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 Allowable 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.

Uncontrolled Particulate Emission Rates

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

Typical composition of one cubic yard of concrete produced at the Alto Concrete Batch Plant (CBP) will be:

Concrete Design Mix for One Cubic Yard

Materials	Weight Per Cubic Yard (in lbs)	Weights Per 125 Cubic Yards (in ton)
Cement	489	30.6
Fly Ash	132	8.3
Water	260	16.3
Coarse Aggregate(gravel)	1900	118.8
Fine Aggregate (sand)	1100	68.8
Total	3881	242.6

Hourly raw material throughputs used in material handling emission equations are based on the tons per hour throughput.

Aggregate/Sand = 187.5 tons/hour
Cement = 30.6 tons/hour
Fly Ash = 8.3 tons/hour

To estimate material handling uncontrolled particulate emission rates for aggregate handling operations (loading storage piles, loading feeder, loading the 4-bin aggregate feeder), 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 (1/1995), where the k is a constant (PM = 0.74, PM10 = 0.35, PM2.5 = 0.053). Input wind speed for maximum hourly emission rates is the NMED Default of 11 mph and input windspeed for the annual emission rates is the Ruidoso 1996 – 2006 wind speed of 8.3 mph. The moisture content for the aggregate of 1.77% and sand of 4.17% (AP-42 Section 11.12, Table 11.12-2, Footnote b). The weighted average moisture content for sand and aggregate is 2.65% ((1.77 * 118.8 + 4.17 * 68.8)/187.5). To estimate pre-control particulate emissions rates for aggregate handling transfer points (unloading of the feeder, loading and unloading the aggregate bin/weigh batcher), emission factors were obtained from AP-42 Section 11.19.2, Table 11.19.2-2, "Uncontrolled Conveyor Transfer Point". Uncontrolled PM2.5 emission rate is based on the PM2.5/PM10 k factor of 0.053/0.35 found in AP-42 Section 13.2.4 and PM10 emission factor of 0.00110 lbs/ton.

To estimate uncontrolled particulate emission rates for silo loading, cement/fly ash batcher loading operations, and concrete mixer truck loading, emission equations were 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. $PM_{2.5}$ emission factor for concrete mixer truck loading emissions were determined using the ratio of uncontrolled truck loading ratio Table 11.12-3 PM10 emission factor * PM2.5/PM10 (0.05/0.278). $PM_{2.5}$ emission factor for cement/fly ash batcher loading emissions were determined using the ratio of uncontrolled mixer loading ratio Table 11.12-4 PM10 emission factor * PM2.5/PM10 (0.38/1.92). $PM_{2.5}$ emission factor for cement silo emissions loading were determined using the ratio of uncontrolled mixer loading ratio Table 11.12-4 PM10 emission factor * PM2.5/PM10 (0.38/1.92). $PM_{2.5}$ emission factor for fly ash silo emissions loading were determined using the ratio of uncontrolled mixer loading ratio Table 11.12-4 PM10 emission factor * PM2.5/PM10 (0.38/1.92).

Maximum rated material throughput is 125 cubic yards per hour. Annual uncontrolled emissions in tons per year (tpy) were calculated assuming operation for 8760 hours per year.

EPA's AP-42, Section 13.2-4 (01/95)

Aggregate Handling Emission Equation – Hourly Emissions

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 $(11/5)^{1.3}$ / $(1.77/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(1.77/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(1.77/2)^{1.4}$

E_{PM} = 0.00783 lbs/ton; E_{PM10} = 0.00370 lbs/ton; $E_{PM2.5}$ = 0.00056 lbs/ton

Sand Handling Emission Equation – Hourly Emissions

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 $(11/5)^{1.3}$ / $(4.17/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(4.17/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(4.17/2)^{1.4}$

E_{PM} = 0.00236 lbs/ton; E_{PM10} = 0.00112 lbs/ton; $E_{PM2.5}$ = 0.00017 lbs/ton

Aggregate/Sand Handling Emission Equation – Hourly Emissions

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 $(11/5)^{1.3}$ / $(2.65/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2.65/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2.65/2)^{1.4}$

E_{PM} = 0.00445 lbs/ton; E_{PM10} = 0.00211 lbs/ton; $E_{PM2.5}$ = 0.00032 lbs/ton

Aggregate Handling Emission Equation – Annual Emissions

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 $(8.3/5)^{1.3}$ / $(1.77/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(8.3/5)^{1.3}$ / $(1.77/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(8.3/5)^{1.3}$ / $(1.77/2)^{1.4}$

E_{PM} = 0.00543 lbs/ton; E_{PM10} = 0.00257 lbs/ton; $E_{PM2.5}$ = 0.00039 lbs/ton

Sand Handling Emission Equation – Annual Emissions

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 $(8.3/5)^{1.3}$ / $(4.17/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(8.3/5)^{1.3}$ / $(4.17/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(8.3/5)^{1.3}$ / $(4.17/2)^{1.4}$

E_{PM} = 0.00164 lbs/ton; E_{PM10} = 0.00077 lbs/ton; $E_{PM2.5}$ = 0.00012 lbs/ton

Aggregate/Sand Handling Emission Equation – Annual Emissions

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 $(8.3/5)^{1.3}$ / $(2.65/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(8.3/5)^{1.3}$ / $(2.65/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(8.3/5)^{1.3}$ / $(2.65/2)^{1.4}$

E_{PM} = 0.00309 lbs/ton; E_{PM10} = 0.00146 lbs/ton; $E_{PM2.5}$ = 0.00022 lbs/ton

EPA's AP-42, Section 11.19.2 (08/04), Table 11.19.2-2

Conveyor Transfer Point Uncontrolled

E_{PM} (lbs/ton) = 0.003 lbs/ton; E_{PM10} (lbs/ton) = 0.0011 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.000167 lbs/ton

EPA's AP-42, Section 11.12 (06/06), Table 11.12-2

Cement Silo Loading Emission Factor

E_{PM} (lbs/ton) = 0.73 lbs/ton; E_{PM10} (lbs/ton) = 0.47 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.0930 lbs/ton

Fly Ash Silo Loading Emission Factor

E_{PM} (lbs/ton) = 3.14 lbs/ton; E_{PM10} (lbs/ton) = 1.10 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.2177 lbs/ton

Cement/Fly Ash Batcher Loading Emission Factor

E_{PM} (lbs/ton) = 0.572 lbs/ton; E_{PM10} (lbs/ton) = 0.156 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.0309 lbs/ton

Concrete Truck Loading Emission Factor

E_{PM} (lbs/ton) = 1.118 lbs/ton; E_{PM10} (lbs/ton) = 0.31 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.0558 lbs/ton

Uncontrolled Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM10 Emission Factor (lbs/ton)	PM2.5 Emission Factor (lbs/ton)
Aggregate Material Handling - Hourly	0.00783	0.00370	0. 00056
Sand Material Handling - Hourly	0.00236	0.00112	0. 00017
Aggregate/Sand Material Handling - Hourly	0.00445	0.00211	0.00032
Aggregate Material Handling - Annually	0.00543	0.00257	0. 00039
Sand Material Handling - Annually	0.00164	0.00077	0. 00012
Aggregate/Sand Material Handling - Annually	0.00309	0.00146	0.00022
Aggregate Transfer Points	0.0030	0.0011	0.000167
Cement Silo	0.73	0.47	0.0930
Fly Ash Silo	3.14	1.10	0.2177

Process Unit	PM Emission Factor (lbs/ton)	PM10 Emission Factor (lbs/ton)	PM2.5 Emission Factor (lbs/ton)
Cement/Fly Ash Batcher	0.572	0.156	0.0309
Truck Loading	1.118	0.31	0.0558

The following equations were 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 equations 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 Material Handling Particulate Emissions (PER)

Process Unit #	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)
2	Aggregate/Sand Feeder Loading	187.5 tph	0.83	3.66	0.39	1.73	0.060	0.26
3	Feed Hopper Conveyor	187.5 tph	0.56	2.46	0.21	0.90	0.031	0.14
4	4-Bin Aggregate Bin	187.5 tph	0.56	2.46	0.21	0.90	0.031	0.14
5,6	Aggregate Weigh Batcher and Conveyor	187.5 tph	0.56	2.46	0.21	0.90	0.031	0.14
7	Truck Loading	125 cuyd/hr	43.4	190.1	12.0	52.7	2.16	9.48
8	Cement/Fly Ash Batcher	125 cuyd/hr	22.2	97.2	6.05	26.5	1.20	5.25
9	Cement Split Silo	125 cuyd/hr	22.3	97.7	14.4	62.9	2.84	12.5
10	Fly Ash Split Silo	125 cuyd/hr	25.9	113.5	25.9	113.5	9.08	39.7
11	Aggregate/Sand Storage Piles	187.5 tph	1.09	4.78	0.52	2.26	0.078	0.34
		TOTALS	**117.4**	**514.3**	**59.9**	**262.3**	**15.5**	**67.9**

Road Traffic Uncontrolled (Unit 1)

Haul truck travel emissions were estimated using AP-42, Section 13.2.2 (ver.12/03) "Unpaved Roads" emission equation. Haul trucks will be used to deliver cement, fly ash, aggregate material, sand material, water, and transport concrete product.

AP-42 13.2 Unpaved Road (12/03)

Equation:

E = k(s/12)^a*(W/3)^b*[(365-p)/365] Annual emissions only include p factor

k PM	4.9	
k PM10	1.5	
k PM2.5	0.15	
a PM	0.7	
a PM10	0.9	
a PM2.5	0.9	
b PM	0.45	
b PM10	0.45	
b PM2.5	0.45	
% Silt Content = s	4.8 %	Sand and Gravel (AP-42 13.2.2-1)
precipitation days/yr	70 days	AP-42 Figure 13.2.2-1

Cement Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle
Flyash Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle
Aggregate Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle
Concrete Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle
Water Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle

Max. Cement Truck/hr	1.33 truck/hr	23 tons/load	30.56 tons/hr
Max. Flyash Truck/hr	0.36 truck/hr	23 tons/load	8.25 tons/hr
Max. Aggregate Truck/hr	8.15 truck/hr	23 tons/load	187.5 tons/hr
Max. Concrete Truck/hr	10.42 truck/hr	12 cuyd/load	125 cuyd/hr
Max. Water Truck/hr	0.97 truck/hr	4000 gallons/load	3896.9 gallons/hr
	21.2 truck/hr		
	127 truck/day @ 6 hour/day		

Max. Cement Truck/yr	531.5 truck/yr	23 tons/load	12225 tons/yr
Max. Flyash Truck/yr	143.5 truck/yr	23 tons/load	3300 tons/yr
Max. Aggregate Truck/yr	3260.9 truck/yr	23 tons/load	75000 tons/yr
Max. Concrete Truck/yr	4166.7 truck/yr	12 cuyd/load	50000 tons/yr
Max. Water Truck/yr	389.7 truck/yr	4000 gallons/load	1558753 gallons/yr
	8492.2 truck/yr		

Cement Truck VMT	0.27872 RT miles/hr	2441.55 miles/yr uncontrolled
Flyash Truck VMT	0.07524 RT miles/hr	659.07 miles/yr uncontrolled
Aggregate Truck VMT	1.70991 RT miles/hr	14978.85 miles/yr uncontrolled
Concrete Truck VMT	1.20763 RT miles/hr	10578.82 miles/yr uncontrolled
Water Truck VMT	0.20434 RT miles/hr	1790.04 miles/yr uncontrolled
	4.45310 RT miles/hr	39,009.15 miles/yr uncontrolled

Cement Truck weight	26.5 tons/average	15 (ton truck tare)
Flyash Truck weight	26.5 tons/average	15 (ton truck tare)
Aggregate Truck weight	26.5 tons/average	15 (ton truck tare)
Concrete Truck weight	25 tons/average	
Water Truck weight	23.3 tons/average	15 (ton truck tare)

		Uncontrolled	
		PM	
Max. Cement Truck Emissions		1.92 lbs/hr	8.40 tons/yr
Max. Flyash Truck Emissions		0.52 lbs/hr	2.27 tons/yr
Max. Aggregate Truck Emissions		11.76 lbs/hr	51.50 tons/yr
Max. Concrete Truck Emissions		14.64 lbs/hr	64.11 tons/yr
Max. Water Truck Emissions		1.33 lbs/hr	5.81 tons/yr
	total combined traffic	**30.16 lbs/hr**	**132.09 tons/yr**
		PM10	
Max. Cement Truck Emissions		0.49 lbs/hr	2.14 tons/yr
Max. Flyash Truck Emissions		0.13 lbs/hr	0.58 tons/yr
Max. Aggregate Truck Emissions		3.00 lbs/hr	13.13 tons/yr
Max. Concrete Truck Emissions		3.73 lbs/hr	16.34 tons/yr
Max. Water Truck Emissions		0.34 lbs/hr	1.48 tons/yr
	total combined traffic	**7.69 lbs/hr**	**33.66 tons/yr**
		PM2.5	
Max. Cement Truck Emissions		0.049 lbs/hr	0.21 tons/yr
Max. Flyash Truck Emissions		0.013 lbs/hr	0.058 tons/yr
Max. Aggregate Truck Emissions		0.30 lbs/hr	1.31 tons/yr
Max. Concrete Truck Emissions		0.37 lbs/hr	1.63 tons/yr
Max. Water Truck Emissions	0.034	0.15 lbs/hr	0.082 tons/yr
	total combined traffic	**0.77 lbs/hr**	**3.37 tons/yr**

Estimates for Controlled Material Handling Air Pollutants ($PM_{2.5}$, PM_{10}, and PM) (PTE)

No controls will be included for Units 1, 2, or 11 with the exception on limiting annual throughput. Fugitive dust emissions from material handling sources (Units 3, 4, 5, 6) will be controlled by adding water sprays at the exit of the aggregate/sand feed hopper (EPA AP-42 control efficiency of 95.82%).

To estimate material handling control particulate emission rates for aggregate handling operations (loading storage piles, and loading feed hopper), 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 (1/1995), where the k is a constant (PM = 0.74, PM10 = 0.35, PM2.5 = 0.053). Input wind speed for maximum hourly emission rates is the NMED Default of 11 mph and input windspeed for the annual emission rates is the Ruidoso 1996 – 2006 wind speed of 8.3 mph. The moisture content for the aggregate of 1.77% and sand of 4.17% (AP-42 Section 11.12, Table 11.12-2, Footnote b). The weighted average moisture content for sand and aggregate is 2.65% ((1.77 * 118.8 + 4.17 * 68.8)/187.5). To estimate particulate emissions rates for aggregate handling transfer points (unloading of the feeder, loading and unloading the aggregate bin/weigh batcher), emission factors were obtained from AP-42 Section 11.19.2, Table 11.19.2-2, "Conveyor Transfer Point Controlled". Additional reductions for annual emissions are found in limiting annual production.

To estimate control particulate emission rates for silo loading, cement/fly ash batcher loading operations, and concrete mixer truck loading, emission equations were 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 and multiplied by the percent control efficiency of the dust collector baghouse. The dust collector baghouses will control dust to a 99.9 percent efficiency. $PM_{2.5}$ emission rate for concrete mixer truck loading emissions were determined using the ratio of controlled truck loading ratio Table 11.12-3 PM10 lb/hr * PM2.5/PM10 (0.048/0.32). $PM_{2.5}$ emission rate for cement/fly ash batcher loading emissions were determined using the ratio of controlled mixer loading ratio Table 11.12-4 PM10 lbs/hr * PM2.5/PM10 (0.03/0.13). $PM_{2.5}$ emission rate for cement silo emissions loading were determined using the ratio of controlled mixer loading ratio Table 11.12-4 PM10 lbs/hr * PM2.5/PM10 (0.03/0.13). $PM_{2.5}$ emission rate for fly ash silo emissions loading were determined using the ratio of controlled mixer loading ratio Table 11.12-4 PM10 lbs/hr * PM2.5/PM10 (0.03/0.13).

Maximum rated material throughput is 125 cubic yards per hour. Annual emissions in tons per year (tpy) were calculated assuming operation of 50,000 cubic yards per year.

Aggregate Handling Emission Equation – Hourly Emissions

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 $(11/5)^{1.3}$ / $(1.77/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(1.77/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(1.77/2)^{1.4}$

E_{PM} = 0.00783 lbs/ton; E_{PM10} = 0.00370 lbs/ton; $E_{PM2.5}$ = 0.00056 lbs/ton

Sand Handling Emission Equation – Hourly Emissions

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 $(11/5)^{1.3}$ / $(4.17/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(4.17/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(4.17/2)^{1.4}$

E_{PM} = 0.00236 lbs/ton; E_{PM10} = 0.00112 lbs/ton; $E_{PM2.5}$ = 0.00017 lbs/ton

Aggregate/Sand Handling Emission Equation – Hourly Emissions

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 $(11/5)^{1.3}$ / $(2.65/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(11/5)^{1.3}$ / $(2.65/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(11/5)^{1.3}$ / $(2.65/2)^{1.4}$

E_{PM} = 0.00445 lbs/ton; E_{PM10} = 0.00211 lbs/ton; $E_{PM2.5}$ = 0.00032 lbs/ton

Aggregate Handling Emission Equation – Annual Emissions

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 $(8.3/5)^{1.3}$ / $(1.77/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(8.3/5)^{1.3}$ / $(1.77/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(8.3/5)^{1.3}$ / $(1.77/2)^{1.4}$

E_{PM} = 0.00543 lbs/ton; E_{PM10} = 0.00257 lbs/ton; $E_{PM2.5}$ = 0.00039 lbs/ton

Sand Handling Emission Equation – Annual Emissions

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 $(8.3/5)^{1.3}$ / $(4.17/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(8.3/5)^{1.3}$ / $(4.17/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(8.3/5)^{1.3}$ / $(4.17/2)^{1.4}$

E_{PM} = 0.00164 lbs/ton; E_{PM10} = 0.00077 lbs/ton; $E_{PM2.5}$ = 0.00012 lbs/ton

Aggregate/Sand Handling Emission Equation – Annual Emissions

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 $(8.3/5)^{1.3}$ / $(2.65/2)^{1.4}$

E_{PM10} (lbs/ton) = 0.35 x 0.0032 x $(8.3/5)^{1.3}$ / $(2.65/2)^{1.4}$

$E_{PM2.5}$ (lbs/ton) = 0.053 x 0.0032 x $(8.3/5)^{1.3}$ / $(2.65/2)^{1.4}$

E_{PM} = 0.00309 lbs/ton; E_{PM10} = 0.00146 lbs/ton; $E_{PM2.5}$ = 0.00022 lbs/ton

EPA's AP-42, Section 11.19.2 (08/04), Table 11.19.2-2

Conveyor Transfer Point Controlled

E_{PM} (lbs/ton) = 0.00014 lbs/ton; E_{PM10} (lbs/ton) = 0.000046 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.000013 lbs/ton

EPA's AP-42, Section 11.12 (06/06), Table 11.12-2

Cement Silo Loading Emission Factor

E_{PM} (lbs/ton) = 0.00073 lbs/ton; E_{PM10} (lbs/ton) = 0.00047 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.000108 lbs/ton

Fly Ash Silo Loading Emission Factor

E_{PM} (lbs/ton) = 0.00314 lbs/ton; E_{PM10} (lbs/ton) = 0.00110 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.0002177 lbs/ton

Cement/Fly Ash Batcher Loading Emission Factor

E_{PM} (lbs/ton) = 0.000572 lbs/ton; E_{PM10} (lbs/ton) = 0.000156 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.0000309 lbs/ton

Concrete Truck Loading Emission Factor

E_{PM} (lbs/ton) = 0.001118 lbs/ton; E_{PM10} (lbs/ton) = 0.00031 lbs/ton; $E_{PM2.5}$ (lbs/ton) = 0.0000558 lbs/ton

Controlled Emission Factors: Emission Factors:

Process Unit	PM Emission Factor (lbs/ton)	PM10 Emission Factor (lbs/ton)	PM2.5 Emission Factor (lbs/ton)
Aggregate Material Handling - Hourly	0.00783	0.00370	0. 00056
Sand Material Handling - Hourly	0.00236	0.00112	0. 00017
Aggregate/Sand Material Handling - Hourly	0.00445	0.00211	0.00032
Aggregate Material Handling - Annually	0.00543	0.00257	0. 00039
Sand Material Handling - Annually	0.00164	0.00077	0. 00012
Aggregate/Sand Material Handling - Annually	0.00309	0.00146	0.00022
Aggregate Transfer Points	0.00014	0.000046	0.000013
Cement Silo	0.00073	0.00047	0.0000930
Fly Ash Silo	0.00314	0.00110	0.0002177
Cement/Fly Ash Batcher	0.000572	0.000156	0.0000309
Truck Loading	0.001118	0.00031	0.0000558

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

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

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

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

Table 6-2: Controlled Material Handling Particulate Emission Rates

Process Unit #	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)
2	Aggregate/Sand Feeder Loading	187.5 tph, 75,000 tpy	0.83	0.12	0.39	0.055	0.060	0.0083
3	Feed Hopper Conveyor	187.5 tph, 75,000 tpy	0.026	0.0053	0.0086	0.0017	0.0024	0.00049
4	4-Bin Aggregate Bin	187.5 tph, 75,000 tpy	0.026	0.0053	0.0086	0.0017	0.0024	0.00049
5,6	Aggregate Weigh Batcher and Conveyor	187.5 tph, 75,000 tpy	0.026	0.0053	0.0086	0.0017	0.0024	0.00049
7,8	Truck Loading / Cement/Fly Ash Batcher Baghouse	125 cuyd/hr, 50,000 cuyd/yr	0.066	0.013	0.018	0.0036	0.0032	0.00060
9	Cement Split Silo Baghouse	125 cuyd/hr, 50,000 cuyd/yr	0.022	0.0045	0.014	0.0029	0.0033	0.00057
10	Fly Ash Split Silo Baghouse	125 cuyd/hr, 50,000 cuyd/yr	0.026	0.0052	0.0091	0.0018	0.0021	0.00036
11	Aggregate/Sand Storage Piles	187.5 tph, 75,000 tpy	1.09	0.15	0.52	0.072	0.078	0.011
TOTALS			**2.12**	**0.31**	**0.98**	**0.14**	**0.15**	**0.022**

Road Traffic Controlled (Unit 1)

Haul truck travel emissions were estimated using AP-42, Section 13.2.2 (ver.12/03) "Unpaved Roads" emission equation. Haul trucks will be used to deliver cement, fly ash, aggregate material, sand material, water, and transport concrete product. Control efficiency for paving and sweeping, per NMED policy, is 95%. Annual emission rates are reduced by limiting the annual production which limits the number of truck per year.

AP-42 13.2 Unpaved Road (12/03)

Equation:

E = k(s/12)^a*(W/3)^b*[(365-p)/365]*[1-(CE/100)] Annual emissions only include p factor

k PM	4.9		
k PM10	1.5		
k PM2.5	0.15		
a PM	0.7		
a PM10	0.9		
a PM2.5	0.9		
b PM	0.45		
b PM10	0.45		
b PM2.5	0.45		
% Silt Content = s	4.8 %	Sand and Gravel (AP-42 13.2.2-1)	
precipitation days/yr	70 days	AP-42 Figure 13.2.2-1	
Vehicle control (CE)	95 %	Paved and Sweep	

Cement Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle
Flyash Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle
Aggregate Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle
Concrete Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle
Water Truck VMT	337.49 RT meter/vehicle	0.20975 RT miles/vehicle

Max. Cement Truck/hr	1.33 truck/hr	23 tons/load	30.56 tons/hr
Max. Flyash Truck/hr	0.36 truck/hr	23 tons/load	8.25 tons/hr
Max. Aggregate Truck/hr	8.15 truck/hr	23 tons/load	187.5 tons/hr
Max. Concrete Truck/hr	10.42 truck/hr	12 cuyd/load	125 cuyd/hr
Max. Water Truck/hr	0.97 truck/hr	4000 gallons/load	3896.9 gallons/hr
	21.2 truck/hr		
	127 truck/day @ 6 hour/day		

Max. Cement Truck/yr	531.5 truck/yr	23 tons/load	12225 tons/yr
Max. Flyash Truck/yr	143.5 truck/yr	23 tons/load	3300 tons/yr
Max. Aggregate Truck/yr	3260.9 truck/yr	23 tons/load	75000 tons/yr
Max. Concrete Truck/yr	4166.7 truck/yr	12 cuyd/load	50000 tons/yr
Max. Water Truck/yr	389.7 truck/yr	4000 gallons/load	1558753 gallons/yr
	8492.2 truck/yr		

Cement Truck VMT	0.27872 RT miles/hr	111.49 miles/yr controlled	
Flyash Truck VMT	0.07524 RT miles/hr	30.09 miles/yr controlled	
Aggregate Truck VMT	1.70991 1.70991	683.97 miles/yr controlled	
Concrete Truck VMT	1.20763 2.18489	483.05 miles/yr controlled	
Water Truck VMT	0.20434 RT miles/hr	81.74 miles/yr controlled	
	4.45310 RT miles/hr	1781.24 miles/yr controlled	

Cement Truck weight	26.5 tons/average	15 (ton truck tare)
Flyash Truck weight	26.5 tons/average	15 (ton truck tare)
Aggregate Truck weight	26.5 tons/average	15 (ton truck tare)
Concrete Truck weight	25 tons/average	
Water Truck weight	23.3 tons/average	15 (ton truck tare)

	Controlled	
	PM	
Max. Cement Truck Emissions	0.096 lbs/hr	0.015 tons/yr
Max. Flyash Truck Emissions	0.026 lbs/hr	0.0042 tons/yr
Max. Aggregate Truck Emissions	0.59 lbs/hr	0.10 tons/yr
Max. Concrete Truck Emissions	0.73 lbs/hr	0.12 tons/yr
Max. Water Truck Emissions	0.066 lbs/hr	0.011 tons/yr
total combined traffic	**1.51 lbs/hr**	**0.24 tons/yr**
	PM10	
Max. Cement Truck Emissions	0.024 lbs/hr	0.0039 tons/yr
Max. Flyash Truck Emissions	0.0066 lbs/hr	0.0011 tons/yr
Max. Aggregate Truck Emissions	0.15 lbs/hr	0.024 tons/yr
Max. Concrete Truck Emissions	0.19 lbs/hr	0.030 tons/yr
Max. Water Truck Emissions	0.017 lbs/hr	0.0027 tons/yr
total combined traffic	**0.38 lbs/hr**	**0.062 tons/yr**
	PM2.5	
Max. Cement Truck Emissions	0.0024 lbs/hr	0.00039 tons/yr
Max. Flyash Truck Emissions	0.00066 lbs/hr	0.00011 tons/yr
Max. Aggregate Truck Emissions	0.015 lbs/hr	0.0024 tons/yr
Max. Concrete Truck Emissions	0.019 lbs/hr	0.0030 tons/yr
Max. Water Truck Emissions 0.0017	0.00027 lbs/hr	0.082 tons/yr
total combined traffic	**0.038 lbs/hr**	**0.0062 tons/yr**

Estimates for Hot Water Boiler (NO_X, CO, SO_2, VOC and PM) (Unit 12,13,14)

The hot water boiler keeps the water warm during cold periods. The facility will consist of three (3) instantaneous water heaters, each rated at 199,900 Btu/hr. The combined hot water boiler is approximately 0.6 MMBtu/hr. The hot water boiler will burn natural gas with total sulfur content less than 0.75 gr/100scf and will never burn coal, wood, or any grade of fuel oil. Emission factors for NO_X, CO, VOC, and PM were obtained from EPA's Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, Section 1.4 (7/98), Table 1.4-1, -2. Based on a boiler Btu rating of 0.6 million and a natural gas lower heat value of 945 Btu/scf, the approximately amount of natural gas burned per hour will be 634.9 scf/hr. Uncontrolled annual emissions were based on 8760 hours per year. Controlled annual emissions were based on 8760 hours per year.

AP-42 Section 1.4 Emission Factors:

Pollutant	Emission Factor ($lbs/10^6$ scf)
Nitrogen Oxides	100
Carbon Monoxides	84
Particulate	7.6
Hydrocarbons	11

Emission Rate (lbs/hr) = Emission Factor ($lbs/10^6$ scf) * Boiler Rating (10^6 Btu/hr)

Mass Balance

Pollutant	Sulfur Content	Fuel Usage
Sulfur Dioxide	0.75 grains/100 scf	634.9 scf/hr

Emission Rate (lbs/hr) = grains/100 scf * Fuel Usage (100 scf/hr) / 7000 grains/lb *2 S/SO_2

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

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

Table 6-3: Uncontrolled Combustion Emission Rates

Emission Unit Number	Pollutant	Thermal Rating (BTU_{max})	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
12, 13, 14	NO_X	600,000	0.063	0.28
	CO	600,000	0.053	0.23
	SO_2	600,000	0.00068	0.0030
	VOC	600,000	0.0070	0.031
	PM	600,000	0.0048	0.021

Table 6-4: Controlled Combustion Emission Rates

Emission Unit Number	Pollutant	Thermal Rating (BTU_{max})	Emission Rate (lbs/hr)	Emission Rate (tons/yr)
12, 13, 14	NO_X	600,000	0.063	0.28
	CO	600,000	0.053	0.23
	SO_2	600,000	0.00068	0.0030
	VOC	600,000	0.0070	0.031
	PM	600,000	0.0048	0.021

Table 6-5: PTE Emission Totals

ID #	Source Description	NOx		CO		SO2		VOC		PM		PM10		PM2.5	
		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
1	Haul Road									30.2	132.1	7.69	33.7	0.77	3.37
2	Feeder Hopper									0.83	3.66	0.39	1.73	0.060	0.26
3	Feed Hopper Conveyor									0.56	2.46	0.21	0.90	0.031	0.14
4	4-Bin Aggregate Bin									0.56	2.46	0.21	0.90	0.031	0.14
5,6	Aggregate Weigh Batcher and Conveyor									0.56	2.46	0.21	0.90	0.031	0.14
7	Truck Loading									43.4	190.1	12.0	52.7	2.16	9.48
8	Cement/Fly Ash Batcher									22.2	97.2	6.05	26.5	1.20	5.25
9	Cement Split Silo									22.3	97.7	14.4	62.9	2.84	12.5
10	Fly Ash Split Silo									25.9	113.5	25.9	113.5	9.08	39.7
11	Aggregate Storage Piles									1.09	4.78	0.52	2.26	0.078	0.34
12,13,14	Concrete Batch Plant Heater	0.063	0.28	0.053	0.23	0.00068	0.0030	0.0070	0.031	0.0048	0.021	0.0048	0.021	0.0048	0.021
	Total	**0.063**	**0.28**	**0.053**	**0.23**	**0.00068**	**0.0030**	**0.0070**	**0.031**	**148**	**646**	**68**	**296**	**16.3**	**71**

Table 6-6: PER Emission Totals

ID #	Source Description	NOx		CO		SO2		VOC		PM		PM10		PM2.5	
		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
1	Haul Road									1.51	0.24	0.38	0.062	0.038	0.0062
2	Feeder Hopper									0.83	0.12	0.39	0.055	0.060	0.0083
3	Feed Hopper Conveyor									0.026	0.0053	0.0086	0.0017	0.0024	0.00049
4	4-Bin Aggregate Bin									0.026	0.0053	0.0086	0.0017	0.0024	0.00049
5,6	Aggregate Weigh Batcher and Conveyor									0.026	0.0053	0.0086	0.0017	0.0024	0.00049
7,8	Truck Loading and Cement/Fly Ash Batcher									0.066	0.013	0.018	0.0036	0.0032	0.00060
9	Cement Split Silo									0.022	0.0045	0.014	0.0029	0.0033	0.00057
10	Fly Ash Split Silo									0.026	0.0052	0.0091	0.0018	0.0021	0.00036
11	Aggregate Storage Piles									1.09	0.15	0.52	0.072	0.078	0.011
12,13,14	Concrete Batch Plant Heater	0.063	0.28	0.053	0.23	0.00068	0.0030	0.0070	0.031	0.0048	0.021	0.0048	0.021	0.0048	0.021
	Total	**0.063**	**0.28**	**0.053**	**0.23**	**0.00068**	**0.0030**	**0.0070**	**0.031**	**3.63**	**0.57**	**1.37**	**0.22**	**0.20**	**0.049**

Table 6-7: HAPs Emission Rates from the Hot Water Heater (Units 12, 13, 14)

Btu Rating	0.6	mmBtu/hr	
Fuel Usage:	634.9	scf/hr	(based on 945 Btu/scf)
Btu x 10^-12/hr:	0.000634921	mmscf/hr	
Yearly Operating Hours:	8760	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	0.000001	0.000006
Formaldehyde	50-00-0	7.50E-02	0.000048	0.000209
Hexane	110-54-3	1.80E+00	0.001143	0.005006
Naphthalene	91-20-3	6.10E-04	0.000000	0.000002
Toluene	108-88-3	3.40E-03	0.000002	0.000009
	Total Organic Compounds	1.88+00	0.001194	0.005231

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	0.000001	0.000003
Chromium	1.40E-03	0.000001	0.000004
Cobalt	8.40E-05	0.000000	0.000000
Lead	5.00E-04	0.000000	0.000001
Manganese	3.80E-04	0.000000	0.000001
Mercury	2.60E-04	0.000000	0.000001
Nickel	2.10E-03	0.000001	0.000006
Selenium	2.40E-05	0.000000	0.000000
Total Metals HAPS	6.06E-03	0.000004	0.000017
Total HAPS		**0.001198**	**0.005248**