0.001349240
	TOC	0.004158948
	PM	0.000521937
	PM_{10}	0.000521937
	$PM_{2.5}$	0.000521937
Yard	CO	0.000352
	TOC	0.0011

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Process Rate (tons/year)} * \text{Emission Factor (lbs/ton)}}{\text{2000 lbs/ton}}$$

Table 6-20: Controlled Hot Mix Plant Emission Rates

Process Unit Number	Process Unit Description	Pollutant	Average Hourly Process Rate (tons/hour)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P2HMASTK	Aggregate Drum Dryer	NO_X	150	3.75	2.38
		CO	150	60.00	38.00
		SO_2	150	0.69	0.44
		VOC	150	1.23	0.78
		PM	150	6.30	3.99
		PM_{10}	150	4.05	2.57
		$PM_{2.5}$	150	3.81	2.41
P2BATCHUL	Asphalt Mixer Unloading	CO	150	0.20	0.13
		TOC	150	0.62	0.40
		PM	150	0.078	0.050
		PM_{10}	150	0.078	0.050
		$PM_{2.5}$	150	0.078	0.050
P2HMAS	Asphalt Cement Storage Tanks	TOC	50,000 gallons	0.023	0.099
P2YARD	YARD	TOC	150	0.17	0.10
		CO	150	0.053	0.033

Natural Gas-Fired Asphalt Heater

One natural gas asphalt heater (P2HMAHT) heats the asphalt oil before it is mixed with the aggregate in the drum dryer/mixer. The unit is rated at 8,460,000 Btu/hr. The estimated hourly natural gas combusted is 8294.1 scf/hr. Emissions of nitrogen oxides (NO_X), carbon monoxides (CO), hydrocarbons (VOC) and particulate (PM) are estimated using either AP-42 Section 1.4 "Natural Gas Combustion" (7/98). Sulfur content of natural gas will not exceed 0.2 gr/100 scf. No controls are proposed for the fuel asphalt heater. Uncontrolled annual emissions in tons per year (tpy) were calculated assuming operation of 8760 hours per year. Controlled annual emissions in tons per year (tpy) were calculated assuming operation of 7680 hours per year.

AP-42 Emission Factors: Section 1.4

Natural Gas/ Propane Emission Factors

Pollutant	Emission Factor
Nitrogen Oxides	100 lbs/MMscf
Carbon Monoxides	84 lbs/MMscf
Particulate	7.6 lbs/MMscf
Hydrocarbons	5.5 lbs/MMscf
Sulfur Dioxides	0.2 gr/100 scf
Carbon Dioxide	120000 lbs/MMscf

The following equation was used to calculate the hourly emission rate for asphalt heater pollutant (NO_X, CO, VOC, PM):

Emission Rate (lbs/hr) = EF (lbs/MMscf) * fuel usage (MMscf/hr)

The following equation was used to calculate the hourly emission rate for asphalt heater pollutant (SO_2):

Emission Rate (lbs/hr) = Sulfer Content (gr/100 scf) * fuel usage (100 scf/hr) / 7000 gr/lb *2 S/SO_2

The following equation was used to calculate the annual emission rate for asphalt heater pollutant (NO_X, CO, VOC, PM):

$$\text{Emission Rate (tons/year)} = \frac{\text{Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-21: Pre-Controlled Combustion Emission Rates for Asphalt Heater

Process Unit Number	**Pollutant**	**Fuel Usage (scf/hr)**	Emission Rate **(lbs/hr)**	Emission Rate **(tons/yr)**
P2HMAHT	NO_X	8294.1	0.83	3.63
	CO	8294.1	0.70	3.05
	VOC	8294.1	0.046	0.20
	SO_2	8294.1	0.0047	0.021
	PM	8294.1	0.063	0.28
	CO_2	8294.1	995.3	4359.4

Table 6-22: Controlled Combustion Emission Rates for Asphalt Heater

Process Unit Number	**Pollutant**	**Fuel Usage (scf/hr)**	Emission Rate **(lbs/hr)**	Emission Rate **(tons/yr)**
P2HMAHT	NO_X	8294.1	0.83	3.19
	CO	8294.1	0.70	2.68
	VOC	8294.1	0.046	0.18
	SO_2	8294.1	0.0047	0.018
	PM	8294.1	0.063	0.24
	CO_2	8294.1	995.3	3821.9

Table 6-23 Summary of Uncontrolled NOx, CO, SO_2, and PM Emission Rates

Uncontrolled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
P2HMAP	Cold Aggregate Storage Pile	-	-	-	-	-	-	-	-	0.92	3.32	0.43	1.57	0.066	0.24
P2HMA BIN	Feed Bin Loading	-	-	-	-	-	-	-	-	0.92	3.32	0.43	1.57	0.066	0.24
P2HMA TP1	Feed Bin Unloading	-	-	-	-	-	-	-	-	0.42	1.83	0.15	0.67	0.024	0.10
P2HMA TP2	Feed Bin Conveyor to Transfer Conveyor	-	-	-	-	-	-	-	-	0.42	1.86	0.16	0.68	0.024	0.11
P2HMA TP3	Transfer Conveyor to Sling Conveyor	-	-	-	-	-	-	-	-	0.42	1.86	0.16	0.68	0.024	0.11
P2HMAF IL	Mineral Filler Silo Loading	-	-	-	-	-	-	-	-	18.25	7.19	11.75	4.63	0.93	0.36
P2HMAS TK	Drum Dryer	3.75	16.43	60.0	262.8	0.69	3.02	1.23	5.39	4800	21024	675	2957	43.1	189
P2BATC HUL	Asphalt Batcher Unloading	-	-	0.20	0.89	-	-	0.62	2.73	0.078	0.34	0.078	0.34	0.078	0.34
P2HMA HT	Asphalt Heater	0.83	3.63	0.70	3.05	0.0047	0.021	0.046	0.20	0.063	0.28	0.063	0.28	0.063	0.28
P2HMAS	Asphalt Cement Storage Tank	-	-	-	-	-	-	0.023	0.10	-	-	-	-	-	-
P2TRCK	Haul Road Traffic	-	-	-	-	-	-	-	-	12.33	44.7	3.05	11.02	0.35	1.30
P2YARD	Yard	-	-	0.053	0.23	-	-	0.17	0.72	-	-	-	-	-	-
	Total	**4.58**	**20.06**	**60.95**	**267.0**	**0.69**	**3.04**	**2.09**	**9.14**	**4834**	**21089**	**691**	**2978**	**44.7**	**191.7**

Table 6-24 Summary of Allowable NOx, CO, SO_2, and PM Emission Rates

Controlled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
P2HMAP	Cold Aggregate Storage Pile	-	-	-	-	-	-	-	-	0.92	0.48	0.43	0.23	0.066	0.034
P2HMA BIN	Feed Bin Loading	-	-	-	-	-	-	-	-	0.92	0.48	0.43	0.23	0.066	0.034
P2HMA TP1	Feed Bin Unloading	-	-	-	-	-	-	-	-	0.019	0.012	0.0064	0.0041	0.0018	0.0011
P2HMA TP2	Feed Bin Conveyor to Transfer Conveyor	-	-	-	-	-	-	-	-	0.020	0.013	0.0065	0.0041	0.0018	0.0012
P2HMA TP3	Transfer Conveyor to Sling Conveyor	-	-	-	-	-	-	-	-	0.020	0.013	0.0065	0.0041	0.0018	0.0012
P2HMAF IL	Mineral Filler Silo Loading	-	-	-	-	-	-	-	-	0.18	0.010	0.12	0.0067	0.0090	0.00062
P2HMAS TK	Drum Dryer	3.75	2.38	60.00	38.00	0.69	0.44	1.23	0.78	4.95	3.99	3.45	4.31	3.45	4.31
P2BATC HUL	Asphalt Batcher Unloading	-	-	0.20	0.13	-	-	0.62	0.40	0.078	0.050	0.078	0.10	0.078	0.10
P2HMA HT	Asphalt Heater	0.83	3.18	0.70	2.68	0.0047	0.018	0.046	0.18	0.063	0.24	0.063	0.24	0.063	0.24
P2HMAS	Asphalt Cement Storage Tank	-	-	-	-	-	-	0.023	0.10	-	-	-	-	-	-
P2TRCK	Haul Road Traffic	-	-	-	-	-	-	-	-	2.68	1.52	0.60	0.33	0.11	0.062
P2YARD	Yard	-	-	0.053	0.033	-	-	0.17	0.10	-	-	-	-	-	-
	Total	**4.58**	**5.56**	**60.95**	**40.84**	**0.69**	**0.46**	**2.09**	**1.55**	**11.20**	**6.81**	**5.79**	**3.66**	**4.21**	**2.84**

Estimates for State Toxic Air Pollutants (Asphalt Fumes)

The Hot Mix Asphalt Plant #2 (HMA) drum dryer/mixer, asphalt silo loading, asphalt silo unloading, yard emissions, and heated asphalt cement storage tank are sources of asphalt fumes listed in the NMED's 20.2.72 NMAC, 502 "Toxic Air Pollutants and Emissions", Table A. Emissions of asphalt fumes from the drum dryer/mixer are based on PM organic condensable emission factors found in AP-42 Section 11.1, Table 11.1-1 (0.017 pounds per ton x 150 tons/hr) from the drum dryer/mixer baghouse stack or 2.55 pounds per hour.

Emissions of asphalt fumes from the asphalt mixer unloading (P2BATCHUL), yard (asphalt transported in asphalt trucks-P2YARD), and hot oil asphalt storage tanks (P2HMAS) were based on the assumption that the emissions of concern from the asphalt mixer unloading, hot oil asphalt storage tanks, and yard asphalt fumes sources are the PAH HAPs plus other semi-volatile HAPs from the particulate (PM) organics and the volatile organic HAPs from the Total Organic Compounds (TOC). These two combined make up asphalt fume emissions from the asphalt mixer unloading, hot oil asphalt storage tanks, and yard sources. Using information found in AP-42 Section 11.1, Tables 11.1-14, 15, and 16 were reviewed and the following emission equations or emission factors were used to estimate asphalt fumes emissions from asphalt mixer unloading, hot oil asphalt storage tanks, and yard.

Asphalt Mixer Unloading
Asphalt Fumes EF = $0.00078(-V)e^{((0.0251)(T+460)-20.43)}$

Asphalt Storage Tanks
Asphalt Fumes EF = VOC emissions from TANKs * 1.3%

Yard
Asphalt Fumes EF = 0.0000165 lbs/ton of asphalt loaded

Silo filling and silo unloading emission factors were calculated using the default value of –0.5 for asphalt volatility and a tank temperature setting of 325˚ F for HMA mix temperature. Inputting these values in to the equations gives you a pound per ton value of 0.000087 lbs/ton or asphalt fumes emission rates of 0.013 pounds per hour and 0.0083 tons/yr (150 tph of asphalt production).

Emissions of asphalt fumes from the Yard were based on 1.5 percent of the TOC emission. Yard emission factors are found in AP-42 Section 11.1.2.5. TOC emission factor is 0.0011 lbs/ton of asphalt produced. Asphalt fumes emissions are 0.0000165 lbs/ton of asphalt produced or 0.0025 pounds per hour and 0.0016 tons/yr (150 tph of asphalt production).

Emissions of asphalt fumes from the asphalt cement storage (2) tanks (P2HMAS) were determined with EPA's TANK 4.0.9d program and the procedures found in EPA's "Emission Factor Documentation for AP-42 Section 11.1 (12/2000) Section 4.4.5" for input to the TANK program. The annual VOC emissions for working and breathing losses from two 25,000 gallon tank were estimated at 198.48 pounds per year or 0.023 pounds per hour. Based on 1.3 percent of the VOC emissions (0.023 pounds per hour total from both tanks), the asphalt fumes emission rate is 0.00029 pounds per hour and 0.0013 tons/yr (150 tph of asphalt production).

Total asphalt fumes from the Plant #2 HMA plant is 2.57 pounds per hour and 1.63 tons per year.

Estimates for State Toxic Air Pollutants (Calcium Hydroxide)

A potential mineral filler that will be used is lime (calcium hydroxide). Calcium hydroxide is listed in the NMED's 20.2.72 NMAC, 502 "Toxic Air Pollutants and Emissions", Table A. Controlled emissions of lime from the mineral filler silo during loading is 0.18 pounds per hour.

Estimates for Federal HAPs Air Pollutants

The Hot Mix Asphalt Plant (HMA) drum dryer (P2HMASTK) and asphalt heater (P2HMAHT) are sources of HAPs as it appears in Section 112 (b) of the 1990 CAAA. Emissions of HAPs were determined for the drum mixer using AP-42 Section 11.1 Tables 11.1-10, 11.1-12. Emissions of HAPs were determined for the asphalt heaters using AP-42 Section 1.4.

The following tables summarize the HAPs emission rates from the drum mixer and asphalt heater. Total combined HAPs emissions from AAI HMA Plant #2 is 1.15 pounds per hour and 0.73 tons per year.

Table 6-25: HAPs Emission Rates from the Drum Dryer/Mixer (P2HMASTK)

EPA HAPS Emissions Drum Mixer Hot Mix Asphalt Plant with Fabric Filter

Average Hourly Production Rate:	150	tons per hour
Yearly Production Rate:	375000	tons per year

Type of Fuel:	Natural Gas
Emission Factors	AP-42 Section 11.1 Tables 11.1-9, 11.1-11

Non-PAH HAPS	CAS#		Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Acetaldehyde	75-07-0		3.2E-04	0.048000	0.030400
Benzene	71-43-2		2.8E-04	0.042000	0.026600
Ethylbenzene	100-41-4		2.2E-03	0.330000	0.209000
Formaldehyde	50-00-0		7.4E-04	0.111000	0.070300
Quinone	106-51-4		2.7E-04	0.040500	0.025650
Toluene	108-88-3		1.0E-03	0.150000	0.095000
Xylene	1330-20-7		2.7E-03	0.405000	0.256500
		Total Non-PAH HAPS	7.5E-03	1.126500	0.713450

PAH HAPS	CAS#		Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
2-Methylnaphthalene	91-57-6		7.1E-05	0.010650	0.006745
Acenaphthene	83-32-9		9.0E-07	0.000135	0.000086
Acenaphthylene	208-96-8		5.8E-07	0.000087	0.000055
Anthracene	120-12-7		2.1E-07	0.000032	0.000020
Benzo(a)anthracene	56-55-3		4.6E-09	0.000001	0.000000
Benzo(a)pyrene	50-32-8		3.1E-10	0.000000	0.000000
Benzo(b)fluoranthene	205-99-2		9.4E-09	0.000001	0.000001
Benzo(g,h,i)perylene	191-24-2		5.0E-10	0.000000	0.000000
Benzo(k)fluoranthene	207-08-9		1.3E-08	0.000002	0.000001
Chrysene	218-01-9		3.8E-09	0.000001	0.000000
Dibenz(a,h)anthracene	53-70-3		9.5E-11	0.000000	0.000000
Fluoranthene	206-44-0		1.6E-07	0.000024	0.000015
Fluorene	86-73-7		1.6E-06	0.000240	0.000152
Indeno(1,2,3-cd)pyrene	193-39-5		3.0E-10	0.000000	0.000000
Naphthalene	91-20-3		3.6E-05	0.005400	0.003420
Phenanthrene	85-01-8		2.6E-06	0.000390	0.000247
Pyrene	129-00-0		6.2E-08	0.000009	0.000006
		Total PAH HAPS	1.1E-04	0.016972	0.010749

HAPS Metals		Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Arsenic		4.6E-07	0.000069	0.000044
Beryllium		1.5E-07	0.000023	0.000014
Cadmium		6.1E-07	0.000092	0.000058
Chromium		5.7E-07	0.000086	0.000054
Hexavalent Chromium		4.8E-08	0.000007	0.000005
Lead		8.9E-07	0.000134	0.000085
Manganese		6.9E-06	0.001035	0.000656
Mercury		4.1E-07	0.000062	0.000039
Nickel		3.0E-06	0.000450	0.000285
Selenium		4.9E-07	0.000074	0.000047
	Total Metals HAPS	1.4E-05	0.002029	0.001285
	Total HAPS		**1.15**	**0.73**

Table 6-26: HAPs Emission Rates from the Asphalt Heater (P2HMAHT)

Btu Rating	8.46	mmBtu/hr	
Fuel Usage:	8294.1	scf/hr	(based on 1020 Btu/scf)
Btu x 10^-12/hr:	0.008294118	Btu x10^-12	
Yearly Operating Hours:	7680	hours per year	

Type of Fuel:	Natural Gas
Emission Factors	AP-42 Section 1.4

Organic Compounds	**CAS#**		**Emission Factor (lbs/MM scf)**	**Emission Rate (lbs/hr)**	**Emission Rate (ton/yr)**
Benzene	71-43-2		2.10E-03	0.000017	0.000067
Formaldehyde	50-00-0		7.50E-02	0.000622	0.002389
Hexane	110-54-3		1.80E+00	0.014929	0.057329
Naphthalene	91-20-3		6.10E-04	0.000005	0.000019
Toluene	108-88-3		3.40E-03	0.000028	0.000108
		Total Organic Compounds	1.88+00	0.015602	0.059912

HAPS Metals		**Emission Factor (lbs/MM scf)**	**Emission Rate (lbs/hr)**	**Emission Rate (ton/yr)**
Arsenic		2.00E-04	0.000002	0.000006
Beryllium		1.20E-05	0.000000	0.000000
Cadmium		1.10E-03	0.000009	0.000035
Chromium		1.40E-03	0.000012	0.000045
Lead		8.40E-05	0.000001	0.000003
Manganese		5.00E-04	0.000004	0.000016
Mercury		3.80E-04	0.000003	0.000012
Nickel		2.60E-04	0.000002	0.000008
Selenium		2.10E-03	0.000017	0.000067
	Total Metals HAPS	6.06E-03	0.000050	0.000193
	Total HAPS		**0.016**	**0.060**

Hot Mix Asphalt Plant #5

Pre-Control Particulate Emission Rates

Material Handling ($PM_{2.5}$, PM_{10}, and PM)

To estimate material handling pre-control particulate emissions rates for screening, pugmill, and conveyor transfer operations, emission factors were obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Aug. 2004, Section 11.19.2, Table 11.19.2-2. To determine missing $PM_{2.5}$ emission factors the ratio of 0.35/0.053 from $PM_{10}/PM_{2.5}$ *k* factors found in AP-42 Section 13.2.4 (11/2006) were used.

To estimate material handling pre-control particulate emission rates for aggregate handling operations (aggregate piles/ loading cold feed bins), an emission equation was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 13.2.4 (11/2004), where the k (PM = 0.74, PM_{10} = 0.35, $PM_{2.5}$ = 0.053), wind speed for determining the maximum hourly emission rate is the NMED default of 11 MPH and for determining annual emission rate is based on the average wind speed for Santa Fe for the years of 1996 through 2006 of 9.5 mph, and the NMED default moisture content of 2 percent.

The asphalt will contain 1.5% mineral filler. Pre-control particulate emissions rates for mineral filler silo loading was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 11.12 (06/06), Table 11.12-2 "Cement Unloading to Elevated Storage Silo". To determine missing $PM_{2.5}$ emission factors the ratio of 5.90/0.38 from $PM/PM_{2.5}$ uncontrolled k factors found in AP-42 Section 11.12 (06/06), Table 11.12-4 "Central Mix Operation" was used.

Maximum hourly asphalt production is 300 tons per hours. Virgin aggregate/Mineral filler/Asphalt cement ratios used in estimating material handling particulate emission rates is equal to 92.7/1.5/5.8. These ratios are estimates and ratios may change with mix requirements, these are not requested permit conditions.

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Maximum Hour Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00660 lbs/ton;

E_{PM10} (lbs/ton) = 0.00312 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Annual Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00545 lbs/ton;

E_{PM10} (lbs/ton) = 0.00258 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00039 lbs/ton

AP-42 Emission Factors:

All Bin Unloading and Conveyor Transfers = Uncontrolled Conveyor Transfer Point Emission Factor
Screening = Uncontrolled Screening Emission Factor
Pugmill Loading and Unloading = Uncontrolled Conveyor Transfer Point Emission Factor

Material Handling Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Uncontrolled Screening	0.02500	0.00870	0.00132
Uncontrolled Screen Unloading, Pug Mill Loading and Unloading, Feed Bin Unloading, and Conveyor Transfers	0.00300	0.00110	0.00017
Uncontrolled Aggregate Storage Piles, Cold Aggregate Feeder Loading Max Hourly	0.00660	0.00312	0.00047
Uncontrolled Aggregate Storage Piles, Cold Aggregate Feeder Loading Annual	0.00545	0.00258	0.00039

AP-42 Section 11.12 Table 11.12-2 Uncontrolled Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Mineral Filler Silo Loading	0.73	0.47	0.047

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-27 Pre-Controlled Regulated Process Equipment Emission Rates

Unit #	Process Unit Description	Process Rate (tph)	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
P5HMAP	Cold Aggregate Storage Pile	278.1	1.84	6.64	0.87	3.14	0.13	0.48
P5HMABIN	Feed Bin Loading	278.1	1.84	6.64	0.87	3.14	0.13	0.48
P5HMATP1	Feed Bin Unloading	278.1	0.83	3.65	0.31	1.3	0.047	0.21
P5HMASCR	Scalping Screen	278.1	6.95	30.5	2.42	10.6	0.37	1.61
P5HMATP2	Scalping Screen Unloading	278.1	0.83	3.65	0.31	1.34	0.047	0.21
P5HMAPUG	Pug Mill Load	282.6	0.85	3.71	0.31	1.36	0.048	0.21
P5HMATP3	Pug Mill Unload	282.6	0.85	3.71	0.31	1.36	0.048	0.21
P5HMATP4	Conveyor Transfer to Slinger Conveyor	282.6	0.85	3.71	0.31	1.36	0.048	0.21
P5HMAFIL	Mineral Filler Silo Baghouse	25 tph, 39,420 tpy	18.3	14.39	11.75	9.26	1.18	0.93
		TOTALS	**33.09**	**76.58**	**17.45**	**32.91**	**2.04**	**4.53**

HMA Plant #5 Haul Truck Travel

Haul truck travel emissions were estimated using AP-42, Section 13.2.1 (ver.01/11) "Paved Roads" emission equation and AP-42, Section 13.2.2 (ver.11/06) "Unpaved Roads" emission equation. The haul road to the plant will be paved. For the aggregate loop road, the road will be unpaved. See Figure 5-1 for identification of haul roads. Table 6-28 summarizes the emission rate for each haul truck category.

Paved Roads Plant #5 HMA

AP-42, Section 13.2.1 (ver.01/11) "Paved Roads"

E = k(sL)^0.91*(W)^1.02*[1-P/4N] *Annual emissions only include p factor*

k PM	0.011	
k PM10	0.0022	
k PM25	0.00054	
sL	0.6	Ubiquitous Baseline g/m^2 <500
P = days with precipitation over 0.01 inches	70	
N = number of days in averaging period	365	
Truck weight	28.75	tons – 17.5 tons truck, 22.5 tons load

Haul Truck VMT Paved Mineral Filler	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Asphalt Cement	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Asphalt	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Aggregate	640.5	meter/round trip vehicle	0.39805	miles/vehicle

Max. Paved Main Access Road Truck/hr	26.9	truck/hr
Max. Paved Main Access Road Truck/yr	235,352	truck/yr

	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved Main Access Road	15.18038	miles/hr	132,980	miles/yr

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor
PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor
PM = 0.20229 lbs/VMT
PM10 = 0.04046 lbs/VMT
PM2.5 = 0.00993 lbs/VMT

Unpaved Roads Plant #5 HMA

AP-42, Section 13.2.2 (ver.11/06) "Unpaved Roads"

$$E = k * (s/12)^a * (W/3)^b * [(365 - p)/365] * VMT$$

Where k = constant PM2.5 = 0.15
PM10 = 1.5
PM = 4.9

s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)

W = mean vehicle weight (28.75 tons – 17.5 tons truck, 22.5 tons load)

p = number of days with at least 0.01 in of precip. (70 days)

a = Constant PM2.5 = 0.9
PM10 = 0.9
PM = 0.7

b = Constant PM2.5 = 0.45
PM10 = 0.45
PM = 0.45

Vehicle Dust Control 0%

Trucks per Hour

Mineral Fill Trucks = 0.2 truck per hour average
Asphalt Cement Trucks = 0.8 truck per hour average
Aggregate Trucks = 12.6 truck per hour average

Trucks per Year

Mineral Fill Trucks = 1752 truck per year
Asphalt Cement Trucks = 6774 truck per year
Aggregate Trucks = 110,026 truck per year

VMT =Vehicle Miles Traveled

Mineral Fill Trucks	Unpaved – 0.22206 miles per vehicle
Asphalt Cement Trucks	Unpaved – 0.22206 miles per vehicle
Aggregate Trucks	Unpaved – 0.22206 miles per vehicle

–

Miles Traveled

HMA Plant #5 Unpaved – 3.0052 miles per hour; 26,325 miles per year

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor – 0% Control

PM = 7.13379 lbs/VMT
PM10 = 1.81814 lbs/VMT
PM2.5 = 0.18181 lbs/VMT

Annual Emission Rate Factor – 0% Control

PM = 5.76567 lbs/VMT
PM10 = 0.95483 lbs/VMT
PM2.5 = 0.09548 lbs/VMT

Table 6-28: Pre-Controlled Haul Road Fugitive Dust Emission Rates

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Mineral Filler Truck Emissions Paved	0.14232 miles/hr; 1247 miles/yr	0.03024	0.12611	0.00605	0.02522	0.00148	0.00619
Asphalt Cement Truck Emissions Paved	0.55032 miles/hr; 4821 miles/yr	0.11693	0.48761	0.02339	0.09752	0.00574	0.02394
Asphalt Truck Emissions Paved	9.48824 miles/hr; 83117 miles/yr	2.01607	8.40703	0.40321	1.68141	0.09897	0.41271
Aggregate Truck Emissions Paved	4.99950 miles/hr; 43796 miles/yr	1.06230	4.42980	0.21246	0.88596	0.05215	0.21746
Mineral Filler Truck Emissions Paved	0.04441 miles/hr; 389 miles/yr	0.31682	1.12155	0.08075	0.28584	0.00807	0.02858
Asphalt Cement Truck Emissions Unpaved	0.17172 miles/hr; 1504 miles/yr	1.22504	4.33665	0.31222	1.10525	0.03122	0.11053
Aggregate Truck Emissions Unpaved	2.78903 miles/hr; 24432 miles/yr	19.89636	70.43312	5.07085	17.95081	0.50709	1.79508
	Total	**24.7**	**89.3**	**6.11**	**22.0**	**0.70**	**2.59**

Drum Mix Hot Mix Asphalt Plant

Drum mix hot mix asphalt plant uncontrolled emissions were estimated using AP-42, Section 11.1 "Hot Mix Asphalt Plants" (revised 03/04), tables 11.1.3, 7, 8 and 14 emission equations. The drum dryer will be permitted to combust natural gas. Hourly emission rates are based on maximum hourly asphalt production (300 tph) and maximum annual emission rates are based on operating 8760 hours per year. To determine missing $PM_{2.5}$ emission factor the sum of uncontrolled filterable from Table 11.1-4 plus uncontrolled organic and inorganic condensable in Table 11.1-3 was used. Silo filling and plant loadout emission factors were calculated using the default value of –0.5 for asphalt volatility and a tank temperature setting of 325˚ F for HMA mix temperature. Yard emissions were found in AP-42 Section 11.1.2.5. TOC emission equation is 0.0011 lbs/ton of asphalt produced and CO is equal to the TOC emission rate times 0.32.

Emissions of VOCs (TOCs) from the asphalt cement storage tanks were determined with EPA's TANK 4.0.9d program and the procedures found in EPA's "Emission Factor Documentation for AP-42 Section 11.1 (12/2000) Section 4.4.5" for input to the TANK program.

AP-42 Section 11.1 Table 11.1-3, -4, -7, -8, and -14 Uncontrolled Emission Factors:

Process Unit	Pollutant	Emission Factor (lbs/ton)
Drum Mixer	NO_X	0.026
	CO	0.13
	SO_2	0.0034
	VOC	0.032
	TOC	0.044
	PM	28.0
	PM_{10}	6.5
	$PM_{2.5}$	1.565
Drum Unloading	CO	0.001179981
	TOC	0.012186685
	PM	0.000585889
	PM_{10}	0.000585889
	$PM_{2.5}$	0.000585889
Silo Loadout	CO	0.001349240
	TOC	0.004158948
	PM	0.000521937
	PM_{10}	0.000521937
	$PM_{2.5}$	0.000521937
Yard	CO	0.000352
	TOC	0.0011

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-29: Pre-Controlled Hot Mix Plant Emission Rates

Process Unit Number	Process Unit Description	Pollutant	Average Hourly Process Rate (tons/hour)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P5HMASTK	Asphalt Drum Dryer/Mixer	NO_X	300	7.80	34.2
		CO	300	39.0	170.8
		SO_2	300	1.02	4.47
		VOC	300	9.60	42.1
		PM	300	8400	36792
		PM_{10}	300	1950	8541
		$PM_{2.5}$	300	469.5	2056.4
P5DRUMUL	Drum Mixer Unloading	CO	300	0.35	1.55
		TOC	300	3.66	16.01
		PM	300	0.18	0.77
		PM_{10}	300	0.18	0.77
		$PM_{2.5}$	300	0.18	0.77
P5SILOUL	Asphalt Silo Unloading	CO	300	0.40	1.77
		TOC	300	1.25	5.46
		PM	300	0.16	0.69
		PM_{10}	300	0.16	0.69
		$PM_{2.5}$	300	0.16	0.69
P5HMAS	Asphalt Cement Storage Tanks	TOC	50,000 gallons	0.030	0.13
P5YARD	YARD	TOC	300	0.33	1.45
		CO	300	0.11	0.46

Controlled Particulate Emission Rates

No controls or emission reductions for combustion emissions (NO_X, CO, SO_2, VOC, or TOC) are proposed for the drum dryer (P5HMASTK), unloading the drum mixer (P5DRUMUL), asphalt silo (P5SILOUL), and asphalt heater (P5HMAHT) with the exception of limiting annual production rates for production equipment.

Controlled Material Handling ($PM_{2.5}$, PM_{10}, and PM)

No fugitive dust controls or emission reductions are proposed for the aggregate storage piles (P5HMAP) or loading of the cold aggregate feed bins (P5HMABIN) with the exception of limiting annual production rates.

Fugitive dust control for unloading the cold aggregate feed bins onto the cold aggregate feed bin conveyor (P5HMATP1) will be controlled, as needed, with enclosures and/or water sprays at the exit of the feed bins. It is estimated that these methods will control to an efficiency of 95.3 percent per AP42 Section 11.19.2, Table 11.19.2-2. Additional emission reductions include limiting annual production rates.

Fugitive dust control for the scalping screen (P5HMASCR) will be controlled, as needed, with enclosures and/or water sprays. It is estimated that these methods will control to an efficiency of 91.2 percent for screening operations per AP42 Section 11.19.2, Table 11.19.2-2. Additional emission reductions include limiting annual production rates.

Fugitive dust control for unloading the scalping screen (P5HMATP2), loading and unloading the pug mill (P5HMAPUG, P5HMATP3), and transfer from the scale conveyor to the sling conveyor (P5HMATP4) will be controlled, as needed, with enclosures and/or water sprays. It is estimated that these methods will control to an efficiency of 95.3 percent per AP42 Section 11.19.2, Table 11.19.2-2. Additional emission reductions include limiting annual production rates.

Particulate emissions from loading the mineral filler silo (P5HMAFIL) will be controlled with a baghouse dust collector on the exhaust vent. This dust collector consists of filter bags and is passive with no fan. It functions only when material is loaded into the silo. The filter bags are cleaned by air pulses at set intervals. Baghouse fines are dumped back into the silo. It is estimated that this method will control to an efficiency of 99 percent or greater based on information from filter bag specifications. Additional emission reductions include limiting annual production rates.

Particulate emissions from the drum dryer/mixer (P5HMASTK) will be controlled with a baghouse dust collector (P5HMASTK) on the exhaust vent. It is estimated that this method will control to an efficiency of 99.88 percent per AP42 Section 11.1, Table 11.1-3 "controlled emission factor vs. uncontrolled emission factor". Baghouse fines are sent to a dust box. Additional emission reductions include limiting annual production rates.

No fugitive controls or emission reductions are proposed for unloading the drum dryer/mixer or asphalt silo (P5DRUMUL, P5SILOUL) with the exception of limiting annual production rates. No fugitive controls are proposed for yard emissions (P5YARD) or asphalt storage tanks (P5HMAS).

To estimate material handling control particulate emissions rates for pug mill and conveyor transfer operations, emission factors were obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Aug. 2004, Section 11.19.2, Table 11.19.2-2.

To estimate material handling pre-control particulate emission rates for aggregate handling operations (aggregate storage piles and cold aggregate loading feed bins), an emission equation was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 13.2.4 (11/2004), where the k (PM = 0.74, PM_{10} = 0.35, $PM_{2.5}$ = 0.053), wind speed for determining the maximum hourly emission rate is the NMED default of 11 MPH and for determining annual emission rate is based on the average wind speed for Santa Fe for the years of 1996 through 2006 of 9.5 mph, and the NMED default moisture content of 2 percent.

The asphalt will contain approximately 1.5% mineral filler. Control particulate emissions rates for mineral filler silo loading was obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 11.12 (06/06), Table 11.12-2 uncontrolled "Cement Unloading to Elevated Storage Silo" and a control efficiency of 99% for the baghouse. To determine missing $PM_{2.5}$ emission factors the ratio of 0.19/0.03 from $PM/PM_{2.5}$ controlled k factors found in AP-42 Section 11.12 (06/06), Table 11.12-4 "Central Mix Operation" was used.

Maximum hourly asphalt production is 300 tons per hours. Virgin aggregate/Mineral filler/Asphalt cement ratios used in estimating material handling particulate emission rates is equal to 92.7/1.5/5.8. These ratios are estimates and ratios may change with mix requirements, these are not requested permit conditions. Annual emissions in tons per year (tpy) were calculated assuming an annual production throughput of 750,000 tons of asphalt per year.

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Maximum Hour Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00660 lbs/ton;

E_{PM10} (lbs/ton) = 0.00312 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00047 lbs/ton

Aggregate Storage Piles and Feed Bin Loading Emission Equation:

Annual Emission Factor

E (lbs/ton) = k x 0.0032 x $(U/5)^{1.3}$ / $(M/2)^{1.4}$

E_{PM} (lbs/ton) = 0.74 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(9.5/5)^{1.3}$ / $(2/2)^{1.4}$

E_{PM} (lbs/ton) = 0.00545 lbs/ton;

E_{PM10} (lbs/ton) = 0.00258 lbs/ton

$E_{PM2.5}$ (lbs/ton) = 0.00039 lbs/ton

AP-42 Emission Factors:

Feed Bin Unloading = Controlled Conveyor Transfer Point Emission Factor
Crusher = Controlled Tertiary Crusher Emission Factor
Screen = Controlled Screening Emission Factor
Transfer Conveyor = Controlled Conveyor Transfer Point Emission Factor
Scalping Screen Conveyor = Controlled Conveyor Transfer Point Emission Factor
Pug Mill = Controlled Conveyor Transfer Point Emission Factor
Pug Mill Conveyor = Controlled Conveyor Transfer Point Emission Factor

Material Handling Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Feed Bin Unloading	0.00014	0.00005	0.000013
Controlled Screening	0.00220	0.00074	0.00005
Transfer Conveyor	0.00014	0.00005	0.000013
Controlled Pug Mill Loading and Unloading	0.00014	0.00005	0.000013
Uncontrolled Aggregate Storage Piles, Cold Aggregate Bin Loading Max Hourly	0.00660	0.00312	0.00047
Uncontrolled Aggregate Storage Piles, Cold Aggregate Bin Loading Annual	0.00465	0.00220	0.00033

AP-42 Section 11.12 Table 11.12-2 Uncontrolled Emission Factors with 99% Control Efficiency:

Process Unit	PM Emission Factor (lbs/ton)	PM_{10} Emission Factor (lbs/ton)	$PM_{2.5}$ Emission Factor (lbs/ton)
Mineral Filler Silo Loading	0.0073	0.0047	0.0012

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Hourly Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-30 Controlled Regulated Process Equipment Emission Rates

Unit #	Process Unit Description	Process Rate (tph)	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
P5HMAP	Cold Aggregate Storage Pile	278.1	1.84	1.90	0.87	0.90	0.13	0.14
P5HMABIN	Feed Bin Loading	278.1	1.84	1.90	0.87	0.90	0.13	0.14
P5HMATP1	Feed Bin Unloading	278.1	0.039	0.049	0.013	0.016	0.0036	0.0045
P5HMASCR	Scalping Screen	278.1	0.61	0.76	0.21	0.26	0.014	0.017
P5HMATP2	Scalping Screen Unloading	278.1	0.039	0.049	0.013	0.016	0.0036	0.0045
P5HMAPUG	Pug Mill Load	282.6	0.040	0.049	0.013	0.016	0.0037	0.0046
P5HMATP3	Pug Mill Unload	282.6	0.040	0.049	0.013	0.016	0.0037	0.0046
P5HMATP4	Conveyor Transfer to Slinger Conveyor	282.6	0.040	0.049	0.013	0.016	0.0037	0.0046
P5HMAFIL	Mineral Filler Silo Baghouse	25 tph, 39,420 tpy	0.18	0.041	0.12	0.026	0.029	0.0065
	TOTALS		**4.66**	**4.84**	**2.12**	**2.16**	**0.32**	**0.32**

Controlled Haul Truck Travel

Haul truck travel emissions were estimated using AP-42, Section 13.2.1 (ver.01/11) "Paved Roads" emission equation and AP-42, Section 13.2.2 (ver.11/06) "Unpaved Roads" emission equation. The haul in and out of the plant will be paved. All other haul roads throughout the plant are unpaved that will be controlled with surfactants or millings, and water. Haul road traffic emission rates controlled by surfactants or millings, and water have applied a control efficiency of 90%. Table 6-31 summarizes the emission rate for each haul truck category.

Paved Roads Plant #5 HMA

AP-42, Section 13.2.1 (ver.01/11) "Paved Roads"

E = k(sL)^0.91*(W)^1.02*[1-P/4N] *Annual emissions only include p factor*

k PM	0.011	
k PM10	0.0022	
k PM25	0.00054	
sL	0.6	Ubiquitous Baseline g/m^2 <500
P = days with precipitation over 0.01 inches	70	
N = number of days in averaging period	365	
Truck weight	28.75	tons – 17.5 tons truck, 22.5 tons load

Haul Truck VMT Paved Mineral Filler	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Asphalt Cement	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Asphalt	1145.0	meter/round trip vehicle	0.71162	miles/vehicle
Haul Truck VMT Paved Aggregate	640.5	meter/round trip vehicle	0.39805	miles/vehicle

Max. Paved Main Access Road Truck/hr	26.9	truck/hr
Max. Paved Main Access Road Truck/yr	67,167	truck/yr

	Hourly Max VMT		Annual VMT	
Haul Truck VMT Paved Main Access Road	15.18038	miles/hr	37,951	miles/yr

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor
PM = 0.21248 lbs/VMT
PM10 = 0.04250 lbs/VMT
PM2.5 = 0.01043 lbs/VMT

Annual Emission Rate Factor
PM = 0.20229 lbs/VMT
PM10 = 0.04046 lbs/VMT
PM2.5 = 0.00993 lbs/VMT

Unpaved Roads Plant #5 HMA

AP-42, Section 13.2.2 (ver.11/06) "Unpaved Roads"

$$E = k * (s/12)^a * (W/3)^b * [(365 - p)/365] * VMT$$

Where k = constant PM2.5 = 0.15
PM10 = 1.5
PM = 4.9

s = % silt content (Table 13.2.2-1, "Sand and Gravel" 4.8%)

W = mean vehicle weight (28.75 tons – 17.5 tons truck, 22.5 tons load)

p = number of days with at least 0.01 in of precip. (70 days)

a = Constant PM2.5 = 0.9
PM10 = 0.9
PM = 0.7

b = Constant PM2.5 = 0.45
PM10 = 0.45
PM = 0.45

Vehicle Dust Control 90% Surfactants, Millings, Watering

Trucks per Hour

Mineral Fill Trucks = 0.2 truck per hour average
Asphalt Cement Trucks = 0.8 truck per hour average
Aggregate Trucks = 12.6 truck per hour average

Trucks per Year

Mineral Fill Trucks = 500 truck per year
Asphalt Cement Trucks = 1933 truck per year
Aggregate Trucks = 31,400 truck per year

VMT =Vehicle Miles Traveled

Mineral Fill Trucks	Unpaved – 0.22206 miles per vehicle
Asphalt Cement Trucks	Unpaved – 0.22206 miles per vehicle
Aggregate Trucks	Unpaved – 0.22206 miles per vehicle

–

Miles Traveled

HMA Plant #5 Unpaved – 3.00516 miles per hour; 7,513 miles per year

Reduction in emissions due to precipitation was only accounted for in the annual emission rate. Particulate emission rate per vehicle mile traveled for each particle size category is:

Hourly Emission Rate Factor – 90% Control

PM = 0.71338 lbs/VMT
PM10 = 0.18181 lbs/VMT
PM2.5 = 0.01818 lbs/VMT

Annual Emission Rate Factor – 90% Control

PM = 0.57657 lbs/VMT
PM10 = 0.09548 lbs/VMT
PM2.5 = 0.00955 lbs/VMT

Table 6-31: Controlled Haul Road Fugitive Dust Emission Rates

Process Unit Description	Process Rate	PM Emission Rate (lbs/hr)	PM Emission Rate (tons/yr)	PM_{10} Emission Rate (lbs/hr)	PM_{10} Emission Rate (tons/yr)	$PM_{2.5}$ Emission Rate (lbs/hr)	$PM_{2.5}$ Emission Rate (tons/yr)
Mineral Filler Truck Emissions Paved	0.14232 miles/hr; 356 miles/yr	0.03024	0.03599	0.00605	0.00720	0.00148	0.00177
Asphalt Cement Truck Emissions Paved	0.55032 miles/hr; 1376 miles/yr	0.11693	0.13916	0.02339	0.02783	0.00574	0.00683
Asphalt Truck Emissions Paved	9.48824 miles/hr; 23721 miles/yr	2.01607	2.39927	0.40321	0.47985	0.09897	0.11778
Aggregate Truck Emissions Paved	4.99950 miles/hr; 12499 miles/yr	1.06230	1.26421	0.21246	0.25284	0.05215	0.06206
Mineral Filler Truck Emissions Paved	0.04441 miles/hr; 111 miles/yr	0.03168	0.03201	0.00807	0.00816	0.00081	0.00082
Asphalt Cement Truck Emissions Unpaved	0.17172 miles/hr; 429 miles/yr	0.12250	0.12376	0.03122	0.03154	0.00312	0.00315
Aggregate Truck Emissions Unpaved	2.78903 miles/hr; 6973 miles/yr	1.98964	2.01008	0.50709	0.51229	0.05071	0.05123
	Total	**5.37**	**6.00**	**1.19**	**1.32**	**0.21**	**0.24**

Drum Mix Hot Mix Asphalt Plant

Particulate emissions from the drum dryer/mixer (P5HMASTK) will be controlled with a baghouse dust collector (P5HMASTK) on the exhaust vent. This dust collector consists of filter bags and a fan that draws all the drum mixer exhaust through the dust collector. It is estimated that this method will control to an efficiency of 99.88 percent per AP42 Section 11.1, Table 11.1-3. Additional emission reductions include limiting annual production rates. No fugitive controls are proposed for unloading the drum dryer/mixer or asphalt silos (P5DRUMUL, P5SILOUL) with the exception of limiting annual production rates. No fugitive controls are proposed for yard emissions or asphalt storage tank emissions.

Drum mix hot mix asphalt plant controlled emissions were estimated using AP-42, Section 11.1 "Hot Mix Asphalt Plants" (revised 03/04), tables 11.1-3, -4, -7, -8 and -14 emission rates for all pollutants. The drum dryer will be permitted to combust natural gas. Hourly emission rates are based on maximum hourly asphalt production (300 tph) and annual emission rates are based on maximum annual asphalt production (750,000 tpy). PM (PM, PM_{10}, $PM_{2.5}$) emission rates were estimated using the controlled Total PM emission factor found in Table 11.1-3, Fabric Filter. PM_{10} and $PM_{2.5}$ emission rates were estimated using the controlled Total PM_{10} emission factor found in Table 11.1-3, Fabric Filter. Drum dryer/mixer unloading and silo filling emission factors were calculated using the default value of –0.5 for asphalt volatility and a tank temperature setting of 325˚ F for HMA mix temperature. Yard emissions were found in AP-42 Section 11.1.2.5. TOC emission equation is 0.0011 lbs/ton of asphalt produced and CO is equal to the TOC emission rate times 0.32.

Emissions of VOCs (TOCs) from the asphalt cement storage tank (P2HMAS) were determined with EPA's TANK 4.0.9d program and the procedures found in EPA's "Emission Factor Documentation for AP-42 Section 11.1 (12/2000) Section 4.4.5" for input to the TANK program.

AP-42 Section 11.1 Table 11.1-3, 7, 8, and 14 Controlled Emission Factors:

Process Unit	Pollutant	Emission Factor (lbs/ton)
Drum Mixer	NO_X	0.026
	CO	0.13
	SO_2	0.0034
	VOC	0.032
	TOC	0.044
	PM	0.033
	PM_{10}	0.023
	$PM_{2.5}$	0.023
Drum Unloading	CO	0.001179981
	TOC	0.012186685
	PM	0.000585889
	PM_{10}	0.000585889
	$PM_{2.5}$	0.000585889
Silo Loadout	CO	0.001349240
	TOC	0.004158948
	PM	0.000521937
	PM_{10}	0.000521937
	$PM_{2.5}$	0.000521937
Yard	CO	0.000352
	TOC	0.0011

The following equation was used to calculate the hourly emission rate for each process unit:

Emission Rate (lbs/hour) = Process Rate (tons/hour) * Emission Factor (lbs/ton)

The following equation was used to calculate the annual emission rate for each process unit:

$$\text{Emission Rate (tons/year)} = \frac{\text{Process Rate (tons/year)} * \text{Emission Factor (lbs/ton)}}{\text{2000 lbs/ton}}$$

Table 6-32: Controlled Hot Mix Plant Emission Rates

Process Unit Number	Process Unit Description	Pollutant	Average Hourly Process Rate (tons/hour)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P5HMASTK	Asphalt Drum Dryer/Mixer	NO_X	300	7.80	9.75
		CO	300	39.00	48.75
		SO_2	300	1.02	1.28
		VOC	300	9.60	12.00
		PM	300	9.90	12.38
		PM_{10}	300	6.90	8.63
		$PM_{2.5}$	300	6.90	8.63
P5DRUMUL	Drum Mixer Unloading	CO	300	0.35	0.44
		TOC	300	3.66	4.57
		PM	300	0.18	0.22
		PM_{10}	300	0.18	0.22
		$PM_{2.5}$	300	0.18	0.22
P5SILOUL	Asphalt Silo Unloading	CO	300	0.40	0.51
		TOC	300	1.25	1.56
		PM	300	0.16	0.20
		PM_{10}	300	0.16	0.20
		$PM_{2.5}$	300	0.16	0.20
P5HMAS	Asphalt Cement Storage Tanks	TOC	50,000 gallons	0.030	0.13
P5YARD	YARD	TOC	300	0.33	0.41
		CO	300	0.11	0.13

Natural Gas-Fired Asphalt Heater

One natural gas asphalt heater (P5HMAHT) heats the asphalt oil before it is mixed with the aggregate in the drum dryer/mixer. The unit is rated at 1,410,000 Btu/hr. The estimated hourly natural gas combusted is 1382.4 scf/hr. Emissions of nitrogen oxides (NO_X), carbon monoxides (CO), sulfur dioxide (SO_2), hydrocarbons (VOC) and particulate (PM) are estimated using either AP-42 Section 1.4 "Natural Gas Combustion" (7/98). Sulfur content of natural gas will not exceed 0.2 gr/100 scf. No controls are proposed for the fuel asphalt heater. Uncontrolled annual emissions in tons per year (tpy) were calculated assuming operation of 8760 hours per year. Controlled annual emissions in tons per year (tpy) were calculated assuming operation of 7680 hours per year.

AP-42 Emission Factors: Section 1.4

Natural Gas/ Propane Emission Factors

Pollutant	Emission Factor
Nitrogen Oxides	100 lbs/MMscf
Carbon Monoxides	84 lbs/MMscf
Particulate	7.6 lbs/MMscf
Hydrocarbons	5.5 lbs/MMscf
Sulfur Dioxides	0.2 gr/100 scf
Carbon Dioxide	120000 lbs/MMscf

The following equation was used to calculate the hourly emission rate for asphalt heater pollutant (NO_X, CO, VOC, PM):

Emission Rate (lbs/hr) = EF (lbs/MMscf) * fuel usage (MMscf/hr)

The following equation was used to calculate the hourly emission rate for asphalt heater pollutant (SO_2):

Emission Rate (lbs/hr) = Sulfer Content (gr/100 scf) * fuel usage (100 scf/hr) / 7000 gr/lb *2 S/SO_2

The following equation was used to calculate the annual emission rate for asphalt heater pollutant (NO_X, CO, VOC, PM):

$$\text{Emission Rate (tons/year)} = \frac{\text{Emission Rate (lbs/hour)} * \text{Operating Hour (hrs/year)}}{\text{2000 lbs/ton}}$$

Table 6-33: Pre-Controlled Combustion Emission Rates for Asphalt Heater

Process Unit Number	Pollutant	Fuel Usage (scf/hr)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P5HMAHT	NO_X	1382.4	0.14	0.61
	CO	1382.4	0.12	0.51
	VOC	1382.4	0.0076	0.033
	SO_2	1382.4	0.00079	0.0035
	PM	1382.4	0.011	0.046
	CO_2	1382.4	165.9	726.6

Table 6-34: Controlled Combustion Emission Rates for Asphalt Heater

Process Unit Number	Pollutant	Fuel Usage (scf/hr)	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
P5HMAHT	NO_X	1382.4	0.14	0.53
	CO	1382.4	0.12	0.45
	VOC	1382.4	0.0076	0.029
	SO_2	1382.4	0.00079	0.0030
	PM	1382.4	0.011	0.040
	CO_2	1382.4	165.9	637.0

Table 6-35 Summary of Uncontrolled NOx, CO, SO_2, and PM Emission Rates

Uncontrolled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
P5HMAP	Cold Aggregate Storage Pile									1.84	6.64	0.87	3.14	0.13	0.48
P5HMA BIN	Feed Bin Loading									1.84	6.64	0.87	3.14	0.13	0.48
P5HMA TP1	Feed Bin Unloading									0.83	3.65	0.31	1.3	0.047	0.21
P5HMAS CR	Scalping Screen									6.95	30.5	2.42	10.6	0.37	1.61
P5HMA TP2	Scalping Screen Unloading									0.83	3.65	0.31	1.34	0.047	0.21
P5HMAP UG	Pug Mill Load									0.85	3.71	0.31	1.36	0.048	0.21
P5HMA TP3	Pug Mill Unload									0.85	3.71	0.31	1.36	0.048	0.21
P5HMA TP4	Conveyor Transfer to Slinger Conveyor									0.85	3.71	0.31	1.36	0.048	0.21
P5HMAF IL	Mineral Filler Silo Baghouse									18.3	14.39	11.75	9.26	1.18	0.93
P5HMAS TK	Drum Dryer Baghouse	7.80	34.2	39.0	171	1.02	4.47	9.60	42.0	8400	36792	1950	8541	470	2056
P5DRU MUL	Drum Mixer Unloading			0.35	1.55			3.66	16.0	0.18	0.77	0.18	0.77	0.18	0.77
P5SILO UL	Asphalt Silo Unloading			0.40	1.77			1.25	5.46	0.16	0.69	0.16	0.69	0.16	0.69
P5HMA HT	Asphalt Heater	0.14	0.61	0.12	0.51	0.000 79	0.0035	0.0076	0.033	0.011	0.046	0.011	0.046	0.011	0.046
P5HMAS	Asphalt Cement Storage Tank							0.030	0.13						
P5TRCK	Haul Road Traffic									24.7	89.3	6.11	22.0	0.70	2.59
P5YARD	Yard			0.11	0.46			0.33	1.45						
	Total	**7.94**	**34.8**	**40.0**	**175.1**	**1.02**	**4.47**	**14.9**	**65.1**	**8458**	**36959**	**1974**	**8597**	**473**	**2065**

Table 6-36 Summary of Allowable NOx, CO, SO_2, and PM Emission Rates

Controlled Emission Totals															
		NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
Unit #	Description	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
P5HMAP	Cold Aggregate Storage Pile									1.84	1.90	0.87	0.90	0.13	0.14
P5HMA BIN	Feed Bin Loading									1.84	1.90	0.87	0.90	0.13	0.14
P5HMA TP1	Feed Bin Unloading									0.039	0.049	0.013	0.016	0.0036	0.0045
P5HMAS CR	Scalping Screen									0.61	0.76	0.21	0.26	0.014	0.017
P5HMA TP2	Scalping Screen Unloading									0.039	0.049	0.013	0.016	0.0036	0.0045
P5HMAP UG	Pug Mill Load									0.040	0.049	0.013	0.016	0.0037	0.0046
P5HMA TP3	Pug Mill Unload									0.040	0.049	0.013	0.016	0.0037	0.0046
P5HMA TP4	Conveyor Transfer to Slinger Conveyor									0.040	0.049	0.013	0.016	0.0037	0.0046
P5HMAF IL	Mineral Filler Silo Baghouse									0.18	0.041	0.12	0.026	0.029	0.0065
P5HMAS TK	Drum Dryer Baghouse	7.80	9.75	39.0	48.8	1.02	1.28	9.60	12.00	9.90	12.38	6.90	8.63	6.90	8.63
P5DRU MUL	Drum Mixer Unloading			0.35	0.44			3.66	4.57	0.18	0.22	0.18	0.22	0.18	0.22
P5SILO UL	Asphalt Silo Unloading			0.40	0.51			1.25	1.56	0.16	0.20	0.16	0.20	0.16	0.20
P5HMA HT	Asphalt Heater	0.14	0.53	0.12	0.45	0.000 79	0.0030	0.0076	0.029	0.011	0.040	0.011	0.040	0.011	0.040
P5HMAS	Asphalt Cement Storage Tank							0.030	0.13						
P5TRCK	Haul Road Traffic									5.37	6.00	1.19	1.32	0.21	0.24
P5YARD	Yard			0.11	0.13			0.33	0.41						
	Total	**7.94**	**10.28**	**40.0**	**50.3**	**1.02**	**1.28**	**14.9**	**18.7**	**20.3**	**23.7**	**10.6**	**12.6**	**7.78**	**9.64**

Estimates for State Toxic Air Pollutants (Asphalt Fumes)

The Hot Mix Asphalt Plant #5 (HMA) drum dryer/mixer, asphalt silo loading, asphalt silo unloading, yard emissions, and heated asphalt cement storage tank are sources of asphalt fumes listed in the NMED's 20.2.72 NMAC, 502 "Toxic Air Pollutants and Emissions", Table A. Emissions of asphalt fumes from the drum dryer/mixer are based on PM organic condensable emission factors found in AP-42 Section 11.1, Table 11.1-3 (0.012 pounds per ton x 300 tons/hr) from the drum dryer/mixer baghouse stack or 3.60 pounds per hour.

Emissions of asphalt fumes from the asphalt silo loading (P5DRUMUL), asphalt silo unloading (P5SILOUL), yard (asphalt transported in asphalt trucks-P5YARD), and hot oil asphalt storage tanks (P5HMAS) were based on the assumption that the emissions of concern from the silo filling, silo unloading, hot oil asphalt storage tanks, and yard asphalt fumes sources are the PAH HAPs plus other semi-volatile HAPs from the particulate (PM) organics and the volatile organic HAPs from the Total Organic Compounds (TOC). These two combined make up asphalt fume emissions from the silo filling, silo unloading, hot oil asphalt storage tanks, and yard sources. Using information found in AP-42 Section 11.1, Tables 11.1-14, 15, and 16 were reviewed and the following emission equations or emission factors were used to estimate asphalt fumes emissions from silo filling, silo unloading, hot oil asphalt storage tanks, and yard.

Drum Loadout
Asphalt Fumes $EF = 0.00036(-V)e^{((0.0251)(T+460)-20.43)}$

Silo Filling
Asphalt Fumes $EF = 0.00078(-V)e^{((0.0251)(T+460)-20.43)}$

Asphalt Storage Tanks
Asphalt Fumes EF = VOC emissions from TANKs * 1.3%

Yard
Asphalt Fumes EF = 0.0000165 lbs/ton of asphalt loaded

Silo filling and silo unloading emission factors were calculated using the default value of –0.5 for asphalt volatility and a tank temperature setting of 325˚ F for HMA mix temperature. Inputting these values in to the equations gives you a pound per ton value of 0.000189 lbs/ton and 0.000087 lbs/ton or asphalt fumes emission rates of 0.057 pounds/hour/0.071 tons/yr and 0.026 pounds per hour/0.033 tons/yr (300 tph of asphalt production).

Emissions of asphalt fumes from the Yard were based on 1.5 percent of the TOC emission. Yard emission factors are found in AP-42 Section 11.1.2.5. TOC emission factor is 0.0011 lbs/ton of asphalt produced. Asphalt fumes emissions are 0.0000165 lbs/ton of asphalt produced or 0.0050 pounds per hour and 0.0062 tons/yr (300 tph of asphalt production).

Emissions of asphalt fumes from the asphalt cement storage (2) tanks (P5HMAS) were determined with EPA's TANK 4.0.9d program and the procedures found in EPA's "Emission Factor Documentation for AP-42 Section 11.1 (12/2000) Section 4.4.5" for input to the TANK program. The annual VOC emissions for working and breathing losses from two 25,000 gallon tank were estimated at 266.76 pounds per year or 0.030 pounds per hour. Based on 1.3 percent of the VOC emissions (0.030 pounds per hour total from both tanks), the asphalt fumes emission rate is 0.00040 pounds per hour and 0.0017 tons/yr.

Total asphalt fumes from the Plant #5 HMA plant is 3.69 pounds per hour and 4.61 tons per year.

Estimates for State Toxic Air Pollutants (Calcium Hydroxide)

A potential mineral filler that will be used is lime (calcium hydroxide). Calcium hydroxide is listed in the NMED's 20.2.72 NMAC, 502 "Toxic Air Pollutants and Emissions", Table A. Controlled emissions of lime from the mineral filler silo during loading is 0.18 pounds per hour.

Estimates for Federal HAPs Air Pollutants

The Hot Mix Asphalt Plant (HMA) drum dryer (P5HMASTK) and asphalt heater (P5HMAHT) are sources of HAPs as it appears in Section 112 (b) of the 1990 CAAA. Emissions of HAPs were determined for the drum mixer using AP-42 Section 11.1 Tables 11.1-10, 11.1-12. Emissions of HAPs were determined for the asphalt heaters using AP-42 Section 1.4.

The following tables summarize the HAPs emission rates from the drum mixer and asphalt heater. Total combined HAPs emissions from AAI HMA Plant #5 is 1.61 pounds per hour and 2.02 tons per year.

Table 6-37: HAPs Emission Rates from the Drum Dryer/Mixer (P5HMASTK)

EPA HAPS Emissions Drum Mixer Hot Mix Asphalt Plant with Fabric Filter

Average Hourly Production Rate:	300	tons per hour
Yearly Production Rate:	750000	tons per year

Type of Fuel:	Natural Gas
Emission Factors	AP-42 Section 11.1 Tables 11.1-10, 11.1-11

Non-PAH HAPS	CAS#	Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Benzene	71-43-2	3.9E-04	0.117000	0.146250
Ethylbenzene	100-41-4	2.4E-04	0.072000	0.090000
Formaldehyde	50-00-0	3.1E-03	0.930000	1.162500
Hexane	110-54-3	9.2E-04	0.276000	0.345000
Isooctane	540-84-1	4.0E-05	0.012000	0.015000
Methyl chorlform	71-55-6	4.8E-05	0.014400	0.018000
Toluene	108-88-3	2.9E-03	0.045000	0.056250
Xylene	1330-20-7	2.0E-04	0.060000	0.075000
	Total Non-PAH HAPS	5.1E-03	1.526400	1.908000

PAH HAPS	CAS#	Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
2-Methylnaphthalene	91-57-6	7.4E-05	0.022200	0.027750
Acenaphthene	83-32-9	1.4E-06	0.000420	0.000525
Acenaphthylene	208-96-8	8.6E-06	0.002580	0.003225
Anthracene	120-12-7	2.2E-07	0.000066	0.000083
Benzo(a)anthracene	56-55-3	2.1E-07	0.000063	0.000079
Benzo(a)pyrene	50-32-8	9.8E-09	0.000003	0.000004
Benzo(b)fluoranthene	205-99-2	1.0E-07	0.000030	0.000038
Benzo(b)pyrene	192-97-2	1.1E-07	0.000033	0.000041
Benzo(g,h,I)perylene	191-24-2	4.0E-08	0.000012	0.000015
Benzo(k)fluoranthene	207-08-9	4.1E-08	0.000012	0.000015
Chrysene	218-01-9	1.8E-07	0.000054	0.000068
Fluoranthene	206-44-0	6.1E-07	0.000183	0.000229
Fluorene	86-73-7	3.8E-06	0.001140	0.001425
Indeno(1,2,3-cd)pyrene	193-39-5	7.0E-09	0.000002	0.000003
Naphthalene	91-20-3	9.0E-05	0.027000	0.033750
Perylene	198-55-0	8.8E-09	0.000003	0.000003
Phenanthrene	85-01-8	7.6E-06	0.002280	0.002850
Pyrene	129-00-0	5.4E-07	0.000162	0.000203
	Total PAH HAPS	1.9E-04	0.056243	0.070304

HAPS Metals		Emission Factor (lbs/ton)	Emission Rate (lbs/hr)	Emission Rate (ton/yr)
Arsenic		5.6E-07	0.000168	0.000210
Beryllium		0.0E+00	0.000000	0.000000
Cadmium		4.1E-07	0.000123	0.000154
Chromium		5.5E-06	0.001650	0.002063
Cobalt		2.6E-08	0.000008	0.000010
Hexavalent Chromium		4.5E-07	0.000135	0.000169
Lead		1.5E-05	0.000186	0.000233
Manganese		6.2E-07	0.002310	0.002888
Mercury		7.7E-06	0.000072	0.000090
Nickel		2.4E-07	0.018900	0.023625
Phosphorus		6.3E-05	0.008400	0.010500
Selenium		2.8E-05	0.000105	0.000131
	Total Metals HAPS	1.1E-04	0.032057	0.040071
	Total HAPS		**1.61**	**2.02**

Table 6-38: HAPs Emission Rates from the Asphalt Heater (P5HMAHT)

Btu Rating	1.41	mmBtu/hr	
Fuel Usage:	1382.4	scf/hr	(based on 1020 Btu/scf)
Btu x 10^-12/hr:	0.001382353	Btu x10^-12	
Yearly Operating Hours:	7680	hours per year	

Type of Fuel:	Natural Gas
Emission Factors	AP-42 Section 1.4

Organic Compounds	**CAS#**		**Emission Factor (lbs/MM scf)**	**Emission Rate (lbs/hr)**	**Emission Rate (ton/yr)**
Benzene	71-43-2		2.10E-03	0.000003	0.000011
Formaldehyde	50-00-0		7.50E-02	0.000104	0.000398
Hexane	110-54-3		1.80E+00	0.002488	0.009555
Naphthalene	91-20-3		6.10E-04	0.000001	0.000003
Toluene	108-88-3		3.40E-03	0.000005	0.000018
		Total Organic Compounds	1.88+00	0.002600	0.009985

HAPS Metals		**Emission Factor (lbs/MM scf)**	**Emission Rate (lbs/hr)**	**Emission Rate (ton/yr)**
Arsenic		2.00E-04	0.000000	0.000001
Beryllium		1.20E-05	0.000000	0.000000
Cadmium		1.10E-03	0.000002	0.000006
Chromium		1.40E-03	0.000002	0.000007
Lead		8.40E-05	0.000000	0.000000
Manganese		5.00E-04	0.000001	0.000003
Mercury		3.80E-04	0.000001	0.000002
Nickel		2.60E-04	0.000000	0.000001
Selenium		2.10E-03	0.000003	0.000011
	Total Metals HAPS	6.06E-03	0.000008	0.000032
	Total HAPS		**0.0026**	**0.010**

Table 6-39 Summary of Uncontrolled NOx, CO, SO_2, and PM Emission Rates for Whole Facility

Uncontrolled Emission Totals															
Unit #	Description	NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
		lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
	Plant #2 HMA	4.58	20.1	61.0	267.0	0.69	3.04	2.09	9.1	4834	21089	691	2978	44.9	192
	Plant #5 HMA	7.94	34.8	40.0	175.1	1.02	4.47	14.9	65.1	8458	36959	1974	8597	473	2065
	Crushing & Screening/Scalping Screen	3.20	7.02	2.44	5.35	0.0044	0.010	0.37	0.82	19.5	39.3	7.62	15.33	1.33	2.69
Total		**15.72**	**61.8**	**103.4**	**447.4**	**1.72**	**7.52**	**17.33**	**75.1**	**13311**	**58087**	**2673**	**11591**	**519**	**2259**

Table 6-40 Summary of Allowable NOx, CO, SO_2, and PM Emission Rates for Whole Facility

Controlled Emission Totals															
Description	NOx		CO		SO_2		VOC		PM		PM_{10}		$PM_{2.5}$	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
Plant #2 HMA	4.58	5.56	61.0	40.8	0.69	0.46	2.09	1.55	11.20	6.81	5.79	3.66	4.22	2.84
Plant #5 HMA	7.94	10.28	40.0	50.3	1.02	1.28	14.9	18.7	20.3	23.7	10.56	12.56	7.78	9.64
Crushing & Screening/Scalping Screen	3.20	5.85	2.44	4.46	0.0044	0.008	0.37	0.68	8.72	7.40	3.63	3.17	0.69	0.71
Total	**15.72**	**21.7**	**103.4**	**95.6**	**1.72**	**1.74**	**17.33**	**20.9**	**40.2**	**37.9**	**20.0**	**19.39**	**12.69**	**13.19**

Table 6-41 Summary of Allowable HAPS and Asphalt Fumes Emission Rates for Whole Facility

Controlled Emission Totals				
Description	HAPS		Asphalt Fumes (State TAPS)	
	lbs/hr	tons/yr	lbs/hr	tons/yr
Plant #2 HMA	1.17	0.79	2.57	1.63
Plant #5 HMA	1.61	2.03	3.69	4.61
Crushing & Screening/Scalping Screen	0.018	0.0025		
Total	**2.80**	**2.82**	**6.25**	**6.24**